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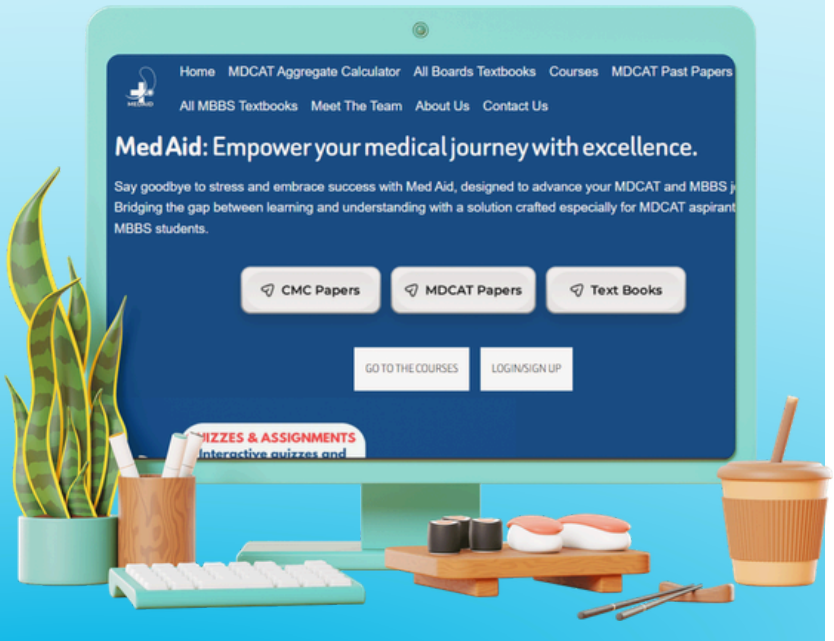

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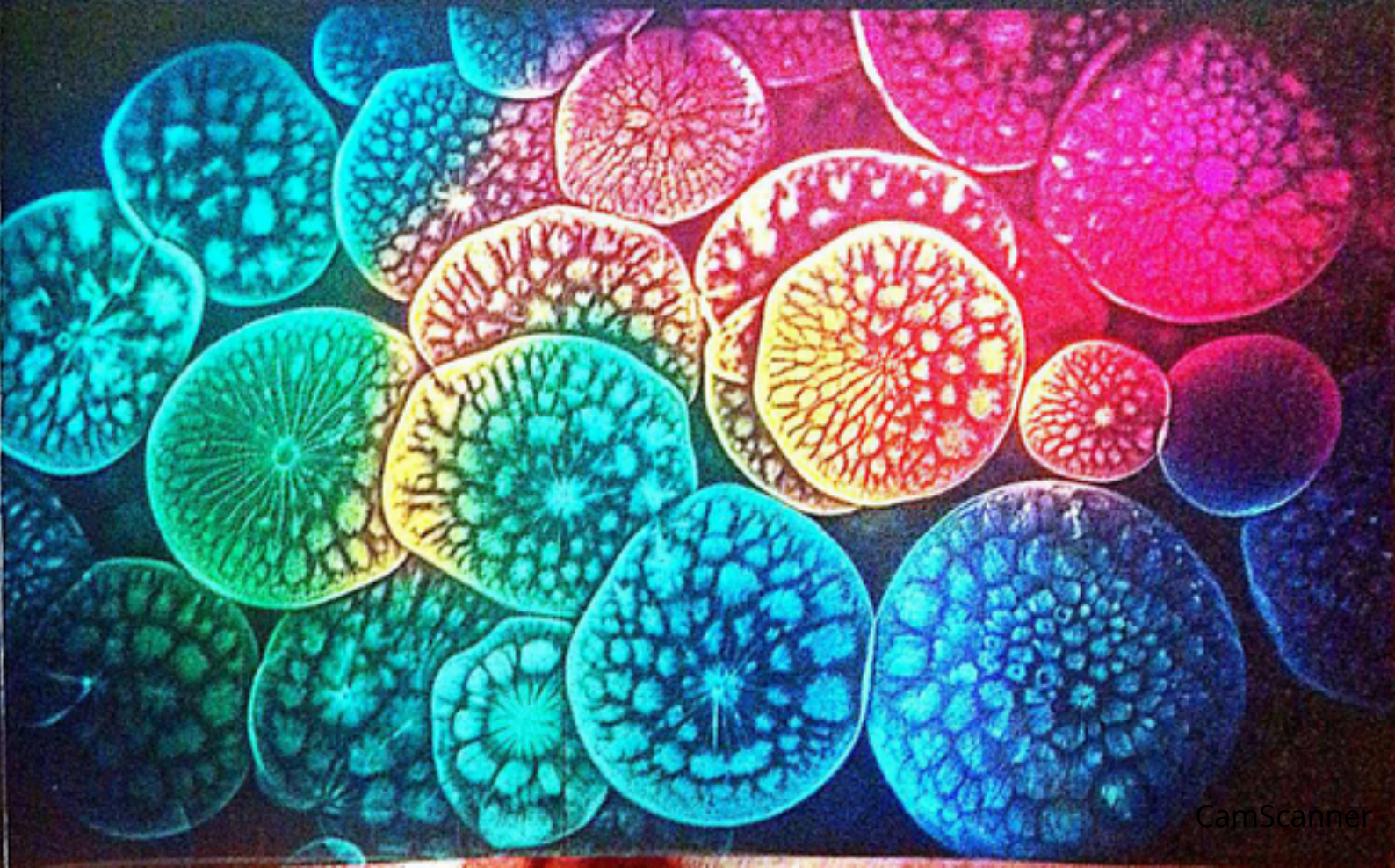

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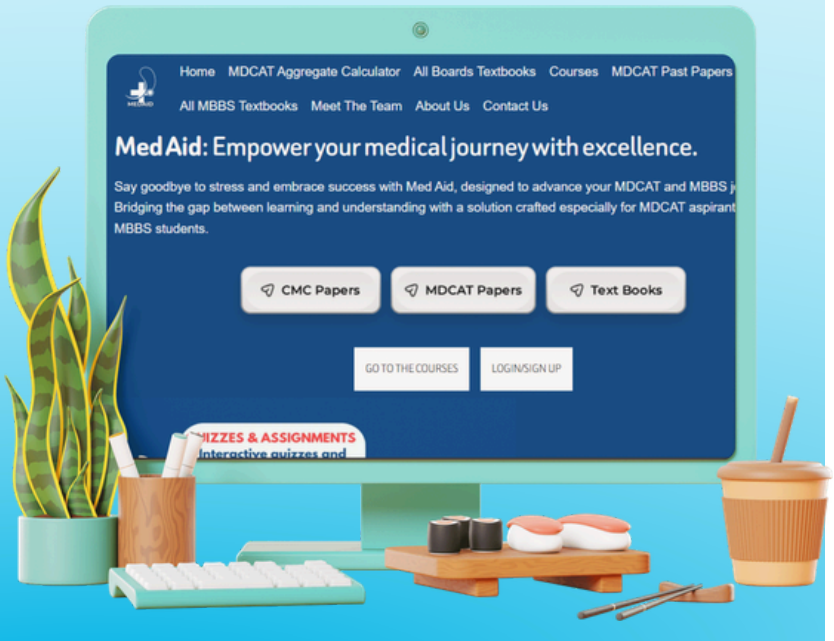

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TABLE OF CONTENTS

TOPIC NO.		PAGE NO.
0	Pre-Prep Test.....	i
1	Bio-Diversity (Acellular Life / variety of Life).....	1
2	Bioenergetics	19
3	Biological Molecules	41
4	Cell Structure and Function.....	69
5	Coordination & Control Nervous / Chemical Coordination.....	97
6	Diversity Among Animals	129
7	Enzymes	143
8	Evolution	159
9	Life processes in animals & plants (Nutrition / Gaseous Exchange / Transport).....	174
10	Prokaryotes.....	224
11	Reproduction.....	240
12	Support & Movement	260
13	Variation & Genetics / Inheritance	279

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KDP UNIT WISE SELF ASSESSMENT TEST

UNIT NO.		PAGE NO.
1	Cell Structure and Function	300
2	Biological Molecules & Enzymes	305
3	Bioenergetics	310
4	Bio-Diversity (Acellular Life / Variety of Life) + Prokaryotes.....	315
5	Diversity Among Animals	319
6	Life Processes in Animals & Plants (Nutrition & Gaseous Exchange)	323
7	Life Processes (Transport + Immunity)	327
8	Coordination & Control / Nervous & Chemical Coordination.....	331
9	Reproduction + Support and Movement	335
10	Variations & Genetics / Inheritance + Evolution	339
00	Post-Prep Test	343

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- **This Pre-Prep Test is designed to help you to pinpoint the weak areas in your background. Set aside 1 hour to take this test. Check your answers with those at the end of the test. Then evaluate yourself.**

PRE-PREP TEST

Q.1 The presence of which of the following feature would best indicate a eukaryotic cell?

A. DNA
B. Plasma membrane
C. Membrane bounded organelles
D. Ribosomes

Q.2 These are the most abundant components of a cell membrane:

A. Lipids
B. Carbohydrates
C. Proteins
D. Glycolipids

Q.3 How do membranes function as a locus of biochemical reactions?

A. Membranes lipids catalyze important cellular reactions
B. Membranes increase the activation energy for catalysis
C. Membrane hold enzymes of sequential reactions nearby
D. Membranes separate the reactants from the products of enzymatic reactions

Q.4 Which of the following cell have no mitochondria?

A. Viruses
B. Mature mammalian RBCs
C. Nerve cells
D. Muscle cell

Q.5 Among the following, identify a self-replicating organelle:

A. Mitochondria
B. Peroxisomes
C. Phagosomes
D. Golgi bodies

Q.6 Cisternae are made up of:

A. Glycoproteins
B. Lipoproteins
C. Glycolipids
D. Nucleoproteins

Q.7 Cellular digestion is associated with which organelle:

A. Mitochondria
B. Plastids
C. Golgi bodies
D. Lysosomes

Q.8 Storage of fats is the function of:

A. Elaioplast
B. Amyloplast
C. Aleuroplasts
D. Proteinoplast

Q.9 Hydrolysis of which of the following would yield fructose in addition to glucose?

A. Sucrose
B. Lactose
C. Maltose
D. Cellulose

Q.10 Variety among amino acids is produced due to:

A. NH_2 group
B. R-group
C. COOH group
D. α-carbon

Q.11 Which amino acid has no asymmetrical carbon atom?

A. Proline
B. Glycine
C. Histidine
D. Threonine

Q.12 The primary structure of proteins is determined by:

A. Number of polypeptide chains involved
B. Sequence of amino acids
C. Bending of polypeptide chains
D. Coiling of polypeptide chains

Q.13 It is not an example of globular protein:

A. Anti Rh-antibody
B. Myosin tail
C. Enzyme
D. Haemoglobin

Q.14 For enzymes cyanides act as:
A. Substrates
B. Cofactors
C. Prosthetic groups
D. Inhibitors

Q.15 Enzyme inhibition caused by a product of the enzyme-catalyzed reaction is:
A. Feedback inhibition
B. Metabolic antagonism
C. Competitive inhibition
D. Non-competitive inhibition

Q.16 It is a copper containing protein, involved in both non-cyclic and cyclic photophosphorylation:
A. Plastoquinone
B. Plastocyanin
C. Cytochrome 'b_6'
D. Ferredoxin

Q.17 Net production of ATP during glycolysis is:
A. 2 ATP
B. 4 ATP
C. 3 ATP
D. 40 ATP

Q.18 The end product of the preparatory phase of glycolysis is:
A. Glucose
B. ATP
C. Pyruvate
D. G3P

Q.19 The one which is present in all aerobic species:
A. Cytochrome a
B. Cytochrome a_3
C. Cytochrome c
D. Cytochrome b

Q.20 The phase of cellular respiration during which coenzyme Q is reduced by NADH is:
A. Glycolysis
B. Krebs cycle
C. Pyruvic acid oxidation
D. Electron transport chain

Q.21 All of the following are involved in cyclic photophosphorylation except:
A. Ferredoxin
B. Chemiosmosis
C. Plastocyanin
D. $NADP^+$ Reductase

Q.22 Which of the following provides protons within the chloroplast?
A. Water
B. Carbon dioxide
C. Excited chlorophyll molecules
D. RuBisCO

Q.23 Host biosynthetic machinery forms all of the following components of viruses under viral genomic instruction except:
A. Nucleic acid
B. Envelope
C. Tail proteins
D. Capsid proteins

Q.24 Transfer of genetic material from prokaryote to prokaryote via viruses is called:
A. Conjugation
B. Transformation
C. Transduction
D. Binary fission

Q.25 Which of these is incorrect about HIV?
A. Envelope is lipoprotein in nature
B. Cone-shaped capsid
C. Contains one molecule of RNA
D. Two molecules of reverse transcriptase

Q.26 All of the following characteristics are related to prokaryotes except:
A. Unicellular
B. Lack of membrane-bound organelle
C. Lack of a nucleus
D. They are placed in Kingdom Protista

Q.27 Which of following is not considered as basic shape of a bacterium?
A. Cocci
B. Filamentous
C. Spiral
D. Bacilli

Q.28 *Enterobius vermicularis* is usually not associated with:
A. Inflammation of appendix
B. Inflammation of colon
C. Itching of anus
D. Blood clotting

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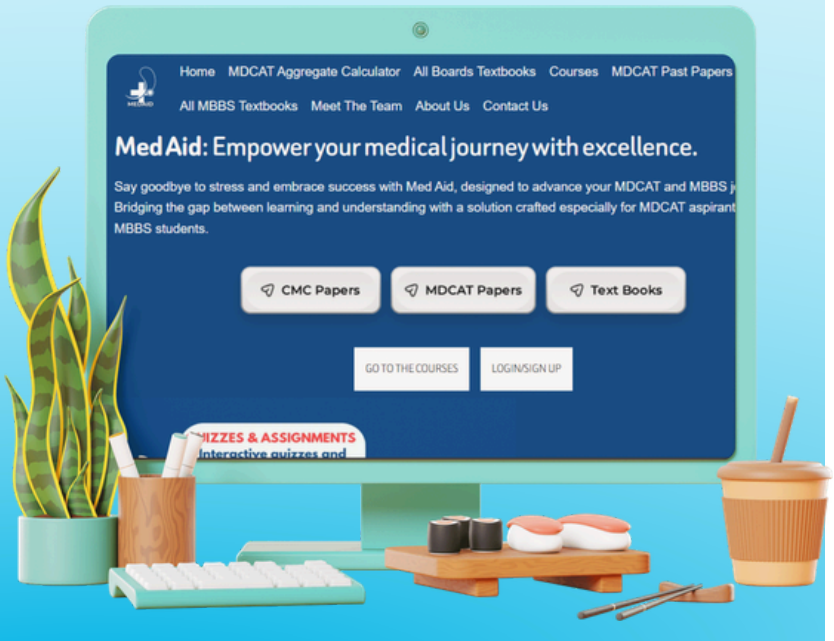

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Q.29 Pick out different considering habitat:

A. Liver fluke
B. Hookworm
C. Pinworm
D. *Ascaris*

Q.30 The member of which of the following phylum is triploblastic and acoelomate?

A. Porifera
B. Platyhelminthes
C. Aschelminthes
D. Annelida

Q.31 *Drosera intermedia* is generally known as:

A. Sun dew
B. Pitcher plant
C. Morels
D. Venus fly trap

Q.32 There are _____ principle sites of digestion in the digestive system of man:

A. 2
B. 4
C. 3
D. 5

Q.33 Oral cavity is bounded by all except:

A. Cheeks
B. Palate
C. Teeth
D. Salivary glands

Q.34 The pyloric sphincter is present between the stomach and _____.

A. Esophagus
B. Colon
C. Duodenum
D. Ileum

Q.35 Chylomicrons are concerned with the:

A. Digestion of fats
B. Digestion of protein
C. Absorption of proteins
D. Absorption of fats

Q.36 An enzyme that converts a dipeptide into individual amino acids is an example of:

A. Oxidoreductase
B. Isomerase
C. Hydrolase
D. Transferase

Q.37 Which one has the smallest diameter?

A. Right bronchus
B. Secondary bronchiole
C. Left bronchus
D. Respiratory bronchiole

Q.38 The largest quantity of air that can be expired after a maximum inspiratory effort is:

A. Residual volume
B. Vital capacity
C. Tidal volume
D. Total lung volume

Q.39 Oxygen binding to hemoglobin is:

A. Directly proportional to CO_2 concentration
B. Inversely proportional to CO_2 concentration
C. Directly proportional to CO concentration
D. Independent of CO concentration

Q.40 What is the function of a valve in human body?

A. To prevent blood from flowing into the aorta
B. To push blood into the ventricle
C. To push blood into the aorta
D. To prevent backflow of blood into the left ventricle

Q.41 How many papillary muscles are present in left ventricle?

A. 1
B. 3
C. 2
D. 4

Q.42 All of the following veins carry deoxygenated blood except:

A. Superior vena cava
B. Hepatic vein
C. Inferior vena cava
D. Pulmonary vein

Q.43 **At which cell layer, water movement through the apoplast pathway is restricted and is facilitated towards symplast pathway?**
A. Cortex
B. Pericycle
C. Epidermis
D. Endodermis

Q.44 **Translocation of food in flowering plants occurs in the form of**
A. Starch
B. Glyceraldehyde
C. Glucose
D. Sucrose

Q.45 **Which of these makes the third line of defense?**
A. Neutrophils
B. Macrophages
C. Skin
D. Lymphocytes

Q.46 **An antibody molecule consists of:**
A. One polypeptide chain
B. Two polypeptide chains
C. Three polypeptide chains
D. Four polypeptide chains

Q.47 **Which of the following part of the neuron is covered by fatty sheath?**
A. Axon
B. Cyton
C. Dendrite
D. Node of Ranvier

Q.48 **The spiny look of neurons is due to their:**
A. Myelin sheath
B. Axon
C. Dendron
D. Dendrites

Q.49 **All of the following are important functions of neuroglia in CNS except:**
A. Protection of neurons
B. Speed up impulse conduction
C. Neuronal division
D. Nutrition of neurons

Q.50 **Which of the following hormone stimulates the synthesis and secretion of steroid hormones called glucocorticoids from the adrenal cortex?**
A. TSH
B. LH
C. ACTH
D. FSH

Q.51 **Aldosterone causes all except:**
A. Reabsorption of electrolyte and water from the renal tubule
B. Excretion of PO_4^{-3}
C. Excretion of K^+
D. Absorption of K^+

Q.52 **The correct sequence of meninges from inner to the outer side is:**
A. Arachnoid mater → Dura mater → Pia mater
B. Dura mater → Arachnoid mater → Pia mater
C. Pia mater → Arachnoid mater → Dura mater
D. Dura mater → Pia mater → Arachnoid mater

Q.53 **In males, the essential hormone for secondary sexual characteristics is:**
A. Relaxin
B. Estrogen
C. Testosterone
D. Progesterone

Q.54 **The Graafian follicle is maintained by:**
A. Estrogen
B. Prolactin
C. LH
D. FSH

Q.55 **The one which causes contraction of the wall of the uterus during and after birth:**
A. ADH
B. Oxytocin
C. MSH
D. Progesterone

Q.56 **Uterus gains maximum thickness during:**
A. Secretory phase
B. Proliferative phase
C. Menstrual phase
D. Ovulatory phase

Q.57 **Oogenesis in human females starts:**
A. At puberty
B. Before puberty
C. Before birth
D. After puberty

Q.58 **Cartilage is a form of:**
A. Cardiac tissue
B. Connective tissue
C. Epithelial tissue
D. Nervous tissue

Q.59 **Elastin is a protein that can be found in:**
A. Bones
B. Ligaments
C. Tendons
D. Capillaries

Q.60 **Joint present between the proximal end of radius and ulna with humerus is:**
A. Pivot
B. Hinge joint
C. Ball and socket joint
D. Synovial joint

Q.61 **Which of the following blood group in humans is an example of co-dominance?**
A. A
B. B
C. AB
D. O

Q.62 **Multiple alleles are the alleles that are always:**
A. More than 1
B. More than 3
C. More than 2
D. More than 4

Q.63 **Albinism is a _____ trait.**
A. Autosomal dominant
B. Sex-linked dominant
C. Autosomal recessive
D. Sex-linked recessive

Q.64 **Which of the following traits pass in zig-zag fashion from parents to offspring?**
A. X-linked traits
B. Y-linked traits
C. Sex influenced traits
D. Sex limited traits

Q.65 **Gene for all of the followings is linked with autosomal chromosomes except:**
A. Sickle cell anemia
B. Gout
C. Leukemia
D. Hemophilia 'C'

Q.66 **Haemophilia can be the result of:**
A. Reduction of blood clotting factors
B. Malfunctioning of blood clotting factors
C. Complete absence of blood clotting factors
D. All A, B, C

Q.67 **The process that has transformed life on earth from its earliest forms to vast diversity is:**
A. Mutation
B. Evolution
C. Migration
D. Genetic drift

Q.68 **The structure which has been formed or modified from gill pouches in humans is:**
A. Gills
B. Middle ear
C. Eustachian tube
D. Lungs

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ANSWER KEY

1	C	11	B	21	D	31	A	41	C	51	D	61	C
2	C	12	B	22	A	32	C	42	D	52	C	62	C
3	C	13	B	23	B	33	D	43	D	53	C	63	C
4	B	14	D	24	C	34	C	44	D	54	D	64	A
5	A	15	A	25	C	35	D	45	D	55	B	65	B
6	B	16	B	26	D	36	C	46	D	56	A	66	D
7	D	17	A	27	B	37	D	47	A	57	C	67	B
8	A	18	D	28	D	38	B	48	D	58	B	68	C
9	A	19	C	29	A	39	B	49	C	59	B		
10	B	20	D	30	B	40	D	50	C	60	B		

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EXPLANATORY NOTES

1. DNA, plasma membrane and ribosomes are present in both prokaryotic and eukaryotic cells, while membrane bounded organelles are present in eukaryotic cells only.
2. Cell membrane is chemically composed of lipids and proteins; 60-80% are proteins, 20-40% are lipids. In addition, there is a small quantity of carbohydrates are also present in cell membrane.
3. Membranes function as a locus for biochemical reactions because of the presence of enzymes. The membrane bound enzymes are positioned in the mitochondria, and cell membrane etc. For example;
   - **NADH dehydrogenase:** This enzyme is accountable for the oxidation of NADH that is related to the electron transport systems of aerobes.
   - **Adenylate cyclase:** This is a type of plasma membrane-bound enzyme. In its activated form, it forms the cAMP.
4. Viruses are non-cellular infectious entities and lack organelles.
   - RBCs are responsible for delivering oxygen to the body via hemoglobin. As a result, they are designed to incorporate the hemoglobin in order to supply it, and hence they lack cell organelles such as the nucleus and mitochondria
   - Nerve and muscle cells need ATP/energy for their activities, which can be generated by the mitochondria.
5. Mitochondria and chloroplast are self-replicating organelles because both have their own DNA, due to which they can synthesize some of their proteins. They are produced only by growth and division of pre-existing mitochondria or chloroplasts. They cannot be formed de novo or from other organelles or pre-existing membranes.
6. A cisterna is a flattened membrane vesicle found in the endoplasmic reticulum and Golgi apparatus. Chemically, these are made up of lipoproteins.
7. Mitochondria involve in aerobic respiration.
   - Plastids are plants organelles that are involved in the synthesis of sugar, pollination and storage of organic materials.
   - Golgi bodies are involved in the packing, processing, modification, and transport of materials.

   Lysosomes are sac-like organelles that have digestive/hydrolytic enzymes which are involved in cellular digestion.
8. Different types of leucoplast are responsible for the storage of food. For example;
   - Elaioplasts store fats
   - Amyloplast store starch
   - Aleuroplast/proteinoplast store proteins.
9. Hydrolysis of;
   - Sucrose yields fructose and glucose.
   - Lactose yields galactose and glucose.
   - Maltose yields two glucose monomers.
   - Cellulose yields glucose monomers.

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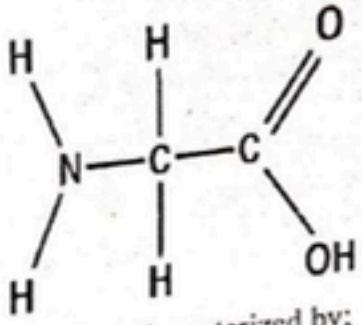
10. The differences in the R-group gives rise to different types of amino acids. Hence, each amino acid is unique due to the presence of R-group. The other three substituents i.e., carboxylic group, amino group and hydrogen remain the same in all the amino acids.

11. Glycine:



12. The primary structure of a proteins is characterized by;
- Number of amino acids in a protein molecule.
- Sequence of amino acids in a protein molecule.
- Type amino acids in a protein molecule.

13. Antibodies, enzymes and haemoglobin are globular proteins and play functional role in the cells. However, myosin tail is an example of fibrous protein.

14. For enzymes, cyanide has been recognized as an inhibitor of mitochondrial electron transport due to its binding to the heme of cytochrome oxidase. The shutdown of aerobic ATP generation is recognized as the primary mode of cyanide's cytotoxic action in eukaryotes.
- Prosthetic group is a type of cofactor, which is covalently bonded to the enzyme.

15.



16. Plastoquinone is an isoprenoid quinone molecule involved in the electron transport chain in the light-dependent reactions of photosynthesis.
- Cytochrome b_6 and ferredoxin are iron containing molecules.
- Plastocyanin is a copper containing protein that transfer electrons to PS-I.

17. Although four ATP molecules are produced in the oxidative phase, the net gain is only two ATP because two ATP molecules are used in the preparatory phase of glycolysis.

18. In the preparatory phase of glycolysis, two molecules of ATP are invested and the hexose sugar is cleaved into two triose phosphates. During this, phosphorylation of glucose and its conversion to glyceraldehyde 3-phosphate take place.

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19. The cytochrome 'c' is a small haeme containing protein, found loosely associated with the inner membrane of the mitochondrion where it plays a critical role in cellular respiration. It is found in all aerobic species.

20. Glycolysis, pyruvate oxidation and Krebs cycle are the phases of aerobic respiration where NADH are produced. These NADH molecules are oxidized by the coenzyme Q in the ETC.

21. When chloroplast runs low on ATP, photo-excited electrons take an alternative path from non-cyclic to cyclic electron flow until ATP supply meets demand. This does not involve $NADP^+$ reductase that is involved in non-cyclic electron flow.

22. The water molecules undergo photolysis to give protons. Excited chlorophyll molecules release electrons that move in non-cyclic phosphorylation. Rubisco is a protein involved in Calvin cycle.

23. Biosynthetic machinery of the host can be hijacked by the viruses for the synthesis of viral nucleic acids, capsomeres and tail proteins under the instructions from viral genome. However, the instructions of envelope come from the infected cell, in a process called 'budding off.' During the budding process, newly formed viral particles become 'wrapped' in an outer coat that is made from a small piece of the cell's plasma membrane.

24. Transduction is the process by which genetic material is transferred from one prokaryote to another via a virus (specifically a bacteriophage). In this process, a virus infects a bacterial cell, incorporates bacterial DNA, and then transfers that DNA to another bacterium when the virus infects it.

- A. Conjugation: This is the direct transfer of genetic material between two prokaryotic cells via a pilus.
- B. Transformation: This involves the uptake of free DNA from the environment by a prokaryotic cell.
- D. Binary fission: This is a method of asexual reproduction in prokaryotes where the cell divides into two identical daughter cells.

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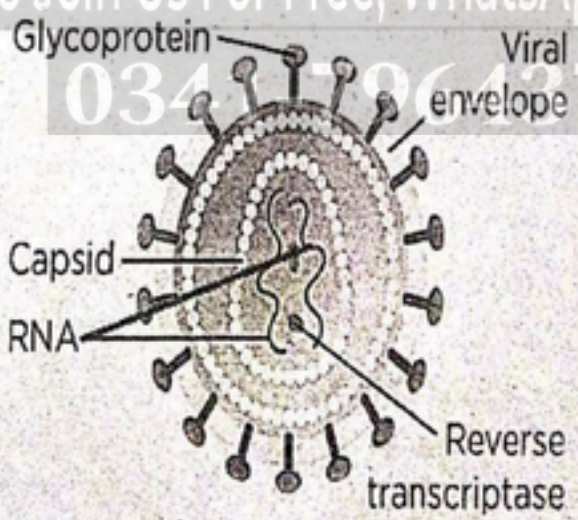
25.



26. Prokaryotes are characterized as the unicellular organisms whose genetic material is submerged in the cytoplasm. They also lack membrane bounded organelles and placed in Kingdom Monera.

27.



Bacili Cocci Spirilli

28. *Enterobius vermicularis* is the parasites in the human caecum, colon and appendix. Their movement causes intense itching of anus, inflammation of mucous membrane of colon appendix, resulting in insomnia and loss of appetite.

29. Hook worm, pin worm, and *Ascaris* are parasites of gut, while liver fluke is parasite of bile duct of liver an accessory digestive gland.

30. The members of phylum Porifera are asymmetrical and lacks a body cavity.
- The members of phylum Platyhelminthes are triploblastic and acoelomates.
- The members of phylum Aschelminthes are triploblastic and pseudocoelomates.
- The members of phylum Annelida are triploblastic and coelomates.

31. Sceintific names of carnivores plants are:
Sundew: *Drosera intermedia*
Pitcher plant: *Saracenia pupurea*
Venus fly trap: *Dionaea muscipula*
Morel **is a fungus.**

32. Proper and complete digestion requires both mechanical and chemical digestion and occurs in the;
- Oral cavity
- Stomach
- Small intestine

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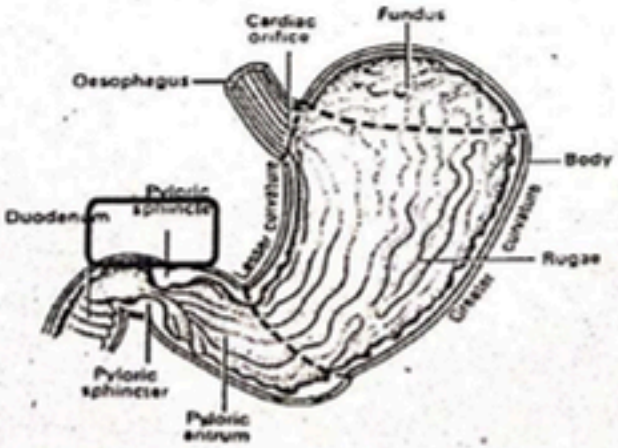
33. The oral cavity is bounded anteriorly by the lips, laterally by the cheeks, superiorly by the hard palate, and inferiorly by the mucosa covering the superior surface of the tongue and the sheet of muscles attaching to the inner side of the mandible.

34.

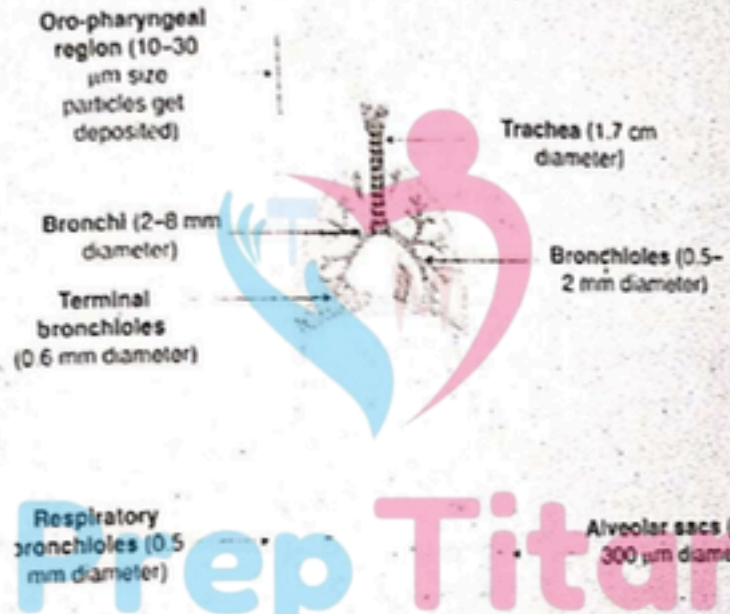


35. Chylomicrons are lipoprotein particles that consist of triglycerides, cholesterol, and proteins. They are concern with the transport of dietary lipids from the intestines to other locations in the body.

36. An oxidoreductase is an enzyme that catalyzes the transfer of electrons from one molecule to another.

- Isomerase bring about intra-molecular rearrangement of atoms in the molecules and thus forming isomers.
- Transferase catalyzes the transfer of a specific functional group, other than the hydrogen, from one molecule to another.
- Hydrolase catalyzes bond cleavages by adding water molecule. For example, erypsin converts a dipeptide molecule into individual amino acids.

37.



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38. Total lungs capacity is 5-6 liters.

- Vital capacity is the total amount of air exhaled after maximal inhalation. The value is about 4800ml, and it varies according to age and body size.
- Tidal volume is the volume of air moved into or out of the lungs during a normal breath. In a healthy, young human adult, tidal volume is approximately 500 ml per inspiration or 7 ml/kg of body mass.
- Residual volume is the volume remaining in the lungs after a normal, passive exhalation. In a normal individual, this is about 3L.

39. When PCO_2 increases, the oxygen tension decreases and oxygen holding capacity of hemoglobin becomes less. In this situation increases PCO_2 favour the greater liberation of O_2 from the blood to tissues.

40. The valves prevent the backward flow of blood. These valves are actual flaps that are located on each end of the two ventricles (lower chambers of the heart). They act as one-way inlets of blood on one side of a ventricle and one-way outlets of blood on the other side of a ventricle.

41. Bicuspid and tricuspid valves are present in left and right atrioventricular septa respectively. These valves are connected with papillary muscles through connective tissues called chordae tendineae. There are two papillary muscles in the left ventricle and three papillary muscles in the right ventricle.

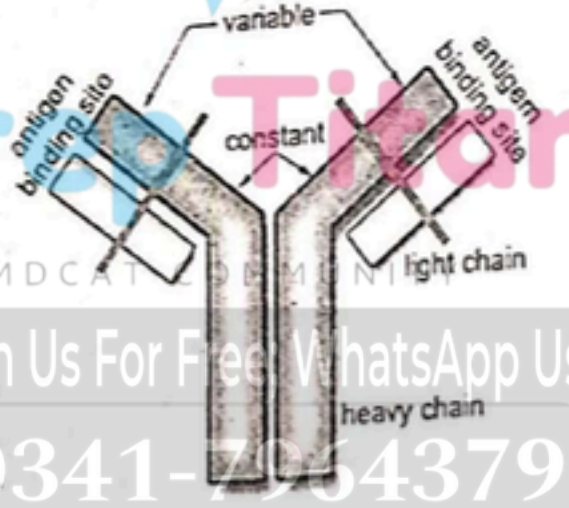
42. All the veins carry deoxygenated blood towards heart except the pulmonary and umbilical veins while all the arteries carry oxygenated blood away from heart except pulmonary and umbilical arteries.

43. In the apoplast pathway, water is transported from root hair to xylem through the cell wall of intervening cells. Apoplastic water movement beyond the cortex is blocked by the Casparian strip of endodermal cells. Hence, the symplastic route is utilized to deliver water and ions beyond the cortex.

44. Translocation of food:
- Translocation of food in the flowering plants occurs in the form of sucrose.
- It is transported by the vascular tissue phloem from a source (regions of excess carbohydrates, primarily mature leaves) to sinks (regions where the carbohydrate is needed).

45. Defense lines:
- Skin and mucous membrane of the digestive and respiratory tract are external barrier and said to be first line of defense while neutrophils and macrophages (phagocytic cells) provide second line of defense.
- Lymphocytes are associated with third line of defense and provide specific immune response in the body.

46.



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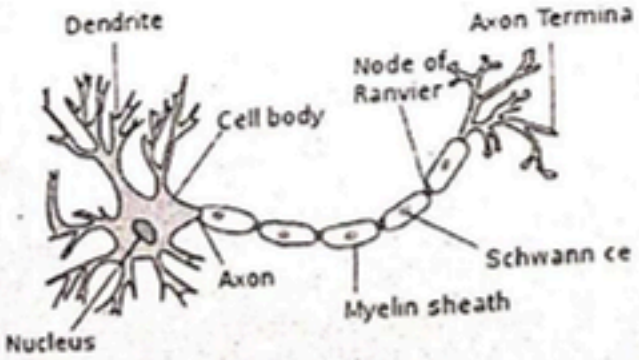

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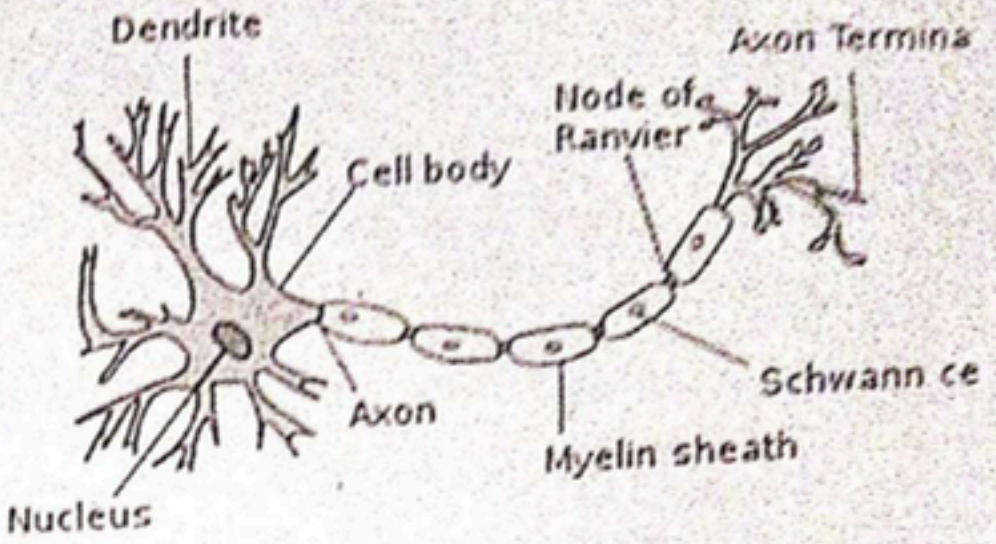

49. In the CNS, the neuroglial cells provide protection and nutrition to the neurons. These cells also help in the conduction of saltatory impulse conduction.

- These cells, however, do not help in neuronal division. The neurons once mature, do not divide any further. It is because the neurons lack centrioles.

50. Release of corticotrophin releasing factor (CRF) from the hypothalamus is controlled by steroid levels in the blood and by direct nervous stimulation of the hypothalamus as a result of stress.

- LH helps in ovulation and helps with the progesterone production needed to support pregnancy
- FSH helps control the menstrual cycle and the production of eggs by the ovaries
- TSH regulates the production of thyroxin

51. It plays a central role in the regulation of blood pressure mainly by acting on organs such as the kidney and the colon to increase the amount of salt (sodium) reabsorbed into the bloodstream and to increase the amount of potassium excreted in the urine.

- Both aldosterone and antidiuretic hormone (ADH) increase potassium loss into the urine.

52. The correct sequence of meninges from outer to the inner side is Dura mater, Arachnoid membrane and pia mater.

53. Testosterone is a sex hormone that plays important roles in the body. In men, it's thought to regulate sex drive, bone mass, fat distribution, muscle mass, strength, and the production of red blood cells and sperm.

- The main function of progesterone is to prepare the endometrium (lining of your uterus) for a fertilized egg to implant and grow
- Estrogen regulates the growth, development, and physiology of the human reproductive system both in males and females
- Relaxin is a reproductive hormone produced by ovaries and the placenta. It loosens and relaxes muscles, joints and ligaments during pregnancy to help body stretch.

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54. The Graafian follicle is the follicular stage after the first meiotic division but before ovulation. It therefore contains a 2N haploid oocyte. It is characterized by a large follicular antrum that makes up most of the follicle. FSH helps control the menstrual cycle and the production of eggs by the ovaries
- LH helps in ovulation and helps with the progesterone production needed to support pregnancy
- Estrogen regulates the growth, development, and physiology of the human reproductive system both in males and females
- Prolactin is primarily responsible for milk production and the development of mammary glands within breast tissues

55. **ADH**: Hormone retain concentration of water in kidney and it is released from posterior lobe of pituitary gland.
Oxytocin: Hormone released from posterior lobe of pituitary gland and causes distension of cervix during child birth.
MSH: Hormone released from middle lobe of pituitary gland causes dark spots on the skin as in Addison's disease.
Progesterone: Hormone released from ovaries that control birth.

56.



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57. Oogenesis begins before birth but is not finished until after puberty. A mature egg forms only if a secondary oocyte is fertilized by a sperm.
- Oogenesis begins long before birth when an oogonium with the diploid number of chromosomes undergoes mitosis.

58. Cartilage is a non-vascular type of supporting connective tissue that is found throughout the body. Cartilage is a flexible connective tissue that differs from bone in several ways; it is avascular and its microarchitecture is less organized than bone.
- Cardiac muscle tissue is a specialized, organized type of tissue that only exists in the heart. It is responsible for keeping the heart pumping and blood circulating around the body.
- Epithelial tissues form the covering of all body surfaces, line body cavities and hollow organs, and are the major tissue in glands.
- Nervous tissue is found in the brain, spinal cord, and nerves. It is responsible for coordinating and controlling many body activities

59. Ligaments are like cords made of connective tissue, elastic fibers that are somewhat stretchy, and collagen, a protein that binds tissues in animals.
- A tendon is composed of dense fibrous connective tissue made up primarily of collagenous fibers. Primary collagen fibers, which consist of bunches of collagen fibrils and are inelastic.
- Capillaries are just made up of one celled thick endothelial tissues.
- Bones contain ossien protein.

60.



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61. AB blood group can be the example of co-dominance as both allele for antigen A and B are share the equal dominance.
- The genotype of Blood group AB is IAIB
- The blood group genotype of "A" can be IAIA or IAi
- The blood group genotype of "B" can be IBIB or IBi

62. A gene can have two allelic forms if allelic forms are more than two than it is termed as multiple allele.
- Multiple alleles have a common origin

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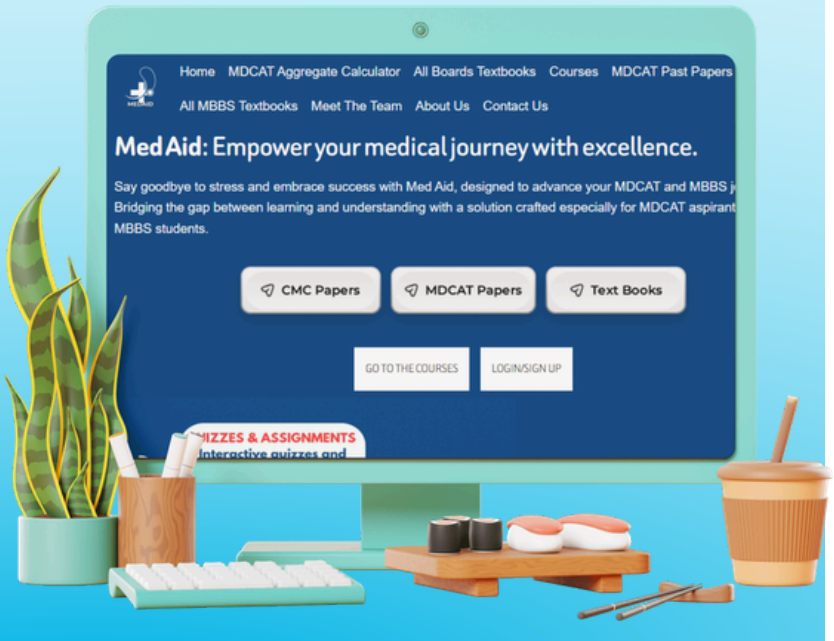

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63. Albinism is a rare genetic disorder where you aren't born with the usual amount of melanin pigment.
- Melanin is a chemical in your body that determines the color of your skin, hair and eyes.
- Most people with albinism have very pale skin, hair and eyes. They are prone to sunburn and skin cancer. Albinism is mostly an autosomal recessive disorder.

64. X-linked traits are transmitted in zigzag fashion (Grandfather to daughter to grandson) while Y-linked traits transmit direct from father to son.

65. Gene for colour blindness, haemophilia and gout form one linkage group on human X chromosome.
- Hemophilia C has autosomal recessive inheritance, since the gene for factor XI is located on chromosome 4
- Sickle cell anemia is caused by a mutation in the haemoglobin-Beta gene found on chromosome 11
- Chronic myeloid leukemia is caused by a rearrangement of genetic material between chromosome 9 and chromosome 22. ABL1 gene from chromosome 9 with part of the BCR gene from chromosome 22

66. Hemophilia is usually an inherited bleeding disorder in which the blood does not clot properly.
- This can lead to spontaneous bleeding as well as bleeding following injuries or surgery.

67. Evolution refers to the processes that have transformed life on earth from its earliest form to vast diversity that we observe today.
- Mutations are any changes in sequence of DNA
- Genetic drift is the change in frequency of an existing gene variant in the population due to random chance. Genetic drift may cause gene variants to disappear completely and thereby reduce genetic variation.

68. In fishes, gills pouches develop into gills while in other terrestrial vertebrates these embryonic structures become modified for other functions, such as eustachian tubes that connect the middle ear with the throat in humans.

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1 TOPIC

BIO-DIVERSITY (ACELLULAR LIFE/VARIETY OF LIFE)

PRACTICE EXERCISE

Q.1 The filterable agents were first purified in 1935, when Stanley was successful in crystallizing the _____.

A. Polio virus
B. Tobacco mosaic virus
C. Hepatitis virus
D. Influenza virus

Q.2 Tobacco mosaic virus was discovered by:

A. Stanley
B. Pasteur
C. Ivanowsky
D. D' Herelle

Q.3 Viruses cannot replicate in:

A. Blood plasma
B. Skin cells
C. A plant cell
D. Hepatocytes

Q.4 Members of which of the following group are all parasites?

A. Viruses
B. Fungi
C. Bacteria
D. Protozoa

Q.5 Volume of bacteriophage is about _____ of host.

A. 1/10
B. 1/100 times
C. 1/100
D. 1/1000

Q.6 It is not true for viruses:

A. Viruses contain either DNA or RNA
B. Viruses are acellular
C. Independent metabolic activities
D. Tiny and infectious agents

Q.7 Viruses cannot be grown on artificial culture media because they are:

A. Facultative parasites
B. Endoparasites
C. Obligate intracellular parasites
D. Ectoparasites

Q.8 The genome of which of the following is consists of double stranded DNA?

A. Poxvirus
B. Parvovirus
C. Reovirus
D. Togavirus

Q.9 TMV are:

A. Tadpole shaped
B. Rod shaped viruses
C. Polyhedral shaped
D. Spherical viruses

Q.10 Which of the following is composed of nucleic acids only?

A. Viruses
B. Virion
C. Viroids
D. Prions

Q.11 In prions, information is carried further through:

A. DNA
B. RNA
C. Proteins
D. Glycoproteins

Q.12 It is present in all the viruses:

A. DNA
B. RNA
C. Capsid
D. Envelop

Q.13 Which component is responsible for determination of shape of viruses is?

A. Type of nucleic acids
B. Capsid
C. Type of hosts
D. Viral envelope

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Q.14 Which of the following is not essential part of virus?
A. Nucleic acid
B. Capsid
C. Envelope
D. Genome

Q.15 A virion is a:
A. Virus
B. Capsid
C. Viral lysozyme
D. Viral gene

Q.16 _____ capsomeres are present in capsid of herpes virus.
A. 152
B. 162
C. 252
D. 262

Q.17 The genome of most of the animal viruses contain:
A. DNA
B. Protein
C. RNA
D. Both DNA and RNA

Q.18 Among followings, _____ enzyme is naturally found in human immunodeficiency virus.
A. DNA polymerase
B. Reverse transcriptase
C. RNA polymerase
D. Ligase

Q.19 In lytic cycle of bacteriophage, the phage is regarded as:
A. Master
B. Inducer
C. Guest
D. Slave

Q.20 The part of bacteriophage that enters into the host cell is:
A. Protein sheath
B. Genome
C. Protein coat
D. Tail

Q.21 The bacteriophage attaches itself by its tail to the cell wall of bacterium at:
A. Anywhere on the cell
B. Adhering surface
C. Receptor site
D. Binding site

Q.22 When a virus is in the lysogenic cycle, which of these will occur?
A. Viral DNA becomes incorporated into the host DNA
B. Host cell produces many new viruses before it breaks apart
C. The viral DNA replicates and it is separated by the cell's spindle apparatus
D. Antiviral defenses of the cell expel the viral DNA

Q.23 Enzyme that is present in a virus also:
A. Dehydrogenase
B. Urease
C. Lysozyme
D. Arginase

Q.24 Most commonly, lesions can be seen around mouth, lips and at other skin sites in:
A. Influenza
B. Polio
C. Mumps
D. Herpes

Q.25 Viral inflammation of parotid gland is commonly associated with:
A. Mumps
B. Small pox
C. Herpes simplex
D. Influenza

Q.26 All of the following are viral diseases except:
A. Influenza
B. Polio
C. Mumps
D. Tetanus

Q.27 Hepatitis A virus is:
A. ss-RNA
B. ds-RNA
C. ds-DNA
D. ss-DNA

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Q.28 **HAV is transmitted through:**
A. Blood B. Serum
C. Fecal-oral route D. Syringes

Q.29 **Virus that attacks on spinal cord is:**
A. Rabies B. HIV
C. HCV D. Poliovirus

Q.30 **Small pox is caused by pox virus which is:**
A. DNA Naked Virus B. RNA Enveloped Virus
C. RNA Naked Virus D. DNA Enveloped Virus

Q.31 **Mad cow disease is caused by:**
A. Viruses B. Virion
C. Viroid D. Prion

Q.32 **Hepatitis C is also known as:**
A. Infections Hepatitis B. Serum Hepatitis
C. Infusion Hepatitis D. Delta Hepatitis

Q.33 **Pigs are reservoir for:**
A. Hepatitis A B. Hepatitis B
C. Hepatitis C D. Hepatitis E

Q.34 **The enzyme involved in viral replication are synthesized only by the:**
A. Host cell B. Interior surface of viral membrane
C. Viral ribosomes D. Interior surface of viral coat

Q.35 **Virus that affects genital organs:**
A. HCV B. HSV
C. HIV D. Pox virus

Q.36 **Which of the following disease infection is caused by a viroid?**
A. AIDS B. Hepatitis B
C. Hepatitis C D. Hepatitis D

Q.37 **_____ is known to cause cancers in animals.**
A. Polio virus B. HBV
C. Retroviruses D. TMV

Q.38 **Retroviruses contain:**
A. Single stranded RNA B. Double stranded RNA
C. Single stranded DNA D. Double stranded DNA

Q.39 **Major cells that are infected by HIV are:**
A. Cytotoxic T-lymphocytes B. Helper T-lymphocytes
C. Plasma clone cells D. Suppressor T-lymphocytes

Q.40 **It acts as a template strand for the reverse transcriptase:**
A. Viral DNA molecule B. Host DNA molecule
C. Viral RNA molecule D. Host RNA molecule

Q.41 **The phenomenon of transcription in HIV life cycle occurs in:**
A. Nucleus B. Inside viral capsid
C. Cytoplasm D. None of these

Q.42 **Attachment of HIV DNA with host cell DNA is done via action of which enzyme:**
A. Integrase B. Reverse transcriptase
C. Protease D. Nuclease

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Q.43 HIV can be transmitted by all of the following sources except:
A. Intimate sexual contact
B. Contact with blood
C. Breast feeding
D. Saliva

Q.44 Uncoating of HIV virion occurs:
A. Outside the cell
B. In cytoplasm
C. In nucleus
D. At any place

Q.45 Protein of HIV that helps in its fusion with T cell:
A. gp31
B. gp120
C. gp141
D. gp41

Q.46 Common among all viruses during their infectious cycles:
A. DNA replication in cytoplasm
B. Translation in cytoplasm
C. Transcription in nucleus
D. Reverse transcription in cytoplasm

Q.47 Receptors proteins present on helper T-lymphocytes where an HIV particle binds:
A. CD4
B. CD8
C. CD2
D. CD1

Q.48 Viruses reproduce by:
A. Binary fission
B. Replication
C. Conjugation
D. Transduction

Q.49 Viruses are extremely small infectious agents, which can only be seen by:
A. Naked eye
B. Light microscope
C. Compound microscope
D. Electron microscope

Q.50 All are acellular infectious entities except:
A. Prions
B. Virions
C. Yeast
D. Virus

Q.51 Ultra violet rays specifically destroy _____ of viruses.
A. Coat
B. Genome
C. Envelope
D. Capsomeres

Q.52 All of the following are the symptoms of herpes except:
A. Itching in genital areas
B. Blisters on penis
C. Burning sensation during urination
D. Swollen lymph nodes

Q.53 A provirus may be referred to as:
A. Replicated viral genome
B. Integrated viral genome
C. Double stranded viral RNA
D. Single stranded viral RNA

Q.54 The rabies viruses were filtered for the first time by:
A. Pasteur
B. Twort
C. Stanely
D. Chamberland

Q.55 Which of the following is not used for classification of viruses?
A. Size
B. Nucleic acid
C. Method of replication
D. Mode of transmission

Q.56 Bacteriophages for their reproduction use the biosynthetic machinery of:
A. Their own
B. Plants
C. Bacteria
D. Animals

Q.57 It mediates fusion between HIV envelope and host cell membrane:
A. gp17
B. gp41
C. gp120
D. gp24

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1 TOPIC BIO-DIVERSITY (ACELLULAR LIFE/VARIETY OF LIFE)

PAST PAPER MCQ'S

Q.58 In 1935 W. M. Stanley prepared an extract of: (ETEA-2022)
A. Tobacco mosaic virus (TMV)
B. Human immunodeficiency virus (HIV)
C. Flu virus
D. Polio virus

Q.59 Virus is a Latin word meaning: (DUHS-2022)
A. Sweet
B. Sour
C. Poison
D. Acidic

Q.60 Cilia and flagella are absent in: (MDCAT-2017)
A. Viruses
B. Lower plants
C. Bacteria
D. Lower animals

Q.61 Virus can only survive and reproduce inside a: (NTS-2019)
A. Animal cells
B. Bacterial cells
C. Living cells
D. Non-living cells

Q.62 Which one can be considered as living characteristic of virus? (NUMS-2022)
A. Can be crystalized
B. No cellular respiration
C. Mutate their genetic material
D. Lack biosynthetic machinery

Q.63 Which one of the following is the characteristic of viruses? (ETEA-2022)
A. They are facultative parasites
B. Intracellular obligate parasites
C. Non-facultative parasites
D. All of these

Q.64 HIV is classified as: (MDCAT-2015)
A. Bacteriophage
B. Retrovirus
C. Oncovirus
D. Icosahedral virus

Q.65 The genome of influenza virus is made up of: (ETEA-2019)
A. Single stranded RNA
B. Double stranded DNA
C. Single stranded DNA
D. Double stranded RNA

Q.66 Which of the following virus contains single stranded DNA? (UHS-2022)
A. Adenovirus
B. Herpes virus
C. Parvovirus
D. Pox virus

Q.67 In viruses, a combined structure formed by core (Nucleic Acid) and capsid is: (MDCAT-2018)
A. Nucleocapsid
B. Capsomeres
C. Envelope
D. Prions

Q.68 Capsid, the protective coat of a virus is made up of subunits known as capsomeres that are _____ in nature. (MDCAT-2019)
A. Lipid
B. RNA
C. Protein
D. DNA

Q.69 Genome of virus is composed of: (NTS-2019)
A. DNA
B. RNA
C. Both A and B
D. Protein

Q.70 Which of the following is not related to enveloped virus? (PMC-2020)
A. They survive for a short time
B. They are tolerant to antibodies
C. Their envelop is sensitive to sunlight
D. Envelope is derived from host

Q.71 The complete mature and infection virus particle is known as: (PMC-2020)
A. Venom
B. Virion
C. Genome
D. Capsid

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Q.72 A virion is designated as: (BUMHS-2022)
A. Viral enzyme B. Viral genome
C. Complete virus D. Viral lysosome

Q.73 Poliovirus is an example of: (BUMHS-2022)
A. Spherical viruses B. Tadpole shaped viruses
C. Rod shaped viruses D. Helical shaped virus

Q.74 Which of the following is a DNA virus? (BUMHS-2022)
A. Polio virus B. Influenza virus
C. Herpes virus D. Mumps virus

Q.75 Which are called as naked viruses? (BUMHS-2022)
A. Non-enveloped viruses B. Enveloped viruses
C. Prions D. Viroids

Q.76 The bacteriophage replicates only inside the: (ETEA-2019)
A. Animal cell B. Bacterial cell
C. Fungal cell D. Both A & B

Q.77 What does the term bacteriophage refer to? (UHS-2022)
A. A virus that infects bacteria B. A bacterium that infects virus
C. A virus which behaves as bacteria D. Combination of bacterium and virion

Q.78 Polio vaccine is given by: (KMDC-2014)
A. Spray B. Tablets
C. Oral drops D. Local application

Q.79 Which of the following is the simplest forms of pathogens causing disease? (NTS-2018)
A. Viruses B. Prions
C. Fungus D. *Amoeba*

Q.80 Which is not a viral disease? (NTS-2018)
A. AIDS B. Malaria
C. Chicken pox D. Influenza

Q.81 The word hepatitis means inflammation of the: (ETEA-2022)
A. Pancreas B. Liver
C. Spleen D. Gall bladder

Q.82 Which one of the following pairs of disease is caused by virus? (ETEA-2022)
A. Syphilis and TB B. AIDS and Typhoid
C. Measles and Mumps D. Tetanus and Cholera

Q.83 Hepatitis is caused by: (DUHS-2022)
A. Protozoans B. Algae
C. Bacteria D. Virus

Q.84 Rabies is caused by: (DUHS-2022)
A. Paramyxovirus B. Rhinovirus
C. Arbovirus D. Rhabdovirus

Q.85 Which of the following cells does HIV mainly infect? (MDCAT-2014)
A. T-killer lymphocytes B. B-plasma cells
C. T-helper lymphocytes D. B-memory cells

Q.86 AIDS is caused by: (MDCAT-2016)
A. Bacteria B. Fungi
C. Virus D. Alga

Q.87 Which one is not an opportunistic disease related to HIV infection? (ETEA-2017)
A. Destruction of body immune system B. Recurrent pneumonia
C. Pulmonary tuberculosis D. Toxoplasmosis

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Q.88 The main target of HIV in AIDS is: **(AJK-2019)**
A. Liver cells
B. B-lymphocytes
C. Red blood cells
D. Helper T-lymphocytes

Q.89 Numerous opportunistic diseases might attack a person suffering from which of the following diseases: **(PMC-2020)**
A. Measles
B. Hepatitis A
C. Influenza
D. AIDS

Q.90 Which of the following is not true about human immunodeficiency virus? **(PMC-2020)**
A. It is a retrovirus
B. It is surrounded by an envelope
C. It does not cause AIDS
D. It causes deficiency of the human immune system

Q.91 The enzymes integrase, protease and reverse transcriptase are found in which virus? **(UHS-2022)**
A. Hepatitis 'A' virus
B. Herpes virus
C. Influenza virus
D. Human immunodeficiency virus

Q.92 Human immunodeficiency virus (HIV) particles are surround with a coat known as the virus envelop or membrane made up of: **(ETEA-2022)**
A. Glycoprotein
B. Glycolipid
C. Lipoprotein
D. Sulpholipid

Q.93 Which of the following is transmitted through infected blood and infected syringes? **(SZABMU-2022)**
A. HIV
B. Influenza virus
C. Morbili virus (Measles)
D. *Vibrio cholerae*

Q.94 In AIDS, 'D' stands for: **(DUHS-2022)**
A. Decompose
B. Difficult
C. Deficiency
D. Degenerate

Q.95 Which of the following virus contains single stranded DNA? **(UHS-2023)**
A. Adeno virus
B. Herpes virus
C. Parvo virus
D. Pox virus

Q.96 Which of the following is not related to enveloped virus? **(SZABMU-2023)**
A. They survive for a short time
B. Their envelope is sensitive to sun light
C. They are tolerant to antibodies
D. Envelop is derived from host

Q.97 The complete, mature and infectious virus particle is known as: **(NUMS-2023)**
A. Venome
B. Genome
C. Virion
D. Capsid

Q.98 All viruses are: **(NUMS-2023)**
A. Autotrophs
B. Heterotrophs
C. Parasites
D. Predators

Q.99 How many pieces of ribonucleic acid (RNA) make up the genome of influenza virus? **(ETEA-2023)**
A. 4
B. 6
C. 8
D. 10

Q.100 Which of the following agents can easily pass through the filter paper? **(ETEA-2023)**
A. Bacteria
B. Yeast
C. Fungi
D. Virus

Q.101 Viruses are not classified based on: **(ETEA-2023 Retake)**
A. Morphology
B. Host specificity
C. Cell membrane
D. Envelope

Q.102 Virus is what type of agent? **(UHS-2023)**
A. Cellular agent
B. Infectious agent
C. Non-infectious agent
D. Non-protein agent

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Q.103 Choose the entities which requires a single cellular gene to encode the protein making up the organism: (SZABMU-2023)
A. Viroid
B. Prions
C. Virus
D. Virion

Q.104 _____ infection is caused by a viroid: (SZABMU-2023)
A. Hepatitis A
B. Hepatitis D
C. Mad Cow disease
D. Mysterious brain infection

Q.105 The head of some phages are icosahedral, which means that the head possess: (ETEA-2023)
A. 6 sides
B. 10 sides
C. 15 sides
D. 20 sides

Q.106 The protein coat surrounding the genome of virus is called: (ETEA-2023 Retake)
A. Capsid
B. DNA sheath
C. Phage
D. Viroid

Q.107 _____ is transmitted through infected blood and hypodermic syringes: (SZABMU-2023)
A. HIV
B. Influenza Virus
C. Morbilli Virus (Measles)
D. Vibrio Cholerae (Cholera)

Q.108 HIV belongs to a special class of virus known as: (ETEA-2023)
A. Retrovirus
B. Flavivirus
C. Novavirus
D. Tetravirus

Q.109 The genome of the human immunodeficiency virus is made up of: (ETEA-2023 Retake)
A. cDNA
B. DNA
C. RNA
D. rRNA

Q.110 The molecules used to control virus during infection of animal cells are: (UHS-2023)
A. Interferon
B. Histone
C. Antigen
D. Serum

Q.111 The provirus of HIV is structurally and chemically made up of? (UHS-2023)
A. ssRNA
B. ssDNA
C. dsRNA
D. dsDNA

Q.112 Which of the following virus has a double stranded DNA genome? (NUMS-2024)
A. Rubella
B. Influenza
C. HIV
D. Small pox

Q.113 Example of viruses having a polyhedral capsid that is with 252 capsomeres is: (UHS-2024)
A. Adenovirus
B. Tobacco Mosaic Virus
C. Influenza virus
D. Bacteriophage

Q.114 The complete, mature & infectious particle of virus is known as: (UHS-2024)
A. Genome
B. Capsomere
C. Prion
D. Virion

Q.115 Antibioties can be used against: (KMU-2024)
A. Herpes simplex
B. Influenza
C. Polio
D. *Salmonella typhi*

Q.116 Which of the following is not true about viruses? (KMU-2024)
A. Contain DNA
B. Can replicate on their own
C. Can infect bacteria
D. They have a sub-cellular structure

Q.117 The genetic code of _____ is bound by a lipid membrane? (KMU-2024)
A. Enterovirus
B. Flu virus
C. Hepatitis A virus
D. Polio virus

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(KMU-2024)

Q.118 Viruses cannot:
A. Crystalize
B. Excrete
C. Infect bacteria
D. Mutate

(SZAMBU-2024)

Q.119 Who purified the filterable agents for the first time?
A. Charles Chamberland
B. Ivanovsky
C. Louis Pasteur
D. W. M. Stanley

(SZAMBU-2024-Reconduct)

Q.120 A virus recognizes its specific host organism by which characteristics?
A. Viral envelope
B. Viral genome
C. Host cytoplasm
D. Host genome

(UHS-2024)

Q.121 In the life cycle of a bacteriophage, the lysozymes are required in which of the following steps of infection process?
A. Genome injection
B. Penetration
C. Replication
D. Adsorption

(SZAMBU-2024)

Q.122 The side of sheath which is attached to head of bacteriophage is called:
A. Capsid
B. Collar
C. Core
D. End plate

(SZAMBU-2024)

Q.123 The lysozyme is involved in which step of the life cycle of bacteriophage?
A. Adsorption
B. Penetration
C. Attachment
D. Assembly

(UHS-2024)

Q.124 _____ is transmitted through infected blood and hypodermic syringes:
A. HIV
B. Influenza Virus
C. Morbilli Virus (Measles)
D. *Vibrio cholerae* (Cholera)

(KMU-2024)

Q.125 Where are the enzymes required for the replication of HIV virus located?
A. In the protein spikes
B. Surrounding the viral core
C. Inside the capsid
D. Outside the capsid

(UHS-2024)

Q.126 The causative organism of measles is:
A. Poxivirus
B. Paporivirus
C. Picornovirus
D. Paramyxovirus

(NUMS-2024)

Q.127 Corona virus is developed virus. Hand sanitizers and hand cleaners were recommended to avoid COVID epidemic. Which property of corona virus made these products effective?
A. pH sensitivity
B. Heat sensitivity
C. ss-RNA genome
D. Hypo-tonicity

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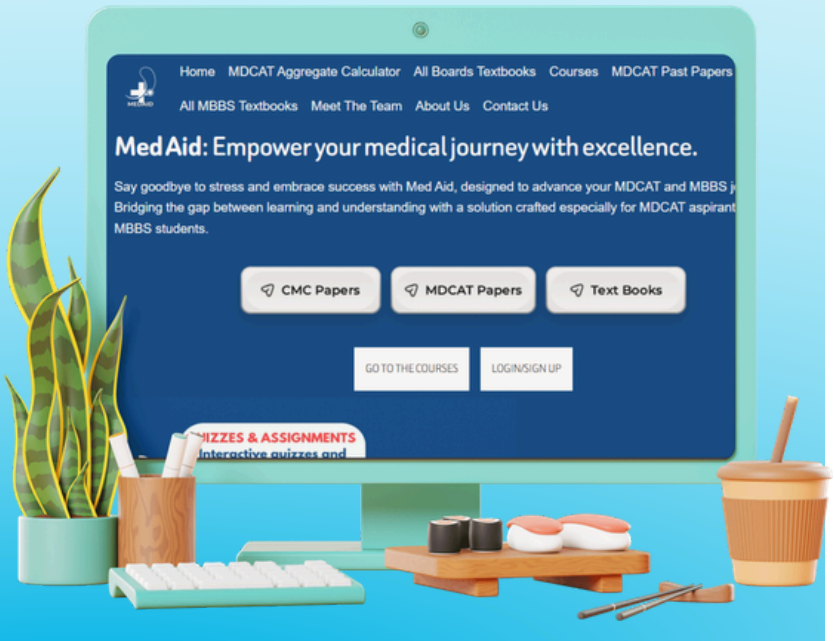

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ANSWER KEY

PRACTICE EXERCISE

1	B	11	C	21	C	31	D	41	A	51	B
2	C	12	C	22	A	32	C	42	A	52	D
3	A	13	B	23	C	33	D	43	D	53	B
4	A	14	C	24	D	34	A	44	B	54	D
5	D	15	A	25	A	35	B	45	D	55	D
6	C	16	B	26	D	36	D	46	B	56	C
7	C	17	C	27	A	37	C	47	A	57	B
8	A	18	B	28	C	38	A	48	B		
9	B	19	A	29	D	39	B	49	D		
10	A	20	B	30	D	40	C	50	C		

PAST PAPER MCQ'S

58	A	68	C	78	C	88	D	98	C	108	A	118	B
59	C	69	C	79	B	89	D	99	C	109	C	119	D
60	A	70	B	80	B	90	C	100	D	110	A	120	A
61	C	71	B	81	B	91	D	101	C	111	D	121	B
62	C	72	C	82	C	92	C	102	B	112	D	122	B
63	B	73	A	83	D	93	A	103	A	113	A	123	B
64	B	74	C	84	D	94	C	104	B	114	D	124	A
65	A	75	A	85	C	95	C	105	D	115	D	125	C
66	C	76	B	86	C	96	C	106	A	116	B	126	D
67	A	77	A	87	A	97	C	107	A	117	B	127	A

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EXPLANATORY NOTES

PRACTICE EXERCISE

1. Stanley was the first scientist who crystallized tobacco mosaic virus in 1935. Chemical analysis of these particles showed that they contained only nucleic acid and protein.
2. Ivanowsky was a Russian scientist who worked on tobacco mosaic virus. He ground diseased leaves of tobacco plants and filtered them using porcelain filter. He put this filtrate on healthy leaves and they got disease. This showed tobacco plants were not infected by bacteria but by viruses.
3. One of the most important features of viruses is that they can reproduce only in living cells, where they reproduce by replication. Therefore, viruses are said to be the obligate intra-cellular parasites. Blood without blood cells is blood plasma and it cannot provide machinery for viral replication.
4. All viruses are parasites while in other groups, some are parasites and some are beneficial.
5. Viruses are extremely small infectious agents. The volume of bacteriophage is typically about 1/1000 of its bacterial host.
6. Virus grows inside the host cells. They do not have their own metabolism. They are acellular, tiny infectious particles which have either DNA or RNA.
7. Viruses cannot be grown in artificial media because they lack metabolic machinery for the synthesis of their own nucleic acids and proteins. That's why they are referred as obligate intracellular parasites.
8. Viruses are classified on different basis such as capsid shape, types of hosts and genome. On basis of genome there are many categories of viruses such as:
   - Double stranded DNA (Poxvirus)
   - Single stranded DNA (Parvovirus)
   - Double stranded RNA (Reovirus)
   - Single stranded RNA (Togavirus)
9. Common shapes of viruses:
   - Polyhedral shape (Adenovirus)
   - Rod-like (TMV)
   - Tadpole (Lambda phages)
10. Viruses contain nucleic acid and capsids as components. Prions contain proteins only. Viroids are infectious agents that has nucleic acid (RNA) only.
11. Prions are proteins only. These are misfolded proteins. They have ability to transmit their misfolded shape onto normal proteins.
12. A capsid is the protein shell of a virus, enclosing its genetic material. It consists of several oligomeric (repeating) structural subunits made of protein called capsomeres.
13. Capsid gives definite shape to viruses. Proteins subunits called capsomeres form capsid. Different categories of viruses are present on basis of capsid shape.

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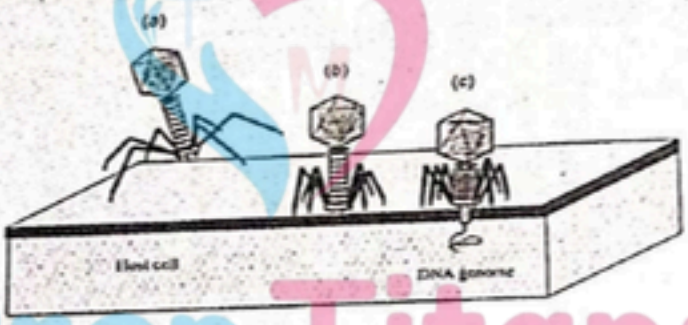
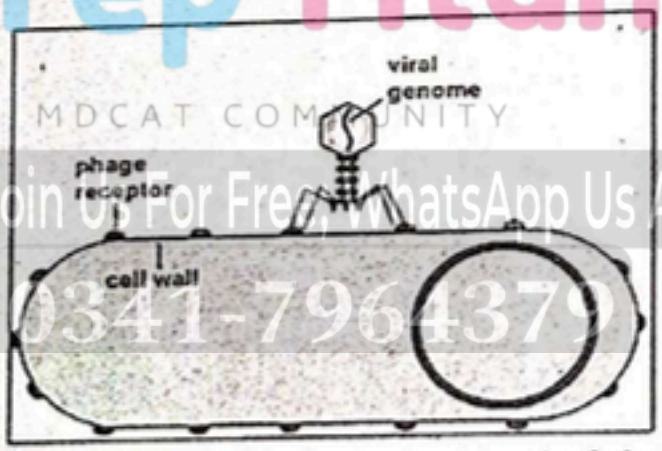
14. Viruses are made up of protein capsid and nucleic acid. There are some viruses that have an additional covering of host plasma membrane known as envelope. Envelope is derived from host plasma membrane; it is not essential part of virus.
15. Complete, mature and infectious particles are known as virion. Virion is consisted of central core of nucleic acid and capsid of protein sub-units.
16. Capsid of viruses is made up of protein subunits known as capsomeres. Number of capsomeres is characteristic of a particular virus i.e., herpes virus has 162 capsomeres and adenovirus has 252 capsomeres in their capsid.
17. Animal virus contains DNA or RNA as genetic material but mostly animal viruses are RNA viruses.
18. HIV particles are equipped with reverse transcriptase, integrase and proteases while DNA polymerase, RNA polymerase and ligase are absent in HIV.
19. In lytic cycle of life cycle of bacteriophage, the phage overtakes the host machinery and forms master slave relationship, while in lysogenic cycle virus form host guest relationship.
20. 

21. 

22. Lysogenic cycle is a form of viral reproduction involving the fusion of the nucleic acid of a bacteriophage with that of a host, followed by proliferation of the resulting prophage.
23. Bacteriophages contain lysozyme that is used to break cell wall of bacteria. All other enzymes which are mentioned in options are absent in viruses.
24. In oral herpes, blisters are usually formed at these sites. It is caused by herpes simplex virus type II. It is transmitted primarily through oral secretions or physical contact with lesions on the skin.

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25. Mumps is a contagious disease caused by a virus that spreads from person to person. Typical symptoms of mumps include swollen salivary glands and fever.
26. Tetanus is a bacterial disease caused by Clostridium tetani resulting in persistent painful spasms of skeletal muscles.
27. Viruses can be classifying on the bases of genome. HAV is a non-enveloped ss-RNA virus and is a member of the Picornaviridae family that causes acute liver infection.
28. The HAV spreads by the fecal–oral route, and infections often occur in conditions of poor sanitation and overcrowding.
29. During intestinal replication, the virus invades local lymphoid tissue and may enter the bloodstream, and then infect cells of the central nervous system. Poliovirus-induced destruction of motor neurons of the anterior horn of the spinal cord and brain stem cells results in distinctive paralysis.
30. Poxvirus is DNA enveloped virus, which caused epidemic in the past causing small pox, but now this disease, has been eradicated from the world. In small pox, raised fluid filled vesicles are formed on the body which become pustules later on and form pitted scars, the pocks.
31. Prions are infectious particles made up of only proteins containing information for replication and cause mad cow infection and mysterious brain infection in man.
32. Hepatitis C virus is RNA enveloped virus that causes infusion hepatitis. Hepatitis A is known as infectious hepatitis, while the common name of hepatitis B is serum hepatitis. Hepatitis D is referred as delta hepatitis.
33. Most recent work of Halbur and coworker reveals that pig could be the source of infection of hepatitis E.
34. Viruses are obligate intracellular parasites. They use host biosynthetic machinery for protein synthesis. They synthesize their enzymes from host cell.
35. Different viruses attack different parts of human body such as hepatitis virus affects liver and polio virus affects nervous system. There are two types of herpes simplex viruses. HSV-I affects lips and mouth parts and is called oral herpes. HSV-II damages genital organs and is called as genital herpes.
36. The only known human disease caused by a viroid is hepatitis D. These can cause several plant diseases, e.g., in potato, coconut, apple, peach, etc.
37. Several viruses cause cancer in animals known as oncoviruses. Like retroviruses.
38. Retroviruses differ from other viruses in that each virion contains two complete copies of the single-stranded RNA genome.
39. HIV attacks on specific type of immune cell in the body, known as T-helper cells. When HIV destroys these cells, then it becomes difficult for the body to fight against the infections.
40. HIV is equipped with reverse transcriptase along with the other essential enzymes. Reverse transcriptase is responsible for reverse transcription, during which viral genomic ss-RNA is converted into viral ds-DNA in the cytoplasm of the infected helper T-cells.
41. In HIV infected helper T-cells, the process of transcription occurs in nucleus while the process of reverse transcription occurs in cytoplasm.

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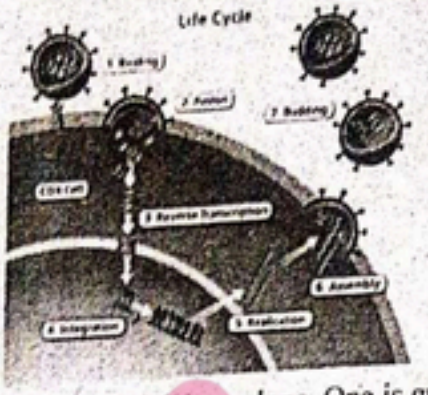
42. HIV genome integration is the insertion of HIV genetic material into the genome of the infected cell. This process is done with the help of integrase.

43. Modes of transmission of HIV are blood transfusion, sexual contacts and breast-feeding. Saliva is not the source of transmission of HIV.

44.



45. Different proteins are embedded in the HIV envelope. One is gp120 that is needed to attach to the host cell and other is gp41, which is critical for fusion process. Both are part of spikes of viral envelope.

46. Viruses attack target cells and use biosynthetic machinery (ribosomes: present in cytoplasm) of host for protein synthesis. DNA replication and transcription of different viruses take place in cytoplasm and nucleus of host cells.

47. CD means cluster of differentiation. There are many types of CD proteins such as CD4 and CD8 etc. attached to cell membrane of different types of T-cells. HIV attaches with CD4 that is part of T helper cell membrane.

48. Viruses are obligate intracellular parasite that use host biosynthetic machinery for their replication.

49. Viruses are extremely small and cannot be seen with a light microscope or the naked eye. An electron microscope is required to view them because it has much higher magnification and resolution power.

50. Yeast is a cellular organism, whereas prions, viruses, and Viroids are acellular.

51. Ultraviolet (UV) rays primarily damage the nucleic acid (genome) of viruses, which can prevent their replication by causing mutations or breaking down the viral genome.

52. Swollen lymph nodes are not typically a primary symptom of herpes, which often causes itching, blisters, and a burning sensation.

53. A provirus is viral DNA integrated into the host genome.

54. Charles Chamberland, in 1884, demonstrated that rabies viruses were filterable, using a porcelain filter.

55. While the mode of transmission can be important for understanding virus behavior, it is not typically a primary criterion for virus classification.

56. All viruses are dependent upon their host for reproduction and bacteriophages are those viruses which infect bacteria.

57. gp41 is responsible for the fusion of the HIV envelope with the host cell membrane.

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58. W.M Stanley (1935) crystallized the infectious particles, now known as tobacco mosaic virus. Subsequently many other viruses actually have been seen with help of the electron microscope.

59. The word virus is derived from Latin word venome meaning poisonous fluid. The word "virus" was generally referred as a poison associated with disease and death.

60. Viruses are infectious particles made up of protein coat known as capsid and genome either DNA or RNA. Both cilia and flagella are absent in viruses.

61. Viruses are obligate intracellular parasites. They only replicate in host cell.

62. Living characteristics of viruses are:
- They show different varieties and strains.
- They have their own genetic material in the form of either DNA or RNA that can undergo mutation.
- They reproduce using the metabolic machinery of the host cell they infect.

63. Viruses are obligate intracellular parasites means they require host cell to replicate and survive.

64. Retroviruses are RNA viruses. After infecting their host cells, the retrovirus uses an enzyme called reverse transcriptase to convert its genomic RNA into DNA. The retrovirus then integrates its viral DNA into the DNA of the host cell, which allows the retrovirus to replicate. One typical example of retrovirus is HIV.

65. Influenza is ss-RNA genome containing enveloped virus. Viruses can be classified on the bases of their genomes which may be ds-DNA, ds-RNA, ss-DNA and ss-RNA.

66. Viruses can be classified on the bases of their genomes
- Double stranded DNA (Adenovirus)
- Double stranded DNA (Herpes virus)
- Single stranded DNA (Parvovirus)
- Double stranded DNA (Pox virus)

67. All viruses contain two main components; genome of either DNA or RNA and a protein coat, called the capsid, which covers the genome. Together this is called the nucleocapsid. In addition, many animal viruses contain a lipid bilayer envelope. The entire intact virus is called the virion.

68. Chemically, a virion is made up of a core of genetic material, either DNA or RNA, surrounded by a protective coat called a capsid which is made up of protein.

69. The genome of a virus may consist of DNA or RNA, which may be single stranded or double stranded, linear or circular. The entire genome may occupy either one nucleic acid molecule or several nucleic acid segments.

70. Enveloped viruses are sensitive to environmental factors like sunlight and survive for a short time outside the host. Their envelope is derived from the host cell membrane, making them more susceptible to immune responses. They are not tolerant to antibodies, which can neutralize them.

71.

Virion	Prions	Virojds
Complete, mature and infectious particles.	Chemically, these are composed of misfolded or infectious proteins.	Made up of only small, circular ssRNA molecules.

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72. Complete infectious particle is referred as virion. It can be divided into two parts i.e., core and coat.

73. Common shapes of viruses:
- Spherical (Polio virus)
- Rod-like (TMV)
- Tadpole (Lambda phages)

74. Viruses can be classified on the bases of their genomes
- Single stranded RNA (Polio)
- Single stranded RNA (Influenzas virus)
- Double stranded DNA (Herpes virus)
- Single stranded RNA (Mumps virus)

75. Some viruses have an additional lipoprotein envelope around the capsid which is derived from the cell surface membrane of the host and contains virally encoded proteins.

76. A bacteriophage also known informally as a phage, is a virus that infects and replicates within bacterial cell.

77. The bacteriophage or simple phage is the virus that attacks upon bacteria. It is generally tadpole shaped virus. It consists of head, neck and tail.
- Head is icosahedral in shape and its inner core contains single stranded DNA.
- Below the head is neck or collar which separates head and tail.
- Tail is a hollow tube made up of protein.

78. Live vaccine of polio given orally, while killed vaccines given by injection.

79. Prions are simplest form of pathogens because they are only proteins structurally. Viruses are nucleoproteins. Fungi is multicellular and eukaryotic organisms. Amoeba is eukaryotic and unicellular organism.

80. Malaria is caused by Plasmodium which is animals like protists (protozoans).

81. Hepatitis is an inflammation of the liver. It is usually caused by viral infection, toxic agents or drugs.

82. Cholera, typhoid, tuberculosis (TB), syphilis and tetanus are bacterial diseases while measles and mumps are the viral infections.

83. Hepatitis is an inflammation of the liver. It is caused by viral infection. It may be mild or can be acute and can lead to liver cancer.

84. Rabies is a preventable viral disease most often transmitted through the bite of a rabid animal. It is caused by rhabdovirus.
- Paramyxovirus: Measles and mumps viruses belong to group paramyxovirus.
- Rhinovirus: The rhinovirus is the most common viral infectious agent in humans and is the predominant cause of the common cold.
- Poliovirus: It causes poliomyelitis and transmitted by fecal oral route.

85. HIV attacks a specific type of immune cell in the body, known as T-helper cells. When HIV destroys these cells, then it becomes difficult for the body to fight against the infections.

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86. AIDS is a chronic, potentially life-threatening condition caused by the HIV. By damaging the immune system, HIV interferes with body's ability to fight infection and disease.

87. Opportunistic infections are infections that occur more often or are more severe in people with weakened immune systems than in people with healthy immune systems. People with weakened immune systems include people living with HIV.

88. HIV infects a type of white blood cell in the body's immune system called a T-helper cell (also called a CD4 cell). These vital cells keep us healthy by fighting off infections and diseases.

89. AIDS results into loss of immunity, which may lead to opportunistic infection like pneumonia, cancer etc.

90. Causative agent of AIDS is HIV. It weakens the human immune system.

91. HIV contains protease, integrase and reverse transcriptase. They perform different functions host cell.

92. Mature virions are gradually released by budding off from the host cell and enclosing a portion of host cell membrane around them. That's why envelop of HIV is made up of lipoproteins.

93. HIV may be transmitted through infected blood and syringes, immoral sexual activities. Infected mother should not feed their babies.

94. Full form of AIDS is Acquired Immune Deficiency Syndrome. It is caused by HIV (Human Immunodeficiency virus).

95. Parvovirus is the only virus that contains single-stranded DNA (ssDNA) as its genome. Most DNA viruses have double-stranded DNA.

96. Enveloped viruses are sensitive to environmental factors like sunlight and detergents, making them less stable outside a host. They do not tolerate antibodies well.

97. A virion is the complete, mature, and infectious form of a virus that consists of the genome and protective protein coat.

98. All viruses are obligate intracellular parasites, meaning they depend on a host to replicate.

99. The genome of the influenza virus is segmented and consists of 8 RNA segments.

100. Viruses are the smallest infectious agents and can easily pass through filter paper, unlike bacteria, fungi, or yeast.

101. Viruses lack a cell membrane, as they are acellular entities composed of genetic material enclosed in a protein coat.

102. A virus is classified as an infectious agent because it requires a host cell to replicate and spread.

103. A viroid is a small RNA molecule that does not encode proteins but can replicate itself in a host cell, and it is the only entity in the list that requires a single RNA molecule for its function. Other entities, like viruses, require more complex genomes to encode proteins.

104. Hepatitis D is caused by a viroid-like pathogen that requires Hepatitis B for its replication.

105. Icosahedral symmetry means the virus head has 20 triangular faces, giving it a stable and efficient structure.

106. The capsid is the protein coat surrounding the viral genome, providing protection and aiding in host cell attachment.

107. HIV is transmitted through infected blood, hypodermic syringes, and other bodily fluids.

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108. HIV belongs to the retrovirus family because it carries RNA as its genetic material and uses reverse transcriptase to convert RNA into DNA.

109. HIV belongs to the retrovirus family because it carries RNA as its genetic material and uses reverse transcriptase to convert RNA into DNA.

110. Interferons are proteins produced by host cells to inhibit viral replication and protect uninfected cells.

111. The provirus of HIV is composed of double-stranded DNA (dsDNA) integrated into the host genome.

112. Smallpox virus (a member of the poxvirus family) has a double-stranded DNA genome, unlike Rubella, Influenza, and HIV, which have RNA genomes.

113. Adenoviruses have a polyhedral capsid with 252 capsomeres, making them structurally stable.

114. The infectious virus particle, including its genome and protective coat, is called a virion.

115. Antibiotics are ineffective against viruses because viruses lack cellular structures like ribosomes or cell walls, which antibiotics target.

116. Viruses cannot replicate independently; they require a host cell, unlike bacteria.

117. The genetic material of enveloped viruses (e.g., flu virus) is enclosed by a lipid membrane derived from the host cell.

118. Viruses do not have metabolic processes like excretion, as they rely on host cells for replication.

119. W. M. Stanley was the first to purify the tobacco mosaic virus, proving that viruses could be crystallized.

120. Viruses recognize their host cells via specific interactions between viral surface proteins (envelope or capsid) and host cell receptors.

121. Lysozymes help bacteriophages penetrate the bacterial cell wall by breaking it down during the infection process.

122. The collar is the structure connecting the head and tail of a bacteriophage.

123. Lysozyme plays a crucial role in the penetration step by breaking down the bacterial cell wall, allowing viral DNA to enter.

124. HIV is transmitted through blood, hypodermic syringes, and unprotected sexual contact.

125. HIV carries enzymes necessary for replication (e.g., reverse transcriptase) inside its capsid.

126. Measles is caused by the Paramyxovirus family, which includes the Morbilli virus.

127. Coronavirus is an enveloped virus, and its lipid bilayer (envelope) is sensitive to changes in pH. Hand sanitizers, particularly those containing alcohol, can disrupt the viral envelope, rendering the virus inactive. This makes hand sanitizers effective in combating COVID-19 by breaking down the viral envelope.

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2 BIOENERGETICS

TOPIC >>> PRACTICE EXERCISE

Q.1 **The most abundant protein in chloroplast is:**

A. Rubisco
B. RUBP
C. Ribulose bisphosphate
D. Ribulose bisphosphate hydrogenase

Q.2 **The products of photosynthesis in green plants are:**

A. $C_6H_{12}O_6 + 6O_2$
B. $(CH_2O)_n + H_2O + 2S$
C. $C_6H_{12}O_6 + 6O_2 + H_2O$ + energy
D. $C_6H_{12}O_6 + 6O_2 + 6H_2O$

Q.3 **Incorrect statement for photosynthesis is:**

A. It occurs during daytime
B. It uses water with CO_2
C. It requires chlorophyll
D. It uses oxygen

Q.4 **Spectrophotometer is used to measure:**

A. Absorption of CO_2
B. Absorption of O_2
C. Reflection of pigments
D. Absorption of different wavelengths

Q.5 **Which shows the effectiveness of wavelengths of light driving photosynthesis?**

A. Absorption spectrum
B. Action spectrum
C. Broad spectrum
D. Narrow spectrum

Q.6 **Conversion of light energy into chemical energy is function of:**

A. Mitochondria
B. Cytoplasm
C. Stroma of chloroplast
D. Grana

Q.7 **The source of oxygen released during photosynthesis is:**

A. Water
B. CO_2
C. Glucose
D. Oxidation of chlorophyll

Q.8 **Van Neil hypothesis about the production of oxygen during photosynthesis was based on the study and investigations on:**

A. Bacteria
B. Algae
C. Protonema
D. Cyanobacteria

Q.9 **Wavelength of blue light that is absorbed maximum by pigments:**

A. 670 nm
B. 540 nm
C. 430 nm
D. 750 nm

Q.10 **Which of the following groups does not use water as proton donor?**

A. Cyanobacteria
B. Purple sulphur bacteria
C. Plants
D. Algae

Q.11 **Air contains _____ percentage of carbon dioxide.**

A. 0.04-0.05
B. 0.01-0.02
C. 0.06-0.08
D. 0.03-0.04

Q.12 **Carotenoids absorb strongly:**

A. Red to orange
B. Yellow green
C. Yellow red
D. Blue violet

Q.13 **Magnesium is central part of:**

A. Porphyrin ring
B. Phytol tail
C. Pyrrole ring
D. Hydrophobic part

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Q.14 Chlorophyll consists of:
A. A head of phytol and tail of four pyrrole rings
B. A head of linked carbons and tail of four pyrrole rings
C. A head of four pyrrole rings and tail of linked nitrogen
D. A head of four pyrrole rings and a phytol tail

Q.15 Following is correct sequence of energy transfer between photosynthetic pigments:
A. Chl.a → Chl.b → Carotenoids
B. Carotenoids → Chl.b → Chl.a
C. Chl.b → Carotenoids → Chl.a
D. In any direction

Q.16 All of the followings are differences between Chl. 'a' and 'b' except:
A. Chl.a has different types while Chl.b has single type
B. Chl.a have functional group -CH_3 but Chl.b has-CHO
C. Chl.a is necessary pigment but Chl.b is accessory pigments
D. Chl.a is present in antenna complex while Chl.b is in reaction center

Q.17 Location of phytol tail of chlorophyll b is:
A. Stroma
B. Thylakoid membrane
C. Thylakoid surface
D. Thylakoid lumen

Q.18 Which one of the following is not function of carotenoids?
A. Convert light energy into chemical energy
B. Protect Chlorophyll
C. Transfer energy
D. Protect human eye

Q.19 Location of photosynthetic pigments in purple sulphur bacteria:
A. Thylakoids
B. Grana
C. Stroma
D. Cytoplasm

Q.20 PS-I is named as it:
A. Absorbs wavelength of 680 nm
B. Discovered earlier than PS-II
C. Absorbs wavelength of 700 nm
D. Slightly located upward than PS-II

Q.21 Photosystem II has reaction center of:
A. P_{680}
B. P_{700}
C. P_{730}
D. P_{660}

Q.22 During cyclic photophosphorylation, electrons pass from all except:
A. Photosystem I
B. Ferredoxin
C. Photosystem II
D. Cytochrome complex

Q.23 Some photosynthetic organisms contain chloroplasts that lack photosystem II, yet are able to survive. The best way to detect the "lack of photosystem II" in these organisms would be:
A. To determine if they have thylakoids in the chloroplasts
B. To test for liberation of O_2 in the light
C. To test for CO_2 fixation in the dark
D. To do experiments to generate an action spectrum

Q.24 Where do the light reactions take place?
A. Stroma
B. Thylakoid membrane
C. Chloroplast
D. Leucoplast

Q.25 The final acceptor of electrons during the noncyclic electron pathway is:
A. Photosystem I
B. Photosystem II
C. ATP
D. $NADP^+$

Q.26 Each photon of light excites how many electrons?
A. 1
B. 4
C. 2
D. 6

Q.27 Water splits during photosynthesis in/on:
A. Interior space of thylakoid
B. Outside the thylakoid membrane
C. Into the stroma
D. At ATP synthase complex

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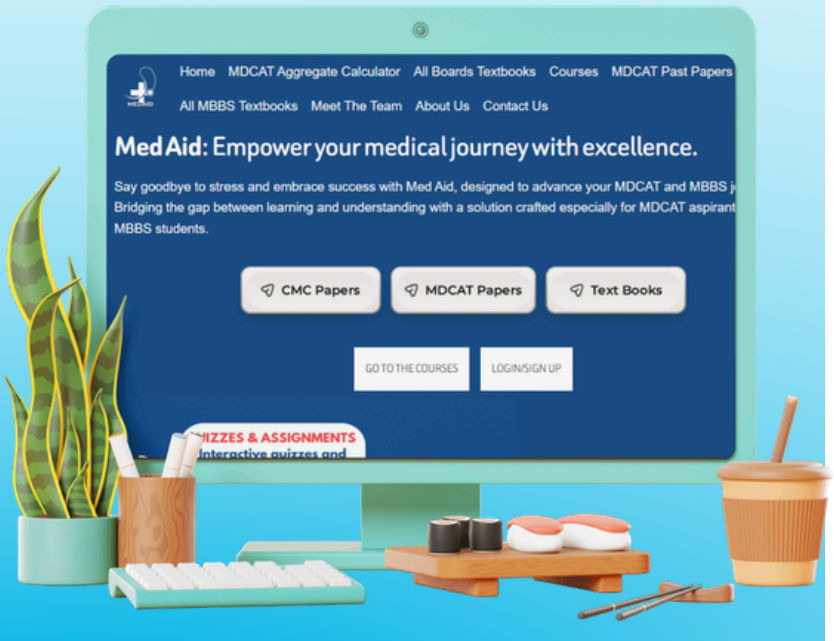

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Q.28 NADP⁺ reductase transfers electron from:
A. NADP⁺ to ferredoxin
B. Ferredoxin to NADP⁺
C. ADP to ATP
D. Cytochrome complex to NADP⁺

Q.29 Which of the following is correct sequence for the movement of electrons during non-cycling photophosphorylation?
A. P680 → P700 → water → NADP⁺
B. Water → P700 → P680 → NADP⁺
C. Water → P680 → P700 → NADP⁺
D. P680 → P700 → NADP⁺ → water

Q.30 Which statement is not true about the noncyclic electron pathway?
A. It absorbs photons into PS-I
B. It is a long pathway
C. It produces ATP
D. Carbon dioxide fixation

Q.31 $NADPH_2$ is produced in photosynthesis during:
A. Dark reaction
B. Pseudo cyclic photophosphorylation
C. Non-cyclic photophosphorylation
D. Cyclic photophosphorylation

Q.32 Z-scheme is another name used for:
A. Cyclic photophosphorylation
B. Calvin cycle
C. Non-cyclic photophosphorylation
D. Oxidative phosphorylation

Q.33 Which is not true for dark reaction?
A. Does not require light directly
B. It uses ATP
C. Also called Z-scheme
D. G_3P is produced

Q.34 The process in which carbon from CO_2 is incorporated into organic molecules is:
A. Glycolysis
B. Calvin cycle
C. Krebs cycle
D. Light dependent reactions

Q.35 Which is associated with the Calvin cycle?
A. ATP production
B. Oxygen production
C. Carbon dioxide fixation
D. Carbon dioxide production

Q.36 The product of the dark reaction is:
A. ATP
B. NADPH
C. G_3P
D. PEP

Q.37 If 12 NADPH are used in Calvin cycle, then how many glucose molecules will be formed:
A. One
B. Six
C. Two
D. Twelve

Q.38 Calvin cycle is also known as C_3 pathway due to:
A. Initial incorporation of 3 CO_2 molecules
B. Production of 3 carbon G3P
C. Production of 3 carbon 3PGA
D. Cycle has 3 steps

Q.39 For fixing 3 molecules of CO_2 in Calvin cycle, what is needed?
A. $9ATP + 6NADPH_2$
B. $18ATP + 12NADPH_2$
C. $6ATP + 9NADPH_2$
D. $3ATP + 3NADPH_2$

Q.40 NADH is oxidized during:
A. Glycolysis
B. Krebs cycle
C. Lactic acid fermentation
D. Dark reactions

Q.41 Which of the following can perform anaerobic respiration?
A. Bacteria
B. Yeast
C. Skeletal muscles
D. All A, B, C

Q.42 Amount of energy extracted from glucose molecule during respiration without oxygen is:
A. 4%
B. 2%
C. 6%
D. 8%

Q.43 In cellular respiration, product formed as a result of release of energy:
A. ATP
B. Oxygen
C. NADH
D. Glucose

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Q.44 Number of ATP molecules used during preparatory phase of glycolysis:
A. 2 B. 4
C. 1 D. 6

Q.45 In plants, energy is released during the process of:
A. Photosynthesis B. Respiration
C. Transpiration D. Water absorption

Q.46 Water is released during conversion of:
A. 2-phosphoglycerate ⟶ PEP
B. 3-phosphoglycerate ⟶ 2-phosphoglycerate
C. 1,3 bisphosphoglycerate ⟶ 3-phosphoglycerate
D. G_3P ⟶ 1,3 bisphosphoglycerate

Q.47 Which one of the following represents de-phosphorylation?
A. Fructose 1-phosphate → Fructose 1,6-biphosphate
B. Fructose 1,3 bisphosphoglycerate → 3 phosphoglycerate
C. Fructose 1-phosphate → Fructose 6-phosphate
D. Glucose 6-phosphate → Fructose 1-phosphate

Q.48 Gross production of ATP molecules during glycolysis is:
A. 2 B. 4
C. 6 D. 8

Q.49 The net gain of energy from one molecule of glucose during aerobic respiration in prokaryotes is:
A. 2 ATP B. 38 ATP
C. 4 ATP D. 40 ATP

Q.50 The oxidation of succinate produces:
A. NADH B. $FADH_2$
C. Malate D. ATP

Q.51 Both NADH and $FADH_2$ are formed during:
A. Glycolysis B. The electron transport system
C. Krebs cycle D. Fermentation

Q.52 When products of glycolysis pass through Krebs cycle, it will produce:
A. 2 NADH, 2 $FADH_2$, 2 ATP B. 1 NADH, 1 $FADH_2$, 1 ATP
C. 1 NADH, 3 $FADH_2$, 2 ATP D. 6 NADH, 2 $FADH_2$, 2 ATP

Q.53 The precursor of fumarate during Krebs cycle requires _____ for fumarate synthesis.
A. Succinate B. Fumarate dehydrogenase
C. Succinate dehydrogenase D. FAD Oxidase

Q.54 Before pyruvate enters the citric acid cycle, it is decarboxylated, oxidized and combined with coenzyme A, forming acetyl CoA, carbon dioxide and one molecule of:
A. NADH B. $FADH_2$
C. ATP D. ADP

Q.55 Starting from end products of glycolysis, how many molecules of CO_2 are produced up to the formation of succinate in a single Krebs cycle?
A. 2 B. 12
C. 6 D. 3

Q.56 Which of the following process is used in the conversion of pyruvate to acetyl CoA?
A. Decarboxylation B. Dehydration
C. Dehydrogenation D. Both A and C

Q.57 Biological oxidation involves removal of hydrogen, linked with specific coenzymes and is catalyzed by:
A. Carboxylase B. Hydrogenase
C. Dehydrogenase D. Catalase

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Q.58 Phosphorylation of ADP during glycolysis occurs via:

A. Photophosphorylation
B. Oxidative phosphorylation
C. Chemiosmosis
D. Substrate level phosphorylation

Q.59 Before entering Krebs cycle, the pyruvate decarboxylated into:

A. α-ketoglutaric acid
B. Glyceric acid
C. Citric acid
D. Acetaldehyde

Q.60 During respiratory chain of cellular respiration, cytochrome 'c' oxidizes:

A. Cytochrome 'a'
B. Cytochrome 'b'
C. Cytochrome 'a3'
D. Coenzyme Q

Q.61 Which of the following is the final acceptor of electron in respiratory chain?

A. Cytochrome a
B. Cytochrome a3
C. Oxygen
D. Hydrogen

Q.62 Electron transport chain in mitochondria is used to:

A. Synthesize NADP
B. Synthesize ADP
C. Create electron gradient
D. Create proton gradient

Q.63 Which of the following types of mammalian cell does not carry out oxidative phosphorylation?

A. Erythrocytes
B. Neuron
C. Oxyntic cell
D. Cardiac muscle cell

Q.64 The stage of cellular respiration producing maximum ATP:

A. Glycolysis
B. Oxidation of pyruvate
C. Krebs cycle
D. Chemiosmosis

Q.65 ATP formation through oxidative phosphorylation involves:

A. Light reactions
B. Dark reactions
C. Chemiosmosis
D. Fermentation

Q.66 Phosphofructokinase is inhibited by:

A. High concentration of NADH
B. Low concentration of citrate
C. High concentration of ATP
D. Pyruvate decarboxylase

Q.67 High concentration of NADH inhibits:

A. Pyruvate decarboxylase
B. Phosphofructokinase
C. Glucokinase
D. Pyruvate kinase

Q.68 A aldo sugar that is intermediate between respiration and photosynthesis:

A. Glucose
B. Dihydroxyacetone
C. Glyceraldehyde 3-phosphate
D. Fructose

Q.69 G_3P is converted into glucose phosphate in:

A. Mitochondria
B. Chloroplast
C. Golgi apparatus
D. Endoplasmic reticulum

Q.70 An 18 carbon fatty acid is converted into how many acetyl-CoA molecules?

A. 18
B. 16
C. 9
D. 18

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Q.71 Deamination of amino acid takes place in:

A. Liver
B. Kidney
C. Pancreas
D. Gall bladder

Q.72 ATP molecule is used in all of the following except:

A. Assimilation
B. Muscular contraction
C. Osmosis
D. Nerve conduction

Q.73 Which of the following is not a type of phosphorylation in biological systems?

A. Substrate level phosphorylation
B. Reductive phosphorylation
C. Oxidative phosphorylation
D. Photophosphorylation

Q.74 In ATP, high energy bond is the one which links:

A. Adenine with phosphate
B. Adenine with ribose
C. Ribose with phosphate
D. Phosphate with phosphate

Q.75 A molecule of chlorophyll a has _____ pyrrole ring which forms _____ porphyrin ring.

A. 1, 4
B. 4, 1
C. 1, 1
D. 16, 4

Q.76 Photosystem I has chlorophyll 'a' molecules which absorb maximum light of:

A. 680 nm
B. 700 nm
C. 780 nm
D. 580 nm

Q.77 Which of the following is used in baking?

A. Aerobic respiration
B. Anaerobic respiration
C. External respiration
D. Internal respiration

Q.78 It is true about preparatory phase of glycolysis:

A. ATP are consumed
B. NADH are consumed
C. ATP are produced
D. NAD^+ are produced

Q.79 Glycolytic pathway involves 10 reactions. Each individual reaction needs:

A. One molecule of ATP
B. One molecule of ADP
C. One molecule of NADH
D. One molecule of specific enzyme

Q.80 Succinic dehydrogenase reduces:

A. NAD^+
B. NADPH
C. FAD
D. $NADP^+$

Q.81 During oxidative phosphorylation, pumping of protons is across:

A. Thylakoid membrane
B. Inner membrane of chloroplast
C. Inner membrane of mitochondria
D. Outer membrane of mitochondria

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2 TOPIC BIOENERGETICS

PAST PAPERS MCQ'S

Q.82 During photosynthesis, CO_2 works as: (NUMS-2022)
A. Proton donor
B. Electron donor
C. Proton accepter
D. Source of O_2

Q.83 In the process of photosynthesis, water acts as: (NUMS-2022)
A. Proton acceptor
B. Electron donor
C. CO_2 reducer
D. CO_2 accepter

Q.84 The range of visible light is from: (ETEA-2022)
A. 300-650 nm
B. 350-700 nm
C. 380-750 nm
D. 430-790 nm

Q.85 Which scientist among the following hypothesized that plant splits water to release oxygen as by-product? (ETEA-2022)
A. Van Neil
B. Lysenko
C. Calvin
D. Krebs

Q.86 Maximum photosynthesis occurs when: (BUMHS-2022)
A. Blue light is given to the plant
B. Red light is given to the plant
C. Green light is given to the plant
D. Yellow light is given to the plant

Q.87 What is the colour of chlorophyll 'b' molecule? (UHS-2022)
A. Bluish green
B. Yellowish green
C. Dark green
D. Reddish green

Q.88 Magnesium is an important nutrient in plant for the formation of: (NUMS-2022)
A. Proteins
B. Lipids
C. Chlorophyll
D. Enzymes

Q.89 If oxygen is available, complete breakdown of glucose produces _____ ATP molecules in prokaryotes. (NUMS-2022)
A. 20
B. 36
C. 38
D. 40

Q.90 What is the number of hydrogen atoms in the molecular formula of chlorophyll 'a'? (BUMHS-2022)
A. Six
B. Fifty five
C. Seventy
D. Seventy two

Q.91 Each carrier in electron transport chain is first _____ and then _____. (UHS-2022)
A. Broken-down, regenerate
B. Generated, broken down
C. Oxidized, reduced
D. Reduced, oxidized

Q.92 Electron transport chain explains: (UHS-2022)
A. Photophosphorylation
B. Z-scheme
C. Photolysis
D. Mechanism of ATP synthesis

Q.93 What are the products of light dependent reactions of photosynthesis? (NUMS-2022)
A. ATP, RuBP and reduced NAD
B. ATP, oxygen and reduced NADP
C. GP, oxygen and reduced NAD
D. GP, reduced NADP and RuBP

Q.94 Each granum consists of _____ thylakoids. (SZABMU-2022)
A. 40-60
B. 25-50
C. 50-70
D. 100-200

Q.95 The element whose electrons are excited during light reactions of photosynthesis is: (SZABMU-2022)
A. Carbon
B. Hydrogen
C. Magnesium
D. Nitrogen

Q.96 Light reaction of photosynthesis takes place in: (DUHS-2022)
A. Cristae
B. Stroma
C. Cisternae
D. Thylakoid

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Q.97 End product of Calvin cycle is: (NUMS-2022)
A. 3-phosphoglycerate
B. 1-3 bisphosphoglycerate
C. Glyceraldehyde 3-phosphate
D. Glucose

Q.98 Light independent phase of photosynthesis involves: (SZABMU-2022)
A. Formation of energy rich carbohydrates
B. Hydrolysis of water
C. ATP generation
D. Production of reducing molecules

Q.99 In which part of chloroplast the fixation of carbon dioxide results in the formation of sugars? (ETEA-2022)
A. Grana
B. Stroma
C. Intergranum
D. Outer membrane of chloroplast

Q.100 The Calvin cycle is completed in _____ stages. (ETEA-2022)
A. Two
B. Three
C. Four
D. Five

Q.101 The enzyme which is used in Calvin cycle is: (DUHS-2022)
A. Oxidase
B. Reductase
C. Isomerase
D. Rubisco

Q.102 What is the end product of glucose by yeast in anaerobic respiration? (UHS-2022)
A. Ethanol and oxygen
B. Ethanol and water
C. Ethanol and CO_2
D. Lactic acid and CO_2

Q.103 Which of the following is not a consequence of anaerobic respiration in human muscles cells? (UHS-2022)
A. Cramps
B. High consumption of energy
C. Pain
D. Tiredness

Q.104 Which of the following is used in baking? (BUMHS-2022)
A. Aerobic respiration
B. External respiration
C. Internal respiration
D. Anaerobic respiration

Q.105 Net ATP produced at the end of glycolysis: (DUHS-2022)
A. 2 ATP
B. 4 ATP
C. 6 ATP
D. 3 ATP

Q.106 Pyruvic acid is acid of: (DUHS-2022)
A. 4 carbon compound
B. 5 carbon compound
C. 6 carbon compound
D. 3 carbon compound

Q.107 In aerobic respiration, glucose molecule is completely broken down into CO_2, H_2O and _____. (ETEA-2022)
A. 2 ATP
B. 4 ATP
C. 34 ATP
D. 36 ATP

Q.108 Which is the main event in electron transport chain? (UHS-2023)
A. ATP synthesis
B. Decarboxylation
C. Substitution
D. Isomerisation

Q.109 Out of 36 ATPs, how many are produced in electron transport chain? (UHS-2023)
A. 28
B. 30
C. 32
D. 34

Q.110 The major enzymes involved in transfer of phosphate group from ATP to Glucose is: (UHS-2023)
A. Isomerase
B. Dehydrogenase
C. Kinase
D. Decarboxylase

Q.111 The end product of glycolysis in anaerobic respiration is: (SZABMU-2023)
A. Ethanol and Carbon dioxide
B. Lactate
C. Pyruvate
D. Acetyl CoA

Q.112 The ATP formed in the preparatory phase of glycolysis is (are): (ETEA-2023)
A. 1
B. 2
C. 4
D. 0

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Q.113 Which of the following is used in baking? (UHS-2023)
A. Aerobic respiration
B. Anaerobic respiration
C. External respiration
D. Internal respiration

Q.114 In alcoholic fermentation _____ ATP molecules are produced from 1 glucose molecule. (ETEA-2023)
A. 2
B. 18
C. 32
D. 36

Q.115 What is the number of carbon atoms in pyruvic acid? (ETEA-2023 Retake)
A. 2
B. 3
C. 4
D. 5

Q.116 The final acceptor of both electrons and protons during light reactions of photosynthesis is: (SZABMU-2023)
A. PQ
B. PC
C. Fd
D. NADP

Q.117 When light falls on P_{700}, which event is likely to occur? (NUMS-2023)
A. It induces photolysis
B. Gains hydrogen
C. Accept electrons
D. It is oxidized

Q.118 The only copper containing protein involved during light reactions of photosynthesis is: (SZABMU-2023)
A. Plastoquinone
B. Cytochrome
C. Ferredoxin
D. Plastocyanin

Q.119 End product of Calvin cycle is: (SZABMU-2023)
A. 3 phosphoglycerate
B. 1-3 bisphosphoglycerate
C. Glyceraldehyde 3 phosphate
D. Glucose

Q.120 Which are the end products of light reactions of photosynthesis? (NUMS-2023)
A. ATP and NADPH
B. ATP and glucose
C. Glucose and NADP
D. ATP and water

Q.121 Synthesis of ATP during photosynthesis takes place at the region: (NUMS-2023)
A. Stroma
B. Thylakoid
C. Matrix
D. Cisternae

Q.122 Which of the following molecules are released after completion of light reaction and the utilized in the dark reaction of photosynthesis? (NUMS-2023)
A. ATP and NADP
B. ADP and NADP
C. ADP and NADPM
D. ATP and NADPH

Q.123 Light reaction occurs in the _____ of chloroplast: (ETEA-2023)
A. Outer membrane
B. Inner membrane
C. Granum
D. Stroma

Q.124 The carotenoids absorb light in the visible spectrum between _____ and wavelengths. (ETEA-2023 Retake)
A. 400-600nm
B. 630-700nm
C. 500-600nm
D. 500-600nm

Q.125 In the non-cyclic electron transport of light reaction, the deficit of _____ electrons occur in the chlorophyll, as it absorbs energy. (ETEA-2023 Retake)
A. 1
B. 2
C. 3
D. 4

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Q.126 The process of ATP synthesis through a combination of electrochemical and osmotic events is known as: (KMU-2024)
A. Fermentation
B. Glycolysis
C. Oxidative phosphorylation
D. Oxidation of pyruvate to acetyl CoA

Q.127 Which of the following receives electrons from $FADH_2$ during oxidative phosphorylation in cristae of mitochondria? (SZAMBU-2024)
A. Cytochrome a
B. Coenzyme Q
C. Cytochrome c
D. Cytochrome b

Q.128 What is the product formed at the end of the respiratory chain in inner membrane of mitochondria? (SZAMBU-2024)
A. NADH
B. Oxygen
C. Water
D. Carbon dioxide

Q.129 The type of phosphorylation which involves the transfer of electrons from NADH to Coenzyme Q in the inner mitochondrial membrane is called: (SZAMBU-2024)
A. Cyclic Phosphorylation
B. Non-cyclic Phosphorylation
C. Oxidative Phosphorylation
D. Substrate level Phosphorylation

Q.130 Which mechanism would be compromised in the absence of cytochrome complex during light reactions of photosynthesis? (NUMS-2024)
A. Reduction of reaction center chlorophyll
B. Photolysis of water
C. Oxidation of primary electron receptor
D. Establishment of proton gradient across thylakoid membrane

Q.131 Which of the following steps of glycolysis does not involve ATP directly? (SZAMBU-2024)
A. Conversion of Glucose to Glucose 6-phosphate
B. Conversion of Fructose 6-phosphate to Fructose 1,6-bisphosphate
C. Conversion of Glyceraldehyde 3-phosphate to 1,3- bisphosphoglycerate
D. Conversion of 1,3- bisphosphoglycerate to 3- phosphoglycerate

Q.132 During glycolysis, isomerization takes place in the form of: (NUMS-2024)
A. Dihydroxyacetone phosphate and 2-phosphoglcerate
B. G3P and fructose 6-phosphates
C. PEP and pyruvate
D. Fructose 6-phosphate and 3-phosphoglycerate

Q.133 The production of energy is _____ (KMU-2024)
A. Faster in anaerobic respiration
B. Faster in aerobic respiration
C. Same in both types of respiration
D. Not associated with respiration

Q.134 The pathway to the breakdown of glucose, carried out by micro-organisms, is called: (KMU-2024)
A. Lactic acid fermentation
B. Alcoholic fermentation
C. Cellular respiration
D. None of the above

Q.135 The amount of energy present in bonds of glucose which is converted into ATP during anaerobic respiration is: (SZAMBU-2024)
A. 2%
B. 4%
C. 10%
D. 36%

Q.136 Which option is correct about a chlorophyll molecule? (UHS-2024)
A. Chemical formula $C_{55}H_{70}O_6N_4Mg$
B. Porphyrin ring with nitrogen in centre
C. Methyl group on second pyrrole ring
D. Aldehyde group on second pyrrole ring

Q.137 In the journey of electrons from photosystem II to photosystem I plastocyanin is reduced by: (UHS-2024)
A. Plastoquinone
B. Cytochrome complex
C. P700
D. Primary electron acceptor of PSI

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Q.138 Enzyme NADP reductase is responsible for: (UHS-2024)

A. Reducing NADP+
B. Oxidizing NADP+
C. Reducing Ferredoxin
D. Reducing P700

Q.139 The PS II during light reactions receives electrons from splitting: (UHS-2024)

A. Water
B. Plastoquinone
C. Plastocyanin
D. Ferredoxin

Q.140 In Calvin cycle CO_2 reacts with RuBP to produce _____. (UHS-2024)

A. 3-PGA
B. G3P
C. 6-Carbon unstable intermediate
D. 1,3 bisphosphoglycerate

Q.141 The step of Calvin Cycle during which five molecules of Glyceraldehyde 3-phosphate (G3P) are converted in Ribulose 1,5-Phosphate by utilizing 3 molecules of ATP is: (SZAMBU-2024)

A. Fixation
B. Reduction
C. Regeneration
D. Phosphorylation

Q.142 Which of the following does not take place during cyclic phosphorylation of the light dependent reaction of photosynthesis? (SZAMBU-2024)

A. ATP synthesis
B. Light Absorption
C. Photoexcitation of electrons
D. Photolysis of water

Q.143 Ubiquinone contains: (SZAMBU-2024-Reconduct)

A. Iron chloride
B. Iron sulphate
C. Iron
D. Iron Phosphate

Q.144 Chlorophyll and accessory pigments absorb light and transfer the energy, that initiates the light reactions. What is the order of energy transfer? (SZAMBU-2024-Reconduct)

A. Chlorophyll b → Carotenoids → Chlorophyll a
B. Chlorophyll b → Carotenoids → Chlorophyll b
C. Chlorophyll a → Chlorophyll b → Carotenoids
D. Carotenoid → Chlorophyll b → Chlorophyll a

Q.145 What is the concentration of CO_2 in air? (SZAMBU-2024)

A. 0.003-0.004%
B. 0.03-0.04%
C. 0.0003-0.0004%
D. 3-4%

Q.146 What is the efficiency of CO_2 fixation in plants with photorespiration? (SZAMBU-2024)

A. 20%
B. 25%
C. 45%
D. 75%

Q.147 Presence of PEP carboxylase in C_4 plants enable them to avoid photorespiration due to: (NUMS-2024)

A. Presence of enzyme in high concentration
B. Absence of RuBisCO
C. PEP carboxylase being strictly carboxylase
D. High yield of enzyme

Q.148 Fats and proteins can be used as respiratory fuel. Which of the following serves as common molecule produced through their catabolism? (NUMS-2024)

A. Acetyl CoA
B. Pyruvate
C. G_3P
D. Lactate

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ANSWER KEY

PRACTICE EXERCISE

1	A	11	D	21	A	31	C	41	D	51	C	61	C	71	A	81	C		
2	D	12	D	22	C	32	C	42	B	52	D	62	D	72	C				
3	D	13	A	23	B	33	C	43	A	53	C	63	A	73	B				
4	D	14	D	24	B	34	B	44	A	54	A	64	D	74	D				
5	B	15	B	25	D	35	C	45	B	55	D	65	C	75	B				
6	D	16	D	26	A	36	C	46	A	56	D	66	C	76	B				
7	A	17	B	27	A	37	A	47	B	57	C	67	A	77	B				
8	A	18	A	28	B	38	C	48	B	58	D	68	C	78	A				
9	C	19	D	29	C	39	A	49	B	59	D	69	B	79	D				
10	B	20	B	30	D	40	C	50	B	60	B	70	C	80	C				

PAST PAPER MCQS

82	C	92	D	102	C	112	D	122	D	132	B	142	D						
83	B	93	B	103	B	113	B	123	C	133	B	143	C						
84	C	94	B	104	D	114	A	124	D	134	B	144	D						
85	A	95	C	105	A	115	B	125	B	135	A	145	B						
86	A	96	D	106	D	116	D	126	C	136	A	146	D						
87	B	97	C	107	D	117	D	127	B	137	B	147	C						
88	C	98	A	108	A	118	D	128	C	138	A	148	A						
89	D	99	B	109	A	119	C	129	C	139	A								
90	D	100	B	110	C	120	A	130	D	140	C								
91	D	101	D	111	C	121	B	131	C	141	C								

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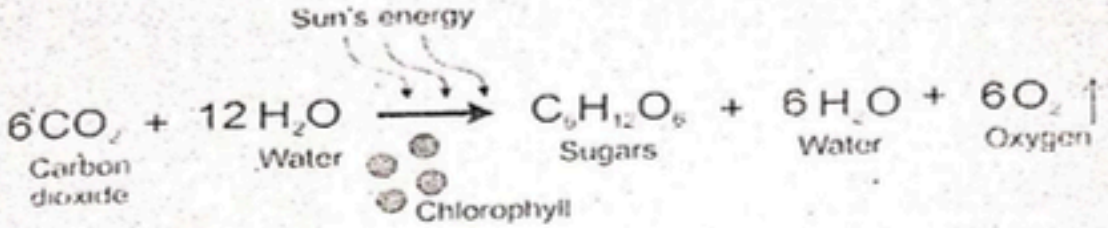
EXPLANATORY NOTES

PRACTICE EXERCISE

1. Carbon dioxide fixation in dark reaction is carried out by the enzyme Ribulose bisphosphate carboxylase, also known as Rubisco. It is the most abundant protein in chloroplasts, and probably the most abundant protein on earth.

2. 

3. Photosynthesis is the biochemical process that occurs during day time and requires chlorophyll for sugar synthesis and uses CO_2 as reactant. O_2, however, is produced as by-product during light dependent phase of photosynthesis and consumed during cellular respiration.

4. Spectrophotometer is an electrical instrument, which is used to measure the relative abilities of different pigments to absorb different wavelengths of light.

5. The graph showing relative effectiveness of different wavelengths of light in driving photosynthesis is called action spectrum. It was reported by T.W Engelmann.

6. Light dependent phase of photosynthesis takes place in grana of chloroplast in which light energy is converted into chemical energy.

7. The source of oxygen released during photosynthesis is water. This was confirmed by scientists Van Niel during 1940s when first use of an isotopic tracer (O^{18}) in biological research was made.

8. Using evidence from bacteria that utilize hydrogen sulfide (H_2S) for photosynthesis, van Niel hypothesized that all photosynthetic organisms need a hydrogen source and that plants split water as their hydrogen source, releasing oxygen. Scientists confirmed this hypothesis by using a heavy isotope of oxygen (O^{18}).

9. Wavelength of visible light varies from 380 nm to 750 nm. This spectrum contains seven different colors. Out of them blue and red wavelengths are absorbed maximally. 430 nm and 670 nm are most effective and they represent blue and red color respectively.

10. Photosynthetic bacteria use hydrogen sulphide as proton donor. Rest of organisms use water as proton donor for photosynthesis. While other groups use water as proton donor.

11. Air contains very less amount of carbon dioxide around 0.03-0.04%. Water contains more carbon dioxide than air.

12. Carotenoids are yellow and red to orange pigments that absorb strongly the blue-violet range, different wavelengths than the chlorophyll absorbs, so they broaden the spectrum of light that provide energy for photosynthesis.

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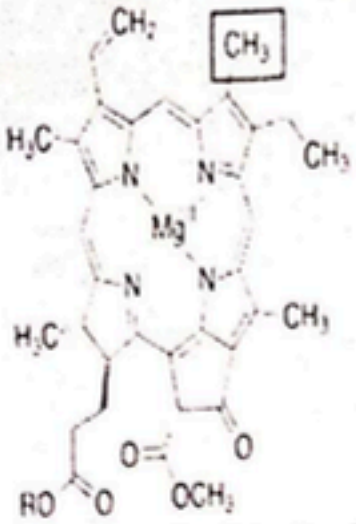
13.



14. A chlorophyll molecule has two main parts; one flat, light absorbing hydrophilic head and the other long, anchoring, hydrophobic hydrocarbon tail. The head is complex porphyrin ring which is made up of four joined smaller pyrrole rings.

15. Carotenoids and chlorophyll 'b' are called accessory pigments because they absorb light and transfer the energy to chlorophyll a, which then initiates the light reactions. It is generally believed that the order of transfer of energy is **Carotenoids → Chl. b → Chl. a**.

16. The antenna complex has many molecules of chlorophyll 'a', chlorophyll 'b' and carotenoids, most of them channeling the energy to reaction center. Reaction center has one or more molecules of chlorophyll 'a' along with primary electron acceptors, and associated electron carries of E.T.C.

17. Chlorophyll molecule has a long hydrocarbon tail which is attached to one of the pyrrole rings of chlorophyll molecules and is embedded in the hydrophobic core of thylakoid membrane.

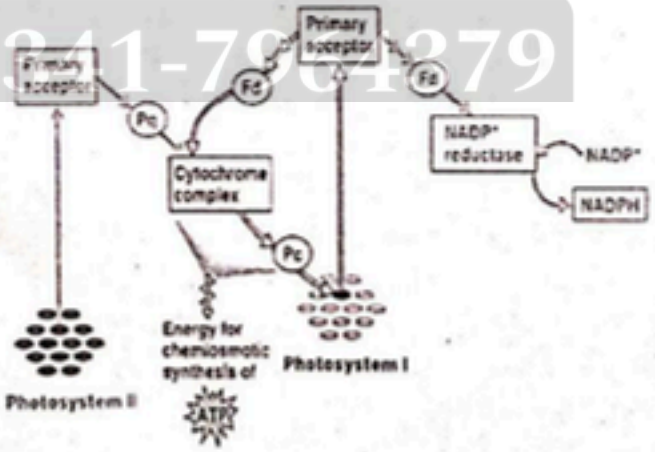
18. Transfer of energy, broadening the spectrum, protection of chlorophyll molecules and eyes are the functions of carotenoids. The conversion of light energy into chemical energy is the function of chlorophyll molecules.

19. Some bacteria are photosynthetic but they lack chloroplast. Their photosynthetic pigments are present in cytoplasm of cell.

20. Photosynthetic pigments are organized into clusters, called photosystems. There are two photosystems found in plants, PS-I and PS-II. These are named so in order of their discovery.

21. There are two types of photosystems named as PS I and PS II. PS I has type of chlorophyll a that absorbs maximum wavelength of 700 nm while PS II has type of chlorophyll a that absorbs maximum wavelength of 680 nm.

22.



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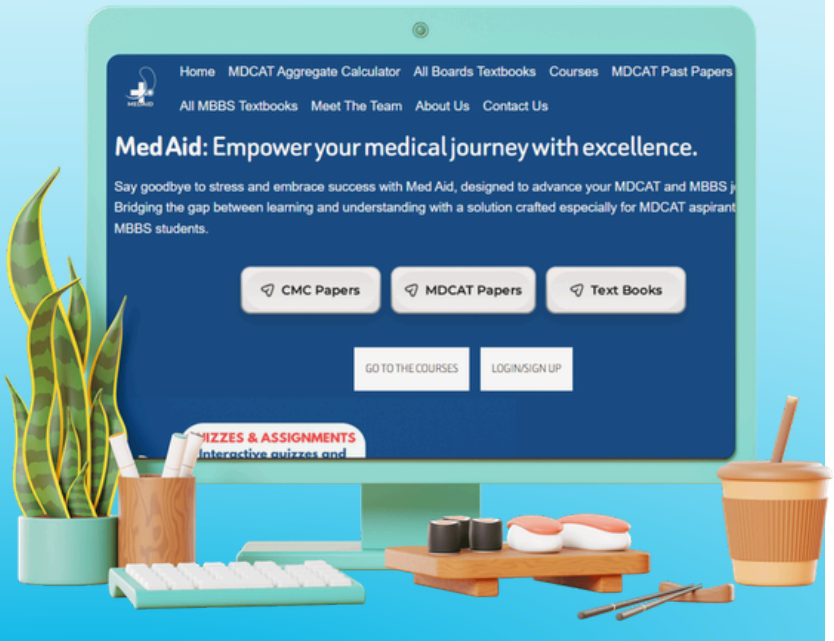

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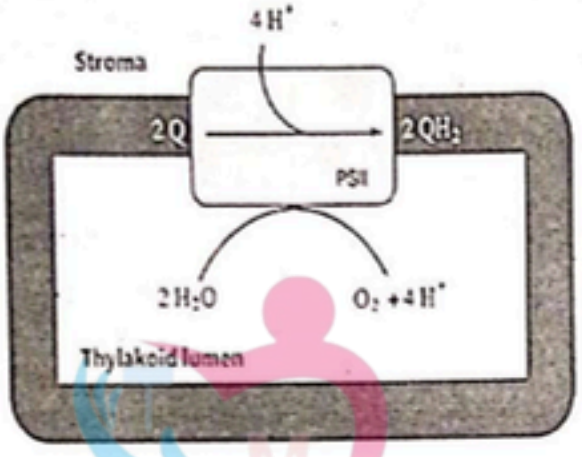
23. Photosystem II is involved in photolysis of water (as a result oxygen is evolved) If photosystem II is absent in an organism, oxygen will not be liberated.
24. The light reactions of photosynthesis take place at thylakoid membrane while dark reactions take place in stroma of chloroplast.
25. $NADP^+$ acts as the final electron acceptor during non-cyclic electron flow, while electrons are moved back from ferredoxin to cytochrome complex to generate assimilating power via cyclic electron flow.
26. Each photon of light is able to excite a single electron during light reactions of photosynthesis.
27.



28.



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29.



30. Carbon dioxide fixation does not take place in light dependent phase of photosynthesis; rather its fixation occurs in light independent phase of photosynthesis.

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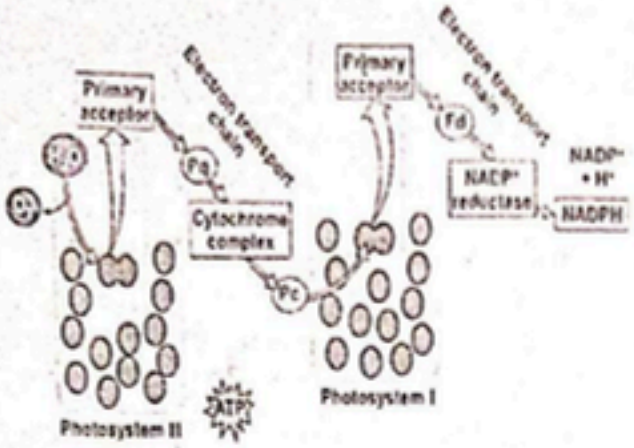

32. Z-scheme is another name use for light dependent reaction of photosynthesis because electrons move in zigzag fashion.

33. Dark reaction is cyclic process. It does not show Z-scheme. It utilizes energy to synthesize G3P.

34. The Calvin cycle or light independent reactions or the dark reactions, is a series of chemical reactions that convert carbon dioxide and hydrogen carrier compounds into sugar.

35. The production of ATP and O_2 as by product is associated with light reactions while CO_2 fixation is associated with dark reactions.

36. ATP and NADH are the products of light dependent reactions of photosynthesis. PEP Phosphoenol pyruvate is intermediate molecule of glycolysis.

37. Since 6 molecules of NADPH are used for the synthesis of 1 G3P in Calvin cycle, so for the synthesis of one glucose molecule that requires 2 G3P molecules, 12 molecules of NADPH are required.

38. Because the product of initial carbon fixation is a three - carbon compound, the Calvin cycle is also known as C3 pathway.

39. The chemical equation of dark reaction is:

$$3CO_2 + 6NADPH + 9ATP \rightarrow C_3H_6O_3 + 6NADP + Pi + 3H_2O$$

40. During glycolysis, NADH is produced. When cell cannot obtain oxygen, it converts pyruvate to either alcohol or lactic acid. In this process, NADH is oxidized.

41. Aerobic organisms use oxygen to produce energy for their metabolism. Almost all types of cells are adapted to do respiration without oxygen.

42. During anaerobic respiration, only 2% of energy of glucose molecule is extracted.

43. Cellular respiration is a process in which energy is released in the form of ATP due to catabolism of organic substance.

44. Glycolysis comprises of two phases. In 1st half, Glucose is converted into two 3 carbon compounds known as glyceraldehyde phosphate using 2 molecules of ATP in step wise reactions.

45. Energy is released during cellular respiration by catabolism of organic molecules in all organisms.

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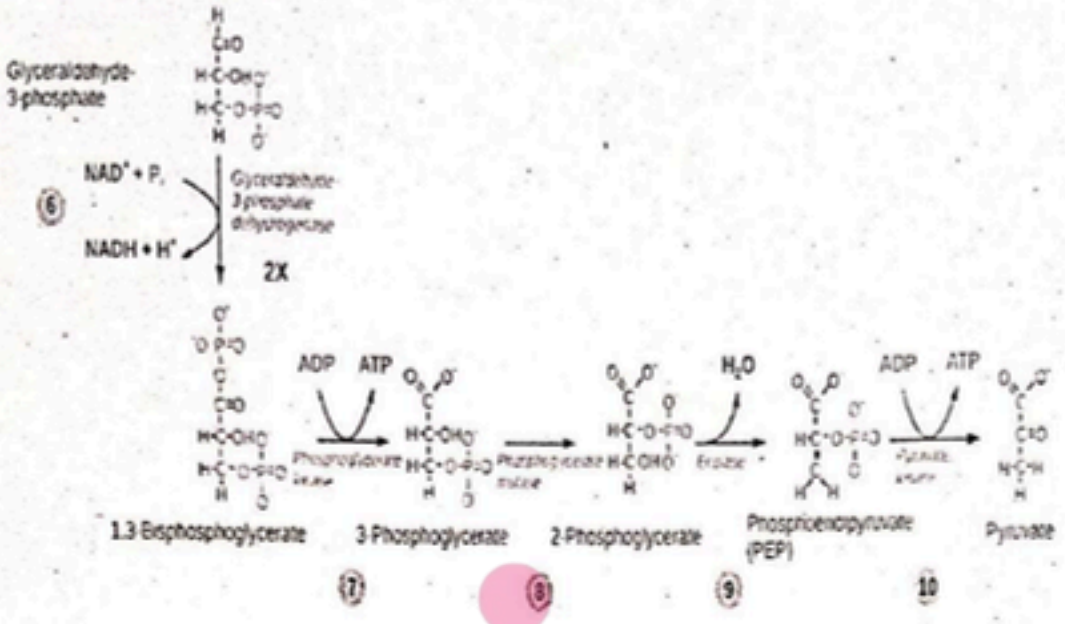

47. Removal of phosphate group from a molecule is called de-phosphorylation. Conversion of fructose 1,3-bisphosphoglycerate into 3-phosphoglycerate is a de-phosphorylation reaction.

48.



49. Total 40 ATP molecules are produced due to aerobic breakdown of glucose in both prokaryotes and eukaryotes. In prokaryotes, 2 ATP are utilized in preparatory phase of glycolysis, so net ATP production is 38.

50. The oxidation of succinate into fumarate produces FADH2.This reaction is catalyzed by an enzyme called succinic acid dehydrogenase.

51. The cyclic reactions of Krebs cycle produce both NADH and $FADH_2$, while in glycolysis, only NADH is produced. During electron transport chain, these NADH and $FADH_2$ molecules are oxidized to produce ATP molecules.

52. When products of glycolysis pass through Krebs cycle, it will produce 6 molecules of NADH, 2 molecules of FADH2 and 2 molecules of ATP.

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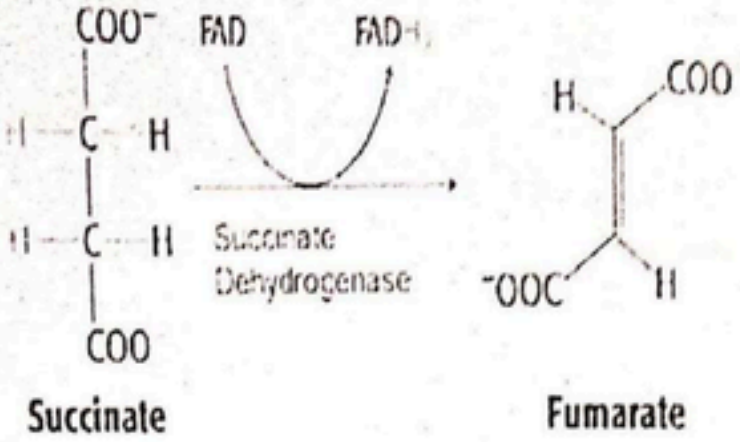
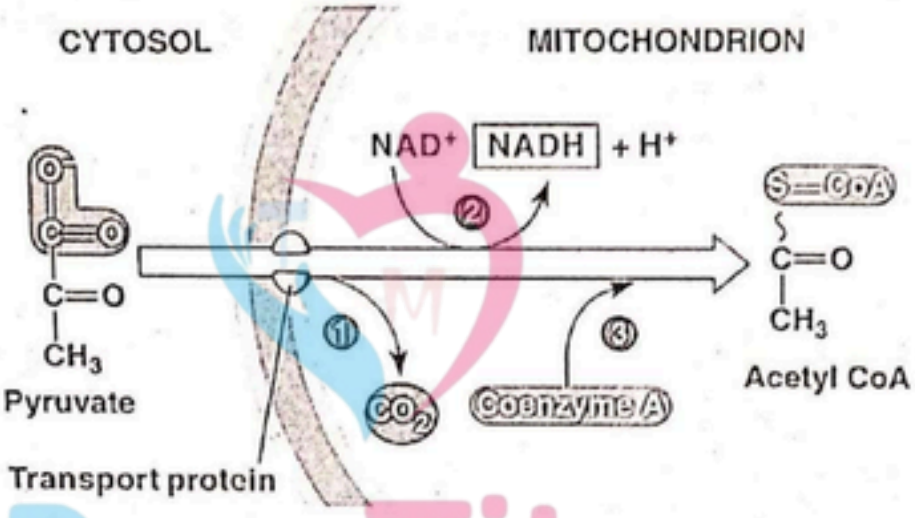


Succinate Fumarate

4.



55. Starting from end product of glycolysis, 3 times decarboxylation occurs. One molecule is produced during pyruvate oxidation while remaining 2 are produced during Krebs cycle. It means 3 molecules of CO_2 produced.

56. When pyruvate molecule is converted into acetyl CoA, one carbon of pyruvate is removed in the form of carbon dioxide (decarboxylation) along with hydrogen (dehydrogenation) that is added to NADH.

57. Biological oxidation involves the removal of hydrogen, a redox reaction catalyzed by the dehydrogenases, linked to a specific coenzyme.

58. The ATP molecules are produced during glycolysis via substrate level phosphorylation in cytosol while oxidative phosphorylation is associated with mitochondria. Photophosphorylation is the process of utilizing light energy from photosynthesis to convert ADP to ATP and is associated with chloroplasts.

59. Glycolysis results in pyruvate formation. It enters mitochondria where an enzyme pyruvate decarboxylase removes carbon dioxide from it. This decarboxylation results in formation of acetic acid.

60. In electron transport chain electrons moves through proteins named as electron carriers. Coenzyme Q reduces cytochrome 'b' and then electrons are passed on to cytochrome 'c' resulting in oxidation of cytochrome 'b'.

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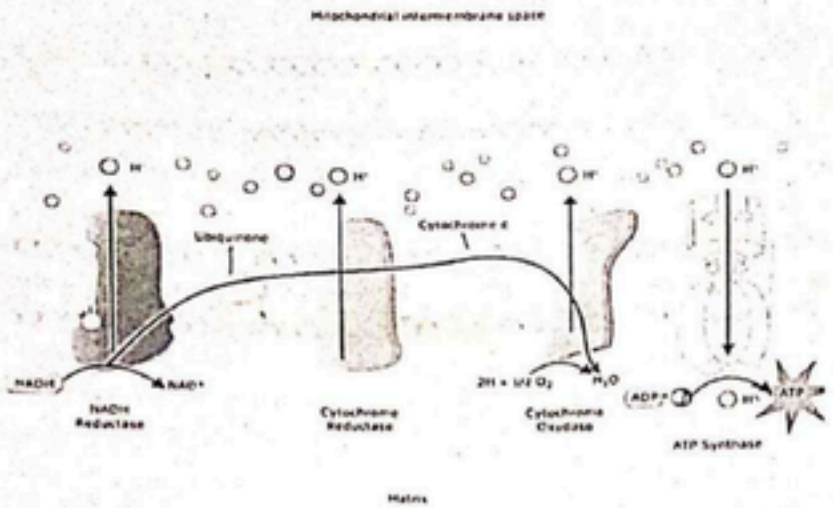
61.



62. Passage of electrons between donor and acceptor in ETC releases energy, which is used to generate a proton gradient across the mitochondrial membrane by actively "pumping" protons into the inter-membrane space, producing a thermodynamic state that has the potential to do work.

63. RBCs are unable to carry out oxidative phosphorylation because they lack mitochondria. Oxyntic cells, neurons and cardiac muscle cells are able to produce ATP molecules through oxidative phosphorylation because they have mitochondria.

64. Glycolysis produces 2 net ATP molecules, while link reaction produces only two NADH molecules. Krebs cycle produces 2 ATP molecules, 6 NADH and 2 $FADH_2$ molecules. These reduced electron carriers are then oxidized via E.T.C to generate maximum ATP molecules through chemiosmosis.

65. Chemiosmosis is the movement of ions across a semi-permeable membrane, down their electrochemical gradient. An example of this would be the generation of ATP by the movement of H^+ across a membrane during cellular respiration or photosynthesis.

66. Phosphofructokinase is involved in process of glycolysis which results in production of ATP. When concentration of ATP is high, it binds with phosphofructokinase and inhibits its catalytic activity.

67. Citric acid results in high concentration of NADH. This increase inhibits catalytic activity of pyruvate decarboxylase leading to shut down of citric acid cycle.

68. G3P is a trisaccharide and contains aldehyde group. It is formed as an intermediate compound during glycolysis and Calvin cycle.

69. Conversion of glucose phosphate from G_3P takes place in chloroplast and it is converted in to glucose, fructose, and sucrose and eventually in starch.

70. Acetyl-CoA has two carbon atoms. When 18 carbons fatty acid is broken down, it produces 9 Acetyl-CoA molecules.

71. Amino acid undergoes deamination in liver. This amino group become ammonia and this enters into urea cycle.

72. Osmosis is a passive process driven by the concentration gradient of water, requiring no ATP. In contrast, assimilation, muscular contraction, and nerve conduction involve active processes powered by ATP.

73. Reductive phosphorylation is not a type of phosphorylation in biological systems.

74. In ATP (adenosine triphosphate), the high-energy bonds are the phosphoanhydride bonds that link the phosphate groups together.

75. A molecule of chlorophyll a contains 4 pyrrole rings which form one porphyrin ring.

76. Photosystem I has chlorophyll 'a' molecules that absorb light most efficiently at a wavelength of 700 nm, which is referred to as P_{700}.

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In baking, yeast undergoes anaerobic respiration (fermentation), producing carbon dioxide gas, which causes the dough to rise.

During the preparatory phase of glycolysis, 2 ATP molecules are consumed to convert glucose into fructose 1,6-bisphosphate.

Each reaction in the glycolytic pathway requires a specific enzyme to catalyze the process.

Succinate dehydrogenase reduces FAD to $FADH_2$ during the conversion of succinate to fumarate in the citric acid cycle.

During oxidative phosphorylation, protons are pumped across the inner mitochondrial membrane into inter-membrane space, creating a proton gradient that drives ATP synthesis.

PAST PAPER MCQ'S

2. During Calvin cycle, CO_2 is reduced into glyceraldehyde 3-phosphate. It receives proton from NADPH during phase 2 (Reduction). That's why CO_2 is acted as proton acceptor.
3. During light reaction, water splits into $2H^+$, $\frac{1}{2}$ O_2 and releases electrons. These electrons are received by chlorophyll molecules.
84. The visible light spectrum is the segment of the electromagnetic spectrum that the human eye can view. Range of visible spectrum is 380-750.
85. In 1930s, Van Niel hypothesized that plants split water as a source of hydrogen, releasing oxygen as a by-product.
86. Maximum photosynthesis occurs due to blue light. Blue light is maximum absorbed by pigments.
87. Color of chlorophyll 'a' is blue-green while chlorophyll 'b' is yellow-green.
88. Magnesium is present in center of porphyrin ring of chlorophyll. Without it chlorophyll is not formed. Deficiency of magnesium causes chlorosis.
89. In prokaryotes, total 40 molecules are produced during complete breakdown of glucose in the presence of oxygen.
90. Molecular formula of chlorophyll 'a' is $C_{55}H_{72}O_5N_4Mg$.
91. Electron transport chain is a redox reaction. Carriers in ETC first receive electrons (reduced) then release them (oxidized).
92. Electrons move along the ETC and release their energy which is used in chemiosmosis for the production of ATP.
93. During light reaction, water breaks into oxygen, ATP is formed through chemiosmosis and NADP is converted into NADPH.
94. Thylakoid sacs are stacked in column called granum. Each granum is consisted of 25-50 thylakoid sacs.
95. Magnesium presents in center of chlorophyll and releases its electrons when it gets excited due to sunlight.
96. Photosynthesis is consisted of two reactions. Light reaction which is linked thylakoid membrane and dark reaction is occurred in stroma of chloroplast.
97. End product of Calvin cycle is glyceraldehyde 3-phosphate which is formed during reduction phase. Total six molecules of G3P are formed but only one molecule is released from cyclic and remaining 5 molecules are stay in cycle and regenerated into RuBP.
98. Light independent reaction is basically Calvin cycle. Its end product is G3P which is carbohydrate. Two molecules of G3P are combined to form one glucose molecule.
99. Fixation of carbon dioxide is first phase of Calvin cycle. Calvin cycle is occurred in stoma of chloroplast.
100. There are three phases of Calvin cycle.
    - Phase I: Carbon fixation
    - Phase II: Reduction
    - Phase III: Regeneration of CO_2 acceptor, RuBP
101. Carbon fixation is performed by an enzyme which is referred as ribulose bisphosphate carboxylase. Also known as rubisco. It is most abundant protein on this planet.

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102. First yeast converts glucose into pyruvic acid. If oxygen is not present, then pyruvate is further converted into ethanol and CO_2 is also released.
103. Anaerobic respiration provides low energy yield. Cramps, pain and tiredness are consequences of anaerobic respiration.
104. Anaerobic respiration is also referred as fermentation. Fermentation is used for baking purposes.
105. During glycolysis, total four molecules of ATP are produced but two molecules of ATP are consumed first phase of glycolysis. 2 molecules of ATP are net gain of glycolysis.
106. End product of glycolysis is pyruvic acid, which is consisted of 3 carbon atoms.
107. In eukaryotes, complete breakdown of glucose yields total 40 molecules of ATP. 2 ATP molecules are used in preparatory phase of glycolysis. Molecules of NADH which are formed during glycolysis are not permeable to mitochondrial membrane. They donate their excited electrons to mitochondrion matrix and received by FAD^+ and converted into $FADH_2$. It gives only 2 ATP molecules. So, eukaryotes yield two less number of ATP than prokaryotes (38 ATP molecules).
108. The main event in the electron transport chain is the production of ATP through oxidative phosphorylation, as electrons are transferred along protein complexes, driving proton pumping.
109. Out of the 36 ATP molecules produced during cellular respiration, 28 are generated in the electron transport chain through chemiosmosis.
110. Kinases are enzymes that transfer phosphate groups from ATP to glucose or other substrates, playing a key role in phosphorylation.
111. In anaerobic conditions, glycolysis ends with pyruvate being converted to lactate (in animals) or ethanol and CO_2 (in yeast), depending on the organism.
112. The preparatory phase of glycolysis consumes 2 ATP to activate glucose, producing no ATP at this stage.
113. Baking relies on yeast performing anaerobic respiration (fermentation), producing CO_2 to leaven dough.
114. Alcoholic fermentation, an anaerobic process, yields only 2 ATP per glucose molecule via glycolysis, as no further ATP is made without oxygen.
115. Pyruvic acid (pyruvate) has a 3-carbon structure ($CH_3COCOOH$), formed as an end product of glycolysis.
116. In the light reactions, $NADP^+$ accepts electrons and protons (H^+) to form NADPH, which is used in the Calvin cycle.
117. P700, the reaction center of Photosystem I, absorbs light and loses electrons, becoming oxidized as they are transferred to an electron acceptor.
118. Plastocyanin, a copper-containing protein, shuttles electrons between the cytochrome complex and Photosystem I in the light reactions.
119. The Calvin cycle uses ATP and NADPH to fix CO_2, ultimately producing glyceraldehyde 3-phosphate (G3P), a 3-carbon sugar precursor.
120. The light reactions produce ATP and NADPH, which provide energy and reducing power for the Calvin cycle, along with oxygen as a byproduct.
121. ATP synthesis occurs in the thylakoid membranes, where a proton gradient drives ATP synthase during the light reactions.
122. ATP and NADPH, produced in the light reactions, are consumed in the Calvin cycle (dark reactions) to fix CO_2 into sugars.
123. The light reactions take place in the granum, the stacked thylakoid membranes where chlorophyll absorbs light energy.
124. Carotenoids absorb light primarily in the blue-green range (500-600 nm), complementing chlorophyll's absorption spectrum.
125. In non-cyclic electron transport, chlorophyll in Photosystem II loses 2 electrons, which are replaced by splitting water.

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126. Oxidative phosphorylation uses an electrochemical proton gradient across the mitochondrial membrane to synthesize ATP via ATP synthase.
127. Coenzyme Q (ubiquinone) accepts electrons from FADH2 in the electron transport chain, passing them to subsequent complexes.
128. Oxygen is the final electron acceptor in the respiratory chain, combining with electrons and protons to form water.
129. Oxidative phosphorylation involves electron transfer from NADH to Coenzyme Q, driving ATP synthesis via a proton gradient.
130. The cytochrome complex helps transfer electrons during the light reactions, contributing to the proton gradient necessary for ATP synthesis via chemiosmosis.
131. This step involves the oxidation of G3P, where NAD+ is reduced to NADH, but it does not require ATP. ATP is involved in the earlier steps of glycolysis, such as the phosphorylation of glucose and fructose 6-phosphate.
132. Fructose 6-phosphate undergoes isomerization to form Glucose 3-phosphate (G3P) through the enzyme phosphoglucose isomerase. This is a key step in glycolysis.
133. Aerobic respiration produces significantly more ATP (36-38 ATP) by fully oxidizing glucose, while anaerobic respiration only yields 2 ATP due to incomplete glucose breakdown.
134. This process occurs in microorganisms like yeast, where glucose is broken down into ethanol and carbon dioxide in the absence of oxygen, producing small amounts of ATP.
135. In anaerobic respiration, only about 2% of the energy in glucose is converted into ATP, as the glucose is only partially broken down compared to aerobic respiration.
136. Chemical formula $C_{55}H_{70}O_6N_4Mg$. This is the chemical formula for chlorophyll, which contains magnesium at the center of its porphyrin ring.
137. In the light reactions, electrons move from photosystem II to photosystem I through the cytochrome complex, where plastocyanin is reduced.
138. NADP reductase is responsible for reducing NADP+ to NADPH by adding electrons in the light-dependent reactions.
139. Photosystem II receives electrons from the splitting of water molecules (photolysis), producing oxygen as a byproduct.
140. In the Calvin cycle, CO_2 reacts with RuBP to form a 6-carbon intermediate that quickly splits into two 3-PGA molecules.
141. During the Calvin cycle, the regeneration step involves converting G3P back into RuBP using ATP.
142. During cyclic phosphorylation, electrons cycle through photosystem I without the need for water splitting (photolysis), which only occurs in non-cyclic phosphorylation.
143. Ubiquinone (also known as coenzyme Q) contains an iron atom, which is part of the electron transport chain involved in cellular respiration.
144. In photosynthesis, carotenoids absorb light energy and transfers it to chlorophyll b, which then passes the energy to chlorophyll a, where the light reactions are initiated.
145. The concentration of CO_2 in the Earth's atmosphere is about 0.03-0.04%, which is essential for the process of photosynthesis in plants.
146. In plants with photorespiration, the efficiency of CO_2 fixation is reduced to about 75% due to the oxygenation activity of RuBisCO.
147. In C4 plants, PEP carboxylase avoids photorespiration because it only catalyzes the fixation of CO_2, unlike RuBisCO, which can also fix oxygen.
148. During the catabolism of fats and proteins, acetyl CoA is a common molecule produced, which enters the citric acid cycle for ATP production.

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3 TOPIC BIOLOGICAL MOLECULES

PRACTICE EXERCISE

Q.1 The sum of all chemical reactions taking place within a cell is called:
A. Thermoregulation
B. Osmoregulation
C. Metabolism
D. Isomerism

Q.2 Which one of the following is an example of anabolic process?
A. Respiration
B. Digestion
C. Photosynthesis
D. Both A and B

Q.3 A mammalian cell contains 1.1 percentage of:
A. Protein
B. Water
C. DNA
D. RNA

Q.4 Most abundant organic compounds of a cell are:
A. Water
B. Proteins
C. Carbohydrates
D. Lipids

Q.5 Water is a very good solvent for substance due to its _____ nature and act as _____ due to its higher heat capacity.
A. Dipole nature, thermo-stabilizer
B. Polar, bipolar
C. Organic, inorganic
D. Ionic, covalent

Q.6 The water molecules remain attached together and do not separate because of this bonding:
A. Non-covalent
B. Ionic
C. Hydrogen
D. Hydrophobic

Q.7 Which property of water plays an important role in regulation of heat produced by oxidation?
A. Heat capacity
B. Heat of vaporization
C. Dipole nature
D. Ionization of water

Q.8 Ice floats on water due to which property of water:
A. Low density
B. Heat of vaporization
C. Ionization
D. Hydrophobic exclusion

Q.9 Most abundant carbohydrate in nature is:
A. Cellulose
B. Polysaccharides
C. Starch
D. Glycogen

Q.10 All of the following yield glucose on complete hydrolysis except:
A. Starch
B. Cellulose
C. Glycogen
D. Chitin

Q.11 Glucose combines with _____ to form milk sugar.
A. Glucose
B. Galactose
C. Fructose
D. Mannose

Q.12 Formation of a tri-saccharide involves release of _____ water molecule.
A. 1
B. 3
C. 2
D. 4

Q.13 How many carbon atoms are present inside the ring of fructose?
A. 6
B. 5
C. 4
D. 3

Q.14 Which of the following polysaccharide is present in human muscles abundantly?
A. Myoglobin
B. Actin and myosin
C. Collagen
D. Glycogen

Q.15 Pick out the odd one:
A. Cellulose
B. Agar
C. Galactose
D. Pectin

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Q.16 Which of the following carbons are present outside the ring of fructose?
A. 1st carbon & 2nd carbon
B. Only 1st carbon
C. 1st carbon and 5th carbon
D. 1st carbon and 6th carbon

Q.17 In a disaccharide, if carbon atoms are 12 then how many OH groups will be present?
A. 11
B. 10
C. 8
D. 12

Q.18 Which of the following is non-reducing disaccharide sugar?
A. Mannose
B. Sucrose
C. Maltose
D. Lactose

Q.19 Which of the following sugar is mainly present in human blood?
A. Glucose
B. Sucrose
C. Fructose
D. Mannose

Q.20 _____ is the storage form of carbohydrates in animals and humans which is equivalent to the _____ in plants.
A. Glycogen, cellulose
B. Starch, cellulose
C. Starch, glycogen
D. Glycogen, starch

Q.21 All are characteristics of monosaccharides except:
A. All carbon contains OH except carbonyl carbon
B. Digestion by amylase enzyme
C. Primary product of photosynthesis
D. Very simple and very sweet in taste

Q.22 Which of the followings sugars is/are component of nucleic acid?
A. Tetroses
B. Trioses
C. Pentoses
D. Hexoses

Q.23 How many types of amino acids are present in the cell?
A. 170
B. 25
C. 20
D. 3000

Q.24 A globular protein consisting of more than one polypeptide chains has:
A. Primary structure
B. Tertiary structure
C. Secondary structure
D. Quaternary structure

Q.25 A protein having secondary structure possesses:
A. Hydrogen bonding
B. Peptide bond
C. Disulfide bond
D. Both A and B

Q.26 All of the following are examples of fibrous proteins except:
A. Silk fiber
B. Myoglobin
C. Keratin
D. Fibrin

Q.27 Which of the following is a complex of globular protein with non-proteinaceous material?
A. Collagen
B. Fibrinogen
C. Albumin
D. Haemoglobin

Q.28 Muscle haemoglobin possesses:
A. Primary structure
B. Tertiary structure
C. Secondary structure
D. Quaternary structure

Q.29 _____ are defensive proteins.
A. Antigens
B. Vaccines
C. Antibodies
D. Fibrinogen

Q.30 Proteins of hair, horns, feathers and other skin parts are:
A. Storage protein
B. Structural protein
C. Enzymatic protein
D. Hormonal protein

Q.31 Identify the protein, which cannot be crystallized.
A. Antibodies
B. Haemoglobin
C. Fibrin
D. Enzymes

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Q.32 How many peptide bonds are present in an insulin molecule?
A. 49 B. 50
C. 51 D. 48

Q.33 Usually, a polypeptide chain bends and folds upon itself to form a globular shape. This is protein's:
A. Primary conformation B. Tertiary conformation
C. Secondary conformation D. Quaternary conformation

Q.34 Which of the following is a protease?
A. Deaminase B. Rennin
C. Oxidase D. Catalase

Q.35 It is an amino acid and also a part of phospholipid:
A. Serine B. Ethanolamine
C. Choline D. Aspartic acid

Q.36 Myelin sheath of neuron is composed of:
A. Sphingolipids B. Ethanolamine
C. Choline D. Waxes

Q.37 How many double bond/s is/are present in R-group of oleic acid?
A. 4 B. 2
C. 6 D. 1

Q.38 Which of following cannot form a biopolymer?
A. Amino acid B. Nucleotides
C. Fatty acid D. Monosaccharides

Q.39 An organic compound that belongs to lipids:
A. $C_{18}H_{32}O_{16}$ B. $C_{57}H_{110}O_6$
C. $C_{300}H_{500}O_{250}$ D. $C_{42}H_{85}O_{23}N_{17}S$

Q.40 It is precursor of bile acids:
A. Waxes B. Phospholipids
C. Steroids D. Acylglycerol

Q.41 Lipase can hydrolyze them:
A. Triglycerides B. Terpenoids
C. Waxes D. All of these

Q.42 All of the following biomolecules are nutritious except:
A. Carbohydrates B. Lipids
C. Proteins D. Nucleic acids

Q.43 It contains nitrogenous base:
A. Glycogen B. Cellulose
C. ATP D. Haemoglobin

Q.44 Nucleo-histones are present in:
A. Lysosome B. Ribosomes
C. Chromosomes D. Mitochondria

Q.45 Type of RNA that is used to start process of replication in prokaryotic cell:
A. tRNA B. rRNA
C. mRNA D. Primers

Q.46 Which type of RNA is catalytic in nature?
A. tRNA B. rRNA
C. mRNA D. SnRNA

Q.47 Most of the cellular secretions are:
A. Glycolipids B. Lipoproteins
C. Glycoproteins D. Nucleoproteins

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Q.48 Type of conjugated molecules present in ribosomes:
A. Glycolipids
B. Nucleoprotein
C. Glycolipids
D. Lipoproteins

Q.49 Difference in concentration (by percentage) of inorganic ions in prokaryotic and mammalian cell is:
A. 2%
B. 4%
C. 0%
D. 1%

Q.50 Which of the following ranks the molecules in a correct order by size?
A. Protein → Water → Glucose → Sucrose
B. Water → Protein → Sucrose → Glucose
C. Protein → Sucrose → Glucose → Water
D. Water → Sucrose → Glucose → Protein

Q.51 Primary fuel for respiration are:
A. Carbohydrates
B. Proteins
C. Lipids
D. Nucleic acids

Q.52 All of the following are examples of homopolysaccrides except:
A. Cellulose
B. Peptidoglycan
C. Starch
D. Glycogen

Q.53 All are carbohydrates except:
A. Pectin
B. Cutin
C. Chitin
D. Agar

Q.54 This is an example of conjugated molecule of lipid:
A. Acylglycerol
B. Phospholipid
C. Glycoprotein
D. Glycolipid

Q.55 Sphingolipids can be found in:
A. Exoskeleton of sponges
B. Myelin sheath of neurons
C. Epidermis of skin
D. Inner membrane of mitochondria

Q.56 All of the following carry quaternary structure of protein except:
A. Antibodies
B. Myoglobin
C. Insulin
D. Haemoglobin

Q.57 Inside red blood cells hemoglobin is synthesized from cytosolic ribosomes, each flat linear α chain and β chain of haemoglobin synthesized by ribosome exhibit _____ structure.
A. Primary
B. Tertiary
C. Secondary
D. Quaternary

Q.58 $C_4H_4N_2O_2$ is the molecular formula of:
A. Adenine
B. Cytosine
C. Uracil
D. Thymine

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TOPIC 3 BIOLOGICAL MOLECULES

PAST PAPER MCQ'S

Q.59 Hydrolysis process is a reverse of _____ process. (UHS-2022)
A. Photolysis
B. Condensation
C. Deduction
D. Convection

Q.60 Hydrolysis is the breakdown of polymers into its monomers by the addition of: (NUMS-2022)
A. Hydroxyl group
B. Hydrogen
C. Water
D. Nitrogen

Q.61 The four types of fundamental biological molecules present in protoplasm are carbohydrates, proteins, lipids and _____. (ETEA-2022)
A. Enzymes
B. Hormones
C. Nucleic acids
D. Alkaloids

Q.62 The most abundant element present in human body is_____. (ETEA-2022)
A. Sulphur
B. Nitrogen
C. Carbon
D. Manganese

Q.63 If water has high latent heat of vaporization, how this property of water could be helpful to plants and animals? (MDCAT-2019)
A. With the release of large amount of water vapors, a small amount of heat loss can take place
B. No cooling effect with the release of even large amount of water vapors
C. It will keep their temperature very high
D. With the release of small amount of water vapors, a great amount of heat loss can take place

Q.64 Which property of water helps to maintain the integrity of lipid membranes? (PMC-2020)
A. Specific heat capacity
B. Cohesion and adhesion
C. Hydrogen bonding
D. Hydrophobic exclusion

Q.65 Water acts as universal solvent because of: (PMC-2020)
A. Heat of vaporization
B. High polarity
C. Hydrogen bonding
D. Cohesion and adhesion

Q.66 Human bone cells contain _____ % of water. (UHS-2022)
A. 20
B. 40
C. 85
D. 90

Q.67 Due to its high heat of vaporization, water plays important role in living organisms as: (NUMS-2022)
A. Being and excellent solvent
B. Cooling agent
C. Membrane stabilizer
D. Thermal shock resistant

Q.68 Which of the following molecules would yield glucose and fructose on hydrolysis? (NUMS-2022)
A. Starch
B. Maltose
C. Sucrose
D. Lactose

Q.69 Which property of water enables it to act as temperature stabilizer in living organisms? (SZABMU-2022)
A. High polarity
B. Being non-polar
C. High specific heat capacity
D. High heat of vaporization

Q.70 Which of the following is antagonistic to condensation? (BUMHS-2022)
A. Decarboxylation
B. Hydration
C. Dehydration
D. Hydrolysis

Q.71 Water is the most abundant compound in living organisms its amount varies from: (DUHS-2022)
A. 30% to 60%
B. 50% to 60%
C. 10% to 20%
D. 70% to 90%

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Q.72 The simplest monosaccharide containing keto group is: (MDCAT-2014)
A. Glyceraldehyde B. Glucose
C. Dihydroxyacetone D. Ribose

Q.73 The compounds which, on hydrolysis, yield polyhydroxy aldehyde or ketone subunits are: (MDCAT-2016)
A. Lipids B. Polynucleotides
C. Proteins D. Carbohydrates

Q.74 Which of the following type of carbohydrates has high molecular weight and is sparingly soluble in water? (MDCAT-2017)
A. Monosaccharide B. Oligosaccharides
C. Disaccharides D. Polysaccharides

Q.75 Glycosidic bond is formed by the: (MDCAT-2018)
A. Removal of water B. Removal of oxygen
C. Addition of oxygen D. Addition of water

Q.76 Starch is present in tuber, fruits and grains but absent in animal cells. Instead, animals have a substance stored in liver and muscles known as: (MDCAT-2019)
A. Glucose B. Galactose
C. Glycogen D. Glucagon

Q.77 The covalent bond or bridge between two monosaccharides to form a disaccharide is called a: (MDCAT-2019)
A. Carboxyl bond B. Hydrogen bond
C. Hydroxyl bond D. Glycosidic bond

Q.78 Which is an example of a disaccharide? (MDCAT-2019)
A. Lactose B. Starch
C. Glycogen D. Fructose

Q.79 _____ is stored in animal cells. (ETEA-2019)
A. Starch B. Cellulose
C. Sucrose D. Glycogen

Q.80 Pure form of cellulose is: (AJK-2019)
A. Cotton B. Chitin
C. Cellophane D. Paper

Q.81 $C_5H_{10}O_4$ is the formula of _____. (AJK-2019)
A. Deoxyribose sugar B. RNA
C. DNA D. ATP

Q.82 Monosaccharides have a general formula represented by: (PMC-2020)
A. $Cn(H_2O)n$ B. $C_3(H_2O)n$
C. $C(H_2O)_n$ D. $C_1(H_2O)_n$

Q.83 _____ are the major sites for the storage of glycogen in an animal's body. (MDCAT-2017)
A. Muscle and liver B. Around belly and hips
C. Around thighs and belly D. Liver and kidneys

Q.84 Chitin is a: (ETEA-2019)
A. Lipoprotein B. Polysaccharide
C. Glycoprotein D. Phospholipid

Q.85 Which of the following is not a carbohydrate? (NUMS-2022)
A. Glucose ($C_6H_{12}O_6$) B. Sucrose ($C_{12}H_{22}O_{11}$)
C. Rhamnose ($C_6H_{12}O_5$) D. Lactic acid ($C_3H_6O_3$)

Q.86 Upon initial hydrolysis, starch yields: (UHS-2022)
A. Maltose B. Glucose
C. Sucrose D. Mannose

Q.87 Butyric acid is a _____ carbon fatty acid. (UHS-2022)
A. 6 B. 2
C. 4 D. 8

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Q.88 Which bond is the potential source of chemical energy for cellular activities? (SZABMU-2022)
A. C=O
B. C-H
C. C-R
D. C-N

Q.89 Which of the following carbohydrates are the sweetest among all? (SZABMU-2022)
A. Monosaccharides
B. Disaccharides
C. Oligosaccharides
D. Polysaccharides

Q.90 Ribose is a pentose sugar (5-carbon) that contains: (ETEA-2022)
A. Aldehyde group
B. Ketone group
C. Carboxyl group
D. Ester group

Q.91 Diastase/amylase acts on: (BUMHS-2022)
A. Maltose
B. Sucrose
B. Lactose
D. Starch

Q.92 Maltose is a: (BUMHS-2022)
A. Polysaccharide
B. Disaccharide
C. Oligosaccharide
D. Monosaccharide

Q.93 Synthesis of disaccharide by condensation two glucose joined by glycosidic linkage to form: (DUHS-2022)
A. Galactose
B. Lactose
C. Fructose
D. Maltose

Q.94 Molecules of amylose consists of unbranched chains of hundreds of glucose sub units, join together by: (DUHS-2022)
A. 1-2 glycosidic linkage
B. 2-3 glycosidic linkage
C. 1-4 glycosidic linkage
D. 1-3 glycosidic linkage

Q.95 Which level of protein structure maintains the helix shape of enzymes? (LUMHS-2014)
A. Primary
B. Secondary
C. Tertiary
D. Quaternary

Q.96 Enzymes are molecules of one of the following group of biomolecules. Mark the correct answer which can also be defined as a biological catalyst: (KMDC-2014)
A. Protein
B. Fats
C. Carbohydrate
D. Vitamins

Q.97 Which molecular structure of enzyme is essential for activity of enzyme? (MDCAT-2015)
A. Primary structure
B. Secondary structure
C. Quaternary structure
D. Tertiary structure

Q.98 Secondary structure of protein is found in: (MDCAT-2016)
A. Trypsin
B. Insulin
C. Keratin
D. Glucagon

Q.99 The number of amino acids that have been found to occur in cells and tissues are: (MDCAT-2017)
A. 170
B. 25
C. 20
D. 45

Q.100 Backbone of amino acid comprises of: (MDCAT-2017)
A. C-C-N
B. –NH2 Group
C. –COOH group
D. –H group

Q.101 Which of the following holds the alpha helix of protein in its place? (MDCAT-2018)
A. Hydrogen bond
B. R-group
C. Amino group
D. Disulphide bond

Q.102 The number and sequence of amino acids along a polypeptide chain is called structure of a protein. (MDCAT-2018)
A. Secondary
B. Primary
C. Quaternary
D. Tertiary

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Q.103 Most proteins are made up of: (MDCAT-2019)

A. 16 types of amino acids
B. 170 types of amino acids
C. 10 types of amino acids
D. 20 types of amino acids

Q.104 The structure of a fibrous protein comprises of polypeptide chains in the form of: (MDCAT-2019)

A. Cluster
B. Spherical or curled up ball
C. Flat uncoiled chains
D. Long strands or fibrils

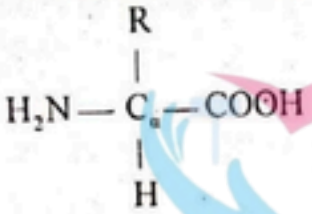
Q.105 In glycine, 'R' is _____. (MDCAT-2019)

A. Fatty acid
B. Hydrogen
C. Ethane
D. Methane

Q.106 Which type of bonds is required to maintain the alpha helix configuration of a protein? (AJK-2019)

A. Hydrophobic interactions
B. Disulfide bonds
C. Hydrogen bonds
D. Ionic bonds

Q.107 The structure given below is the constituent part of: (NUMS-2019)



A. Lipids
B. Carbohydrates
C. Vitamins
D. Proteins

Q.108 Unique three-dimensional shape of the fully folded polypeptide constitutes: (UHS-2022)

A. Primary structure of protein
B. Secondary structure of protein
C. Tertiary structure of protein
D. Quaternary structure of protein

Q.109 Which of the following molecules contains amino acid? (NUMS-2022)

A. Cellulose
B. Collagen
C. Sucrose
D. Ascorbic acid

Q.110 Select an example of fibrous protein: (SZABMU-2022)

A. Enzymes
B. Collagen
C. Hemoglobin
D. Hormones

Q.111 Which function is not performed by proteins? (SZABMU-2022)

A. Providing structural support to cell
B. Catalyzing biochemical reactions
C. Transporting materials across cell membrane
D. Providing insulation against heat loss

Q.112 Proteins are macromolecules formed of units known as amino acids. The amino acids in which the variable group (R) is represented by an H atom is: (ETEA-2022)

A. Lysine
B. Phenylalanine
C. Glycine
D. Alanine

Q.113 Haemoglobin is a: (ETEA-2022)

A. Carbohydrate
B. Protein
C. Nucleic acid
D. Enzyme

Q.114 The most common protein in nature is _____. (ETEA-2022)

A. Collagen
B. Rubisco
C. DNAase
D. Keratin

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Q.115 A haemoglobin molecule consists of _____ amino acids. (ETEA-2022)
A. 874
B. 474
C. 674
D. 574

Q.116 Two simplest amino acids are: (BUMHS-2022)
A. Trypsin and glycine
B. Trypsin and alanine
C. Glycine and alanine
D. Glutamate and alanine

Q.117 Which protein establishes the matrix of bone and cartilage? (BUMHS-2022)
A. Myoglobin
B. Hemoglobin
C. Fibrinogen
D. Collagen

Q.118 If in lipids there is a higher proportion of unsaturated fatty acid, then it will be: (MDCAT-2017)
A. Oils
B. Phenols
C. Waxes
D. Fats

Q.119 Which of the following is an unsaturated fatty acid? (MDCAT-2018, PMC-2020)
A. Butyric acid
B. Oleic acid
C. Stearic acid
D. Palmitic acid

Q.120 Lipids contain double amount of energy as compared to the same amount of carbohydrates due to the presence of: (MDCAT-2019)
A. Lower proportion of C–H bonds
B. Higher proportion of C–O bonds
C. Higher proportion of C–H bonds
D. Higher proportion of oxygen

Q.121 Lipids are organic molecules which are insoluble in: (AJK-2019)
A. Alcohol
B. Ether
C. Chloroform
D. Water

Q.122 What type of linkage is formed when an alcohol and an acid react? (AJK-2019)
A. Hydrogen bond
B. Peptide bond
C. Glycosidic linkage
D. Ester bond

Q.123 Lipids store double amount of energy as compared to carbohydrates because of: (PMC-2020)
A. High proportion of oxygen
B. Low proportion of carbon
C. High CO ratio
D. High proportion of CH

Q.124 The head of phospholipid molecule is polar (hydrophilic) due to: (AJK-2019)
A. Fatty acid
B. Phosphate
C. Carboxylic acid
D. Triacylglycerol

Q.125 Which of the following are the most prominent part of cell membranes in living organisms? (NUMS-2019)
A. Terpenoids
B. Waxes
C. Phospholipids
D. Acylglycerols

Q.126 Three hydrophobic fatty acid tails and a glycerol molecule join to form: (SZABMU-2022)
A. Monoglyceride
B. Diglyceride
C. Triglyceride
D. Phospholipid

Q.127 The type of lipids which do not contain fatty acids are: (ETEA-2022)
A. Phospholipids
B. Waxes
C. Steroids
D. Acylglycerol

Q.128 The glycerol is a _____ carbon compound. (ETEA-2022)
A. Three
B. Four
C. Five
D. Six

Q.129 Which statement is wrong about saturated fats? (BUMHS-2022)
A. They have multiple double bonds in the carbon chains of their fatty acids
B. They are more common in animals than in plants
C. They contain more hydrogen than saturated fats having the same number of carbon atoms
D. They generally solidify at room temperature

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Q.130 This lipid is most common abundant richest source of energy in plant, and animal body: (DUHS-2022)

A. Phospholipid
B. Carotenoids
C. Terpenoids
D. Acylglycerol

Q.131 Phosphodiester bond is: (MDCAT-2016)

A. P—O—C—P—O—C
B. C—O—P—O—C
C. C—O—P
D. C—C—O—P

Q.132 Which of the following is the constituent of RNA molecule? (NUMS-2019)

A. Fatty acids
B. Ribonucleic acid
C. Ascorbic acid
D. Deoxyribonucleic acid

Q.133 Which of the following is a conjugated molecule? (UHS-2022)

A. Protein
B. Lipid
C. Glycoprotein
D. Vitamins

Q.134 Energy is _____ by the breakdown of complex molecules into simpler ones, such reactions are called catabolic reactions. (UHS-2023)

A. Released
B. Consumed
C. Produced
D. Destroyed

Q.135 Second most abundant bio element in human body is: (SZABMU-2023)

A. Oxygen
B. Carbon
C. Hydrogen
D. Nitrogen

Q.136 Which of the following is opposite of condensation reaction? (ETEA-2023 Retake)

A. Decarboxylation
B. Hydration
C. Dehydration
D. Hydrolysis

Q.137 _____ forms almost three-fourth of the body by weight. (UHS-2023)

A. Water
B. Protein
C. Carbohydrates
D. Lipids

Q.138 Thermal stability of organisms in the environment is because of which characteristics of water? (NUMS-2023)

A. Solvent property
B. Heat capacity
C. Ionization
D. Protection

Q.139 Biologically, _____ plays key roles in maintaining the integrity of lipid bilayer membranes. (UHS-2023)

A. Hydrophilic exclusion
B. Hydrophobic exclusion
C. Heat of vaporization
D. Specific heat capacity

Q.140 The specific heat of vaporization of water plays an important role in the regulation of heat produced by _____. (UHS-2023)

A. Reduction
B. Oxidation
C. Redox
D. None of above

Q.141 Which type of bond must be broken for water to vaporize? (UHS-2023)

A. Nonpolar covalent bonds
B. Polar covalent bonds
C. Hydrogen bonds
D. Covalent bonds

Q.142 All are the properties of water excluding: (ETEA-2023 Retake)

A. Universal solvent
B. Polar nature
C. Hydrogen bonding
D. Becomes dense when it freezes

Q.143 _____ is the heat required to convert a gram of water into vapors at its boiling point. (ETEA-2023 Retake)

A. Heat of vaporization
B. Specific heat capacity
C. Heat of ionization
D. Polarity of water

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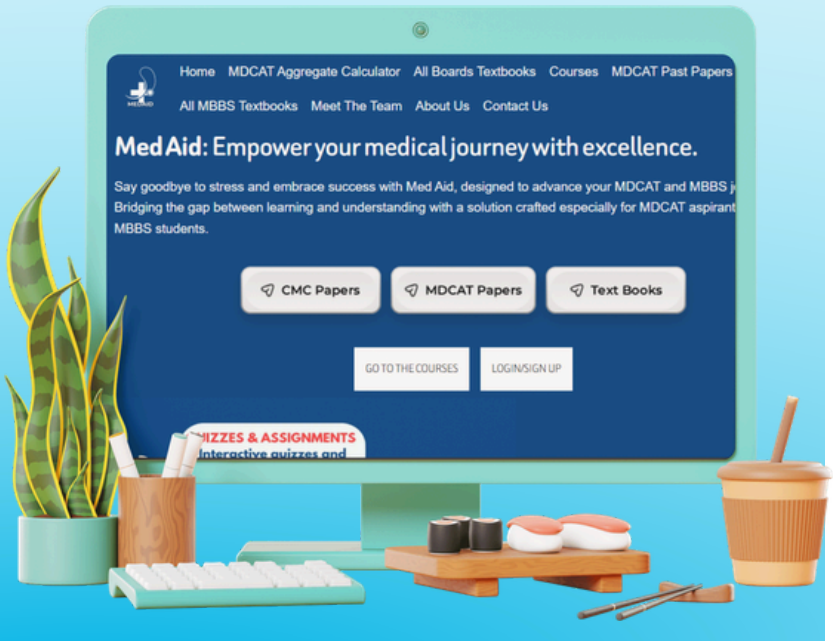

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Q.144 Which statement is true regarding both starch and cellulose? (UHS-2023)
A. They are both polymers of glucose
B. They are geometric isomers of each other
C. They can both be digested by humans
D. They are both used for energy storage in plants

Q.145 These carbohydrates are sweetest among all carbohydrates: (NUMS-2023)
A. Monosaccharaides
B. Disaccharides
C. Oligosaccharides
D. Polysaccharides

Q.146 Most of the monosaccharides form a ring structure when in solution. For example ribose will form a five cornered ring known as _____ (UHS-2023)
A. Glucopyranose
B. Ribofuranose
C. Glyceraldehyde
D. Acetaldehyde

Q.147 Lactose is composed of: (ETEA-2023)
A. Glucose + Galactose
B. Glucose + Fructose
C. Glucose + Glucose
D. Fructose + Glucose

Q.148 Glucose is classified as a _____. (ETEA-2023 Retake)
A. Monosaccharides
B. Disaccharides
C. Oligosaccharides
D. Polysaccharides

Q.149 Sucrose is hydrolyzed into: (ETEA-2023 Retake)
A. Lactose and glucose
B. Lactose and fructose
C. Glucose and fructose
D. Glucose and galactose

Q.150 Which of the following process is involved in decomposition of protein into amino acids? (SZABMU-2023)
A. Condensation
B. Hydrolysis
C. Glycolysis
D. Fixation

Q.151 Which of the following protein establishes the matrix of bone & cartilage? (NUMS-2023)
A. Elastin
B. Keratin
C. Collagen
D. Histone

Q.152 Most abundant organic compound in mammalian cells are: (NUMS-2023)
A. Water
B. Lipids
C. Carbohydrates
D. Proteins

Q.153 Select the protein providing support for the connective tissues: (SZABMU-2023)
A. Histones
B. Keratin
C. Elastin
D. Collagen

Q.154 Fibrous proteins do not take part in: (SZABMU-2023)
A. Blood clotting
B. Formation of nails
C. Muscle contraction
D. Oxygen transport in blood

Q.155 In sickle cell hemoglobin molecule, glutamic acid, is replaced by: (ETEA-2023)
A. Proline
B. Glutamine
C. Valine
D. Glycine

Q.156 _____ is found in the exoskeleton of crabs. (ETEA-2023)
A. Cellulose
B. Chitin
C. Murein
D. Hemi-cellulose

Q.157 Amino acids mainly differ from each other by the difference in their: (ETEA-2023)
A. R-group
B. Amino group
C. Carboxyl group
D. Hydrogen alpha carbon

Q.158 Three hydrophobic fatty acid tails and a glycerol molecule join to form a: (SZABMU-2023)
A. Monoglyceride
B. Diglyceride
C. Triglyceride
D. Phospholipid

Q.159 Choose the unsaturated fatty acid among the following: (ETEA-2023)
A. Palmitic acid
B. Arachidic acid
C. Stearic acid
D. Oleic acid

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(NUMS-2023)

Q.160 C-H bonds in lipids are important:
A. As insulating material
B. Providing more energy
C. As exoskeleton
D. As cuticle of leaves

(SZABMU-2023)

Q.161 The sugar which is part of ribonucleic acid is:
A. Ribulose
B. Ribose
C. Deoxyribulose
D. Deoxyribose

(ETEA-2023 Retake)

Q.162 Purines are _____ nitrogenous bases.
A. Double ringed
B. Single ringed
C. Double bond
D. Single bond

(UHS-2023)

Q.163 Cells of different types can be distinguished on the basis of surface.
A. Phospholipids
B. Globular proteins
C. Glycolipids and glycoprotein
D. Cholesterol

(SZABMU-2023)

Q.164 The basic structural framework of all types of membranes is:
A. Glycolipids
B. Glycoproteins
C. Lipoproteins
D. Nucleoproteins

(ETEA-2023)

Q.165 The conjugated molecule that is primarily present in egg albumin is:
A. Lipoprotein
B. Nucleoprotein
C. Glycolipid
D. Glycoprotein

(UHS-2024)

Q.166 What is the percentage of H_2O in bone cells?
A. 70%
B. 20%
C. 99%
D. 60%

(SZAMBU-2024)

Q.167 At 25 degrees Celsius, the concentration of each of H^+ and OH^- ions in pure water is about _____ moles per liter.
A. 10^{-6}
B. 10^{-7}
C. 10^{-12}
D. 10^{-14}

(SZAMBU-2024-Reconduct)

Q.168 Which property of water helps to maintain the integrity of lipid bilayer membranes?
A. Specific heat capacity
B. Hydrogen bonding
C. Cohesion and adhesion
D. Hydrophobic exclusion

(UHS-2024)

Q.169 Mono-saccharides have a general formula represented by:
A. $Cn(H_2O)n$
B. $Cn(H_2O)n$
C. $C2(H_2O)n$
D. $Cn(H_2O)n$

(UHS-2024)

Q.170 Polysaccharides in plants are synthesized by the process of:
A. Hydrolysis
B. Oxidation
C. Condensation
D. Glycolysis

(UHS-2024)

Q.171 Which monosaccharide will form a gluco pyranose ring in solution?
A. Fructose
B. Glucose
C. Ribose
D. Deoxyribose

(KMU-2024)

Q.172 Sugarcane contains:
A. Fructose
B. Glucose
C. Ribose
D. Sucrose

(SZAMBU-2024)

Q.173 Which of the following monosaccharides is an aldehyde-hexose sugar?
A. Ribose
B. Galactose
C. Glucose
D. Fructose

(SZAMBU-2024)

Q.174 Which of the following carbohydrates gives dark brown colour with iodine solution?
A. Starch
B. Glycogen
C. Sucrose
D. Glucose

(NUMS-2024)

Q.175 Less reactivity of sucrose is due to its:
A. High solubility in water
B. Polar nature
C. Unavailability of functional group
D. 1-2 glycosidic linkage

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Q.176 Sucrose is used as a transport carbohydrate instead of glucose because: (NUMS-2024)
A. It is disaccharide
B. It is non-reducing sugar
C. It is soluble in water
D. It does not change osmotic potential of water

Q.177 Percentage of glucose normally in human body is: (SZAMBU-2024-Reconduct)
A. 8%
B. 1.8%
C. 0.8%
D. 0.08%

Q.178 Polysaccharide found most commonly in grains and seeds is: (SZAMBU-2024-Reconduct)
A. Starch
B. Glycogen
C. Pectin
D. Dextrin

Q.179 Glycogen is most abundant in: (SZAMBU-2024-Reconduct)
A. Brain cells
B. Liver cells
C. Adipose cells
D. Smooth muscle cells

Q.180 Stereoisomers are molecules containing atoms are: (SZAMBU-2024-Reconduct)
A. Same and bonded identically
B. Same and bonded dependently
C. Dependent and bonded identically
D. Dependent and bonded same

Q.181 Which of the following process is involved in breakdown of protein into Amino acids? (UHS-2024)
A. Condensation
B. Hydrolysis
C. Glycolysis
D. Fixation

Q.182 Sickle cell anaemia results from: (KMU-2024)
A. Reduction in oxygen carrying capacity of haemoglobin
B. Linkage between the polypeptide chains
C. Single amino acid substitution in the haemoglobin molecule
D. Viral infections of RNA viruses

Q.183 Which is incorrect about the globular proteins? (KMU-2024)
A. Abundantly found in hair
B. Are spherical in shape
C. Have polypeptide chains
D. Soluble in water

Q.184 The bond between hydroxyl group of carboxylic group of one amino acid and hydrogen of amino group of second amino acid with release of water molecule is called? (SZAMBU-2024)
A. Glycosidic bond
B. Peptide bond
C. Hydrogen bond
D. Disulfide bridge

Q.185 Which of the following does not have a quaternary structure? (SZAMBU-2024)
A. Antibodies
B. Hemoglobin
C. DNA polymerase III
D. Myoglobin

Q.186 Protein with tertiary structures are helpful in: (NUMS-2024)
A. Carrying messages from glands to target organs
B. Maintaining epithelial lining of skin
C. Maintaining the matrix of connective tissues
D. Helping muscle contraction

Q.187 Rebounding is process of straightening the curly hairs, which bond is targeted by oxidizing agents used during the process? (NUMS-2024)
A. Peptide Bond
B. Ionic bond
C. Disulphide bridge
D. Hydrogen bond

Q.188 Number of amino acids in each alpha chain of hemoglobin is: (SZAMBU-2024-Reconduct)
A. 141
B. 146
C. 414
D. 416

Q.189 Two amino acids form a dipeptide through: (SZAMBU-2024-Reconduct)
A. Condensation reaction
B. Hydrolysis
C. Ionic bond formation
D. Hydrogen bonding

Q.190 The protein present in blood plasma and involved in blood clotting is: (SZAMBU-2024-Reconduct)
A. Hormones
B. Fibrinogen
C. Antibodies
D. Enzymes

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Q.191 When glycerol reacts with fatty acid, which type of chemical bond will form? (UHS-2024)
A. Ester Bond
B. Ether Linkage
C. Hydrogen Bond
D. Ionic Bond

Q.192 The hydrophilic end of phospholipid molecule is polar because of the presence of: (UHS-2024)
A. Glycerol
B. Amine group
C. Fatty Acid
D. Phosphate group

Q.193 What is the ester of fatty acids and long chain alcohol called? (KMU-2024)
A. Acylglycerol
B. Glycerol
C. Phospholipid
D. Wax

Q.194 Lipids, which do not contain fatty acid are: (KMU-2024)
A. Neutral lipids
B. Phosphatidic acids
C. Steroids
D. Waxes

Q.195 Which of the following is a basic component of lipid bilayer of plasma membrane? (SZAMBU-2024)
A. Acylglycerol
B. Lecithin
C. Triglyceride
D. Waxes

Q.196 Which fatty acid would have the highest melting point? (SZAMBU-2024-Reconduct)
A. Oleic acid
B. Lauric acid
C. Palmitic acid
D. Stearic acid

Q.197 Lipids that protect plants from water loss are: (SZAMBU-2024-Reconduct)
A. Phospholipids
B. Waxes
C. Terpenoid
D. Triglyceride

Q.198 Which of the following is found in both messenger RNA and DNA of a mammalian cell? (SZAMBU-2024-Reconduct)
A. Double helical structure
B. Ribose sugar
C. Thymine
D. Sugar phosphate backbone

Q.199 Transcription is the process in which an RNA copy of the DNA sequence and coding the gene is produced with the help of an enzyme called: (SZAMBU-2024-Reconduct)
A. DNA polymerase
B. RNA dependent DNA polymerase
C. RNA polymerase
D. RNA transcriptase

Q.200 Nucleoproteins are involved in: (NUMS-2024)
A. Cell to cell recognition
B. Passing hereditary information to next generation
C. Ensuring fast speed of nerve impulse
D. Acting as a surface marker

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ANSWER KEY

PRACTICE EXERCISE

1	C	11	B	21	B	31	C	41	A	51	A
2	C	12	C	22	C	32	A	42	D	52	B
3	D	13	C	23	A	33	B	43	C	53	B
4	B	14	D	24	D	34	B	44	C	54	D
5	A	15	C	25	D	35	A	45	D	55	B
6	C	16	D	26	B	36	A	46	B	56	B
7	B	17	C	27	D	37	D	47	C	57	A
8	A	18	B	28	B	38	C	48	B	58	C
9	A	19	A	29	C	39	B	49	C		
10	D	20	D	30	B	40	C	50	C		

PAST PAPER MCQ'S

59	B	78	A	97	D	116	C	135	B	154	D	173	C	[illegible]	D
60	C	79	D	98	C	117	D	136	D	155	C	174	B	193	D
61	C	80	A	99	A	118	A	137	A	156	B	175	C	194	C
62	C	81	A	100	A	119	B	138	B	157	A	176	B	195	B
63	D	82	A	101	A	120	C	139	B	158	C	177	D	196	D
64	D	83	A	102	B	121	D	140	B	159	D	178	A	197	B
65	B	84	B	103	D	122	D	141	C	160	B	179	B	198	D
66	A	85	D	104	D	123	D	142	D	161	B	180	A	199	C
67	B	86	A	105	B	124	B	143	A	162	A	181	B	200	B
68	C	87	C	106	C	125	C	144	A	163	C	182	C		
69	C	88	B	107	D	126	C	145	A	164	C	183	A		
70	D	89	A	108	C	127	C	146	B	165	D	184	B		
71	D	90	A	109	B	128	A	147	A	166	B	185	D		
72	C	91	D	110	B	129	A	148	A	167	B	186	A		
73	D	92	B	111	D	130	D	149	C	168	D	187	C		
74	D	93	D	112	C	131	B	150	B	169	B	188	A		
75	A	94	C	113	B	132	B	151	C	170	C	189	A		
76	C	95	B	114	B	133	C	152	D	171	B	190	B		
77	D	96	A	115	D	134	A	153	D	172	D	191	A		

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EXPLANATORY NOTES

PRACTICE EXERCISE

1. Word metabolism is derived from Greek word which means "Change". Temperature regulation, water and salt regulation respectively called thermoregulation and osmoregulation, while isomerism is the phenomenon in which more than one compounds have the same chemical formula but different structures.

2.

Process	Definition	Example	Energy relation
Anabolism	Formation of larger molecules from smaller one	Photosynthesis	Energy absorbed
Catabolism	Breakdown of larger molecules into smaller	Respiration & digestion	Energy released

3.

Sr. No.	Chemical Components	% total cell weight Bacterial Cell	Mammalian Cell
1.	Water	70	70
2.	Proteins	15	18
3.	Carbohydrates	3	4
4.	Lipids	2	3
5.	DNA	1	0.25
6.	RNA	6	1.1
7.	Organic molecules (enzymes, hormones, metabolites)	2	2
8.	Inorganic ions (Na^+, K^+, Mg^{+2}, Cl^-, SO_4^{-2} etc.)	1	1

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4.

Sr. No.	Chemical Components	% total cell weight Bacterial Cell	Mammalian Cell
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5. Water is an excellent solvent for polar substances due to its dipole nature. Ions and molecules move randomly and are in a more favorable state to react with other molecules and ions when in solution and water have great ability to absorb heat due to higher heat capacity and act as thermo-stabilizer.

6. The sticking together of like substances is called cohesion. Depending on how attracted molecules of the same substance are to one another, the substance will be more or less cohesive. Hydrogen bonds cause water to be exceptionally attracted to each other. Therefore, water is very cohesive.

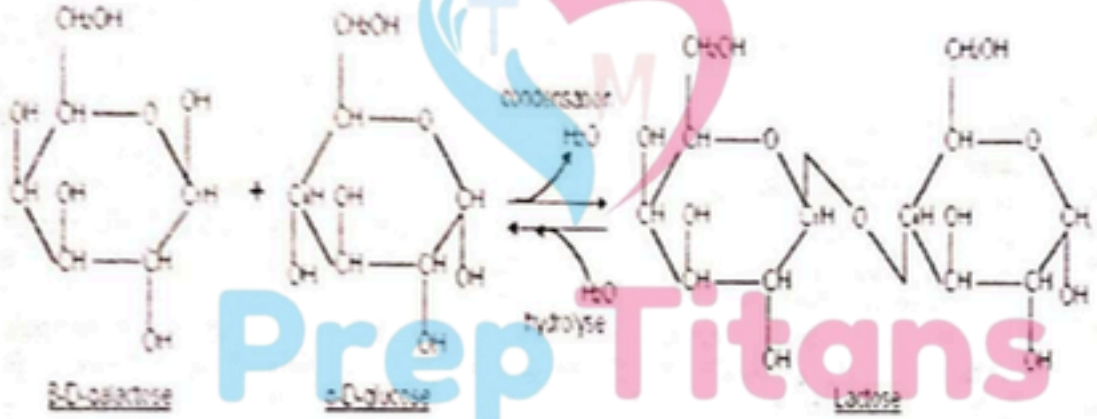
7. Evaporation causes cooling because the process requires heat energy. The energy is taken away by the molecules when they convert from liquid into gas, and this causes cooling on the original surface.

8. Ice is less dense than water because during ice formation water molecules rearrange themselves in hexagonal form, this increases the volume of ice crystals, hence decrease its density.

9. Cellulose is a type of polysaccharide which contains chains of glucose rings providing strength and rigidity. Cellulose forms the cell walls of plants and is the primary constituent of wood, making this organic compound, the most abundant one on the surface of the Earth.

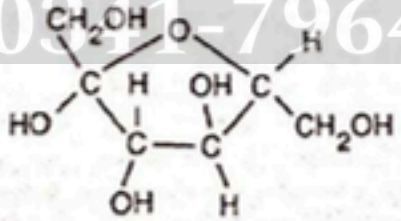
10. Chitin is a nitrogen containing polysaccharide and it will yield N-acetyl-D-glucosamine on hydrolysis while starch and glycogen will yield α-D glucose monomers and Cellulose will yield β-D glucose monomers on hydrolysis.

11.



12. Tri-saccharide is a molecule containing three monosaccharides, there is single glycosidic bond between two adjacent monosaccharides and third monosaccharide will bind to already bound disaccharide by forming another glycosidic bond. Thus, there will be two glycosidic bonds and one water molecule will be released from each glycosidic bond.

13. Four carbon atoms are present inside the ring of fructose while two carbon atoms are present outside of the ring.



Fructose

14. Glycogen is most abundant polysaccharide present in human muscles and liver while myoglobin, collagen, actin and myosin are proteins.

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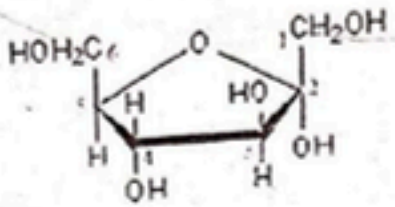
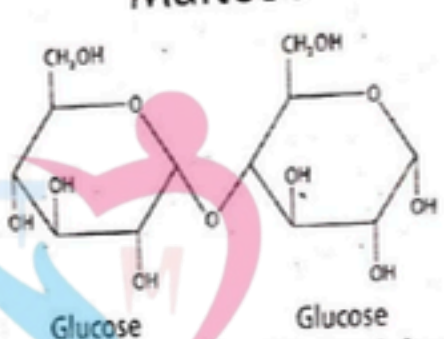
15. Cellulose, agar and pectin are the examples of polysaccharides but galactose is an example of monosaccharide.

16.



17.

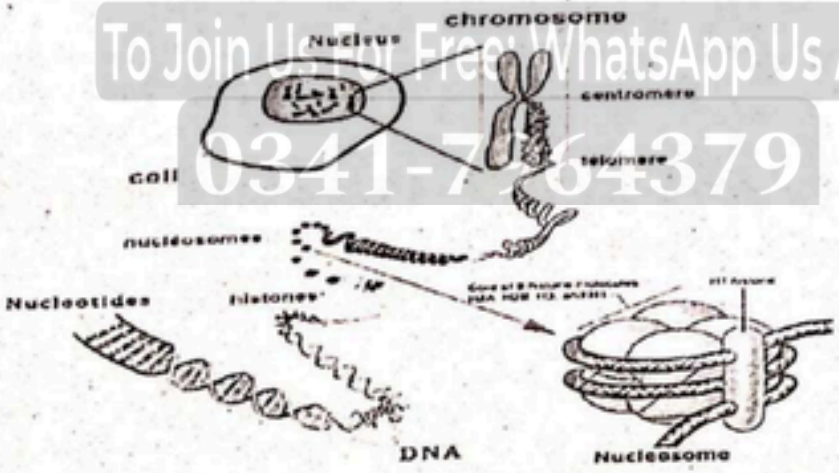


18. The reducing group in sucrose is used in glycosidic bond formation due to which it is non-reducing in nature. On the other hand, mannose, maltose and lactose are all reducing sugars.
19. In non-diabetic individuals, the concentration of glucose in the blood is about 0.08%.
20. Glycogen and starch are storage forms of carbohydrates in animals and plants respectively.
21. Amylase is an enzyme that hydrolyzes polysaccharides like starch and glycogen. It does not break down monosaccharides like glucose, fructose etc.
22. The single repeating unit of nucleic acids is nucleotide and it has three components. i) Phosphate group, ii) Nitrogen bases and iii) Pentose sugar such as ribose and deoxyribose.
23. Types of amino acids:
    - 170 amino acids are present in nature in cells or tissues.
    - 25 types of amino acid are constituents of proteins.
    - The combinations of 20 types of amino acids can synthesize most of the proteins.
24. In many complex proteins, polypeptide tertiary chains are aggregated and held together by hydrophobic interactions, hydrogen and ionic binds. This specific arrangement is the quaternary structure.
25. All proteins have primary structure, amino acids are joined with each other through peptide bonds. In secondary structure, polypeptide chain coils to form either α-helix or β-pleated sheet or both through hydrogen bonds.
26. Silk fiber, keratin and fibrin are examples of fibrous proteins while myoglobin has tertiary structure and it is a typical water-soluble globular protein found in muscles.
27. Hemoglobin consists of 4 polypeptide chains forming a quaternary structure, and 4 haem groups containing 4 iron atoms as a non-protein part of the molecule.
28. Myoglobin, also called as muscle haemoglobin, is made up of single polypeptide chain, which coils upon itself forming tertiary structure.
29. Antibodies are also called immunoglobulins; they are the part of immune system and protect body against invading pathogens.
30. Usually, fibrous proteins containing secondary structure are structural proteins.

31. Fibrin is an example of fibrous protein and cannot be crystallized. Antibodies, hemoglobin and enzymes are globular proteins and can be crystallized.
32. There are two polypeptide chains in insulin. One containing 21 amino acids and the other containing 30 amino acids. The bond between each chain is one less than the total number of the amino acids. In this way number of peptide bonds will be 49 out of 51 amino acids.
33. When a single polypeptide chain folds upon itself and form globular structure, it is tertiary structure of the proteins. Three types of bonds, namely ionic, hydrogen and disulfide maintain it.
34. Protease is an enzyme that cleaves peptide bonds. Rennin performs action on milk protein and converts caseinogen to casein.
35. Serine and aspartic acids are examples of amino acids while choline and ethanolamine are nitrogen containing bases. Serine can be the constituent of phospholipids and acts as nitrogenous base.
36. Sphingolipids are a major component of myelin sheath. Ethanolamine and choline are nitrogenous bases found in phospholipids. Waxes are abundantly found in protective covering of fruits and leaves.
37. **Oleic acid - Monounsaturated fatty acid**



38. Amino acids join to form proteins. Nucleotides join to form nucleic acid while monosaccharides join to form polysaccharides.
39. Lipids are organic compounds that have very less amount of oxygen as compared to other elements like carbon and hydrogen.
40. Steroids include bile acids, male sex hormone, female sex hormone and progesterone etc.
41. Triglycerides are hydrolyzed into fatty acids and glycerol by an enzyme known as lipase. These are only types of lipids that break down in animal body by an enzyme and provide energy source.
42. Through metabolism carbohydrates, lipids and proteins all can be the source of energy, while nucleic acids are not the source of energy.
43. ATP is a nucleotide which contains pentose sugar, nitrogenous base and three phosphate groups. Glycogen and cellulose are polysaccharides and hemoglobin is a quaternary protein.
44.



45. Ten RNA nucleotides are stringed together to form a primer. Polymerase enzyme recognizes these RNA nucleotides known as primer and start process of replication in prokaryotes.

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46. Ribosomal RNA (rRNA) is catalytic in nature because it plays a key role in catalyzing the formation of peptide bonds during protein synthesis in the ribosome.

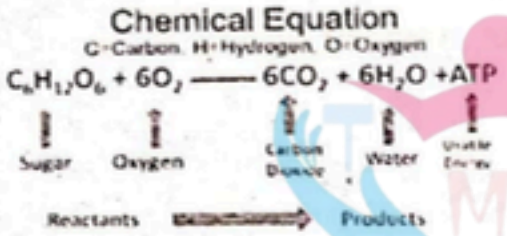
47. The Golgi apparatus is responsible for cellular secretion. When protein vesicles move to Golgi apparatus for delivery to targeted destinations. As the secretory proteins move through the Golgi apparatus, a number of chemical modifications like Glycosylation may occur.

48. Ribosomes are small particles composed of both proteins and RNA. The RNA present in ribosomes are called ribosomal RNA and they are produced in the nucleolus, which is a prominent globular structure in the nucleus.

49. The concentration of inorganic ions in prokaryotic and mammalian cells is generally very similar. Therefore, the difference is typically **0%**.

50.
- **Protein** is the largest of these molecules due to its complex structure.
- **Sucrose** (a disaccharide) is larger than **Glucose** (a monosaccharide).
- **Glucose** is smaller than sucrose.
- **Water** is the smallest molecule of all.

51.



52. Homopolysaccharides are made up of only one type of monosaccharide unit. **Cellulose, starch,** and **glycogen** are all homopolysaccharides made entirely of glucose units.

53. Cutin is a **lipid**, not a carbohydrate. It forms a protective, waxy layer on plant surfaces. **Pectin, chitin, and agar** are all carbohydrates.

54. Acylglycerols and phospholipids are simple lipids while glycolipids are derivatives.

55. These contain sphingosine alcohol.

56. Myoglobin has only a single polypeptide chain, so it does not have a quaternary structure.

57. Hemoglobin chains are synthesized as linear polypeptides, representing the primary structure.

58.
- Adenine ($C_5H_5N_5$)
- Guanine ($C_5H_5N_5O$)
- Cytosine ($C_5H_5N_3O$)
- Thymine ($C_5H_6N_2O_2$)
- Uracil ($C_4H_4N_2O_2$)

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59. Hydrolysis: it is essentially reverse of condensation i.e., the breakdown of a polymer into its monomers by addition of water.
Condensation: when two monomers join, a hydroxyl group is removed from one monomer and a hydrogen atom is removed from other to make water and as a result a bond is synthesized between two monomers.

60. During hydrolysis, a hydroxyl group from water is attached to one monomer and hydrogen is attached to the other monomer. Digestion reactions are examples of hydrolysis, which are controlled enzymes.

61. Carbohydrates, proteins, lipids and nucleic acids are fundamental kinds of biological molecules. They play different roles in living organism.

62. In human body percentage of different bio-elements:

Bioelements	Percentage
Sulphur	0.25%
Nitrogen	3%
Carbon	18%
Manganese	Trace element.

63. Water absorbs much heat as it changes from liquid to gas and causes cooling effect. Evaporation of only two ml out of one liter of water lowers the temperature of the remaining 998 ml by 1°C.

64. When a hydrophobic molecule is dropped in an aqueous medium, hydrogen bonds between water molecules will be broken to make room for the hydrophobic molecule; however, water molecules do not react with hydrophobic molecule. This is considered an endothermic reaction, because when bonds are broken heat is put into the system.

65. A solvent is simply a substance that can dissolve other molecules and compounds, which are known as solutes. Because of its polarity and ability to form hydrogen bonds, water makes an excellent solvent, meaning that it can dissolve different kinds of molecules.

66. Water is a medium of life. In bone and seed cells water is 20%. In brain cell its percentage is about 85-90 %.

67. High heat of vaporization of water gives animal an efficient way to release excess body heat in a hot environment. Body heat is used to vaporize the sweat thus cooling the animal.

68. Disaccharides or oligosaccharides are hydrolyzed into simple monosaccharides. Sucrose is a disaccharide that is hydrolyzed into glucose and fructose.

69. Due to presence of hydrogen bonding in water molecule it acts as temperature stabilizer of many organisms in the environment. Water has great ability to absorb heat with minimum change in its own temperature due to higher heat capacity and act as thermo-stabilizer.

70. Condensation is reverse of hydrolysis. During condensation, two monomers join to form dimer. In hydrolysis, polymers are broken down their monomers in the presence of water.

71. Water varies from 70% to 90% in living organism:

Organism/Cells	Percentage
Any organism	70%
Bone cells	20%
Brain cells	85-90%
Jelly fish	99%

72. Glyceraldehyde, ribose and glucose are sugars containing aldo group while dihydroxyacetone is simplest three carbon keto sugar.

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73. Carbohydrates are polyhydroxy aldehydes or ketones or complex substances which on hydrolysis yield polyhydroxy aldehyde or ketone sub-units. Proteins are polymers of amino acids. Lipids are heterogeneous group of compounds related to fatty acid while polynucleotide chain is made up of nucleotide.

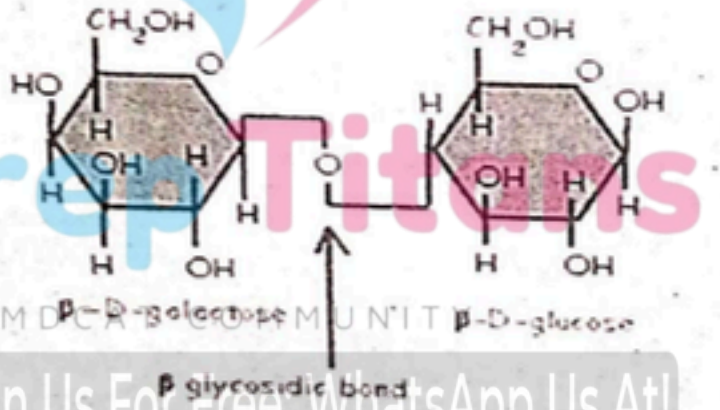
74. Polysaccharides are made up of many monosaccharides subunits and have higher molecular weight as compared to monosaccharides and oligosaccharides. Polysaccharides are sparingly soluble in water while monosaccharide are highly soluble.

75.



76. Glycogen is animal starch found in liver and muscle cell while starch is stored in plants cells.

77.



78. Glycogen and starch are examples of polysaccharides while fructose is an example of monosaccharide. Lactose is a disaccharide and consisted of glucose and galactose.

79. Starch is a storage form of polysaccharides in plants while glycogen is a storage form of carbohydrates in animal cells (Muscles and liver cells). Cellulose is present in cell wall.

80. Cellulose is a natural polymer made up of glucose units and is the pure form of cellulose, commonly found in plant cell walls. Cellophane and paper are products derived from cellulose but are not in its pure form.

81. Formula of ribose is $C_5H_{10}O_5$. RNA and DNA are polymers of nucleotides. ATP is a nucleotide.

82. General formula of monosaccharides is $C_n(H_2O)_n$ as number of carbon and oxygen is usually same in monosaccharides.

83. Glycogen is called as animal starch and it is abundantly found in muscle and liver cells of animal tissue.

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4. Lipoproteins and glycoproteins are conjugated molecules; phospholipids are class of lipids that form basic structure of biological membrane. Chitin is only polysaccharide that contain nitrogen. and it is component of fungal cell wall as well as exoskeleton of insects.

5. Lactic acid contains carboxylic group. It shows acidic behaviors while glucose, sucrose, rhamnose are members of monosaccharides.

6. When amylase breaks down starch. First, it is converted into maltose. Then this maltose is broken down into glucose molecules.

7. Four carbon atoms are present in butyric acid. Two carbon atoms are present in acetic acid. Six carbon atoms are present in caproic acid. Eight carbon atoms are present in octanoic acid.

8. C-H bond is potential source of chemical energy for cellular respiration. Breakdown of these bonds give energy for cellular activities.

9. Monosaccharides are sweetest among all carbohydrates. Fructose has ketone functional group which gives sweet taste when dissolved in water.

90. Ribose is pentose sugar. It has aldehyde group. Ribulose is a keto sugar. Glycerol and fatty acid are condensed through ester bond. Carboxylic group present is fatty acids.

91. Diastase/Amylase break starch into maltose. This maltose is further broken down by maltase into glucose molecules.

92. Maltose in consisted two molecules of glucose. Both glucose molecules are bonded by single glycosidic bond.

93. When two molecules of glucose are bonded by glycosidic bond, resultant structure is referred as maltose.

94. Hundreds of glucose molecules are joined by each other through 1-4 glycosidic linkage to form unbraced chain of starch.

95.



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96. Most of the enzymes are proteins in nature which are used as a biological catalyst.

97. Globular structure of enzyme has very important role in its activity and this globular structure attains at least tertiary level structure.

98. Keratin is a fibrous protein having secondary structure and mostly found in nails and hairs. Trypsin is a protease while insulin and glucagon are the hormones and all are globular proteins.

99. About 170 types of amino acids have been found to occur in cells and tissues. Of these, about 25 are constituents of proteins.

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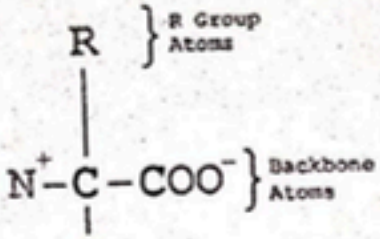
100.



101. The α-helix is a very uniform geometric structure with 3.6 amino acids in each turn of the helix. The helical structure is kept by the formation of hydrogen bonds among the amino acid molecules in successive turns of the spiral.

102. The primary structure of a protein is described by number, sequence and type of amino acids in a polypeptide chains.

103. About 25 amino acids are constituents of proteins. Most of the proteins are however, made of 20 types of amino acids.

104.



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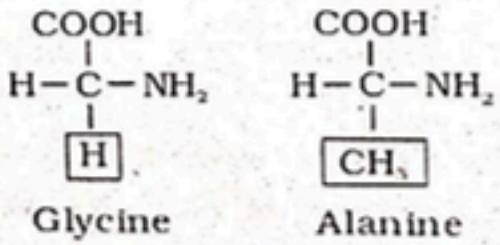


106.



107. A protein molecule is made from a long chain of these amino acids, each linked to its neighbor through a covalent peptide bond.

108. The tertiary structure of a protein refers to the overall three-dimensional arrangement of its polypeptide chain in space. It is generally stabilized by outside polar hydrophilic hydrogen and ionic bond interactions, and internal hydrophobic interactions between nonpolar amino acid side chains.

109. Collagen is a protein and consisted of amino acids. Cellulose and sucrose are carbohydrates. Ascorbic acid is also known as vitamin C.

110. Collagen is a fibrous protein while enzymes, haemoglobin, and hormones are examples of globular proteins.

111. Providing insulation against heat loss is s feature of lipids. While other functions are related to proteins.

112. If R-group is hydrogen atom, then amino acid is referred as glycine.

R-group	Amino acid
$-CH_2-CH_2-CH_2-CH_2-NH_3^+$	Lysine
$-CH_2$-Benzen ring	phenylalanine
$-CH_3$	Alanine

113. Haemoglobin is the oxygen-carrying protein that is found within all RBCs.

114. Rubisco is most common and abundant protein in nature. Collagen is a common protein in animals. Keratin is present in hairs. DNase is an enzyme.

115. Haemoglobin is consisted of four polypeptide chains. Two alpha chains and two beta chains. Each alpha chain is consisted of 141 amino acids (141x2=282) and each beta chain is consisted of 143 amino acids (14x2= 292). Total amino acids (282+292=574)

116. Glycine and alanine are simplest amino acids. R-group is hydrogen atom and methyl group in glycine and alanine, respectively.

117. Matrix of bone and cartilage are composed of collagen proteins. Myoglobin is muscle haemoglobin. Haemoglobin is present in blood and carries oxygen. Fibrinogen is converted into fibrin and promotes clotting.

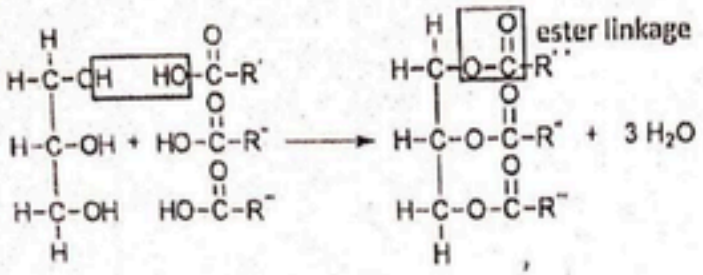
118. Fats containing unsaturated fatty acids are usually liquid at room temperature and are said to be oils. Fats containing saturated fatty acids are solids.

119. Butyric acid, Palmitic acid and Stearic acids examples of saturated fatty acids. Oleic acid is an example of mono-unsaturated fatty acid and has double bond between C_9 and C_{10}.

120. C-H bond is potential source of energy. Lipids have higher proportion of C-H bonds as compare to carbohydrates and proteins.

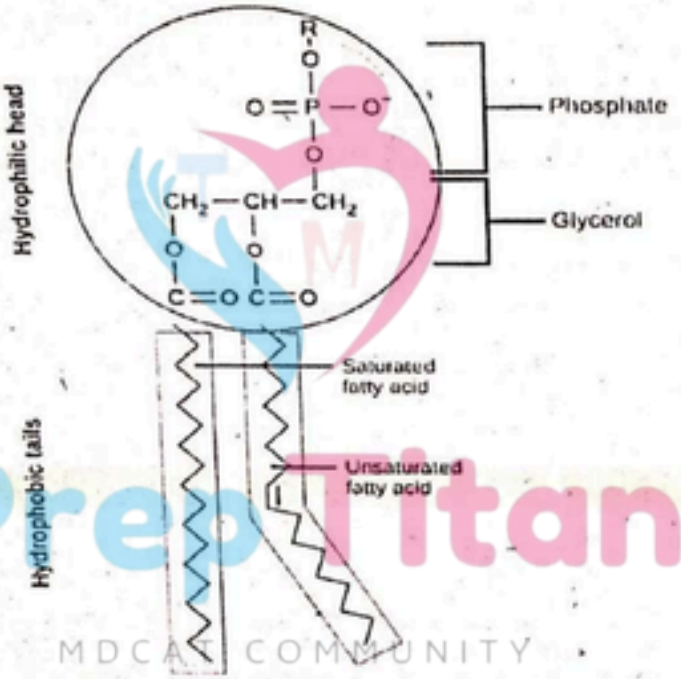
121. Due to non-polar nature lipids are only solubilized in non-polar substances. Water is a polar substance.

122.



123. Lipids are used as energy storage via fatty acids. Fatty acids are composed of carboxylic acids attached to long chains of hydrocarbons. So, percentage of C---H bonds in lipids is much higher.

124.



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125. Phospholipids are major membrane lipids that consist of lipid bilayers. This basic cellular structure acts as a barrier to protect the cell against various environmental insults and more importantly, enables multiple cellular processes to occur in subcellular compartments.

126. Glycerol (trihydroxy alcohol) forms ester bonds with three fatty acids molecules. Resultant compound is triacylglycerol.

127. Steroids are lipids derivatives. But do not contain fatty acids. It is consisted of four rings. Steroids are synthesized from isoprene units.

128. Glycerol is an alcohol with three carbon atoms, five hydrogen atoms and three hydroxyl groups. Because of the presence of three hydroxyl groups, it is called trihydroxy alcohol.

129. Saturated fatty acids do not contain double bond in carbon chain. Single covalent bonds are only present in carbon chain. This feature differentiates them from unsaturated fatty acids which have double covalent bond in carbon chain.

130. Acylglycerol is most common abundant richest source of energy. Its common form is triacylglycerol which is referred as neutral lipids.

131. The bond between two nucleotides is called Phosphodiester bond and it is formed between phosphate group of one nucleotide attach at carbon 5 of pentose sugar with hydroxyl group of 3 carbon of pentose sugar of another nucleotide.
132. Ribonucleic acid is a molecule similar to DNA. Unlike DNA, RNA is single-stranded. An RNA strand has a backbone made of alternating sugar (ribose) and phosphate groups. Attached to each sugar is one of four bases; adenine (A), uracil (U), cytosine (C), or guanine (G).
133. Glycoproteins are consisted of carbohydrates and proteins. Most of cellular secretions are glycoproteins.
134. Energy is released when complex molecules break down into simpler ones in catabolic reactions.
135. Carbon is the second most abundant bio element in the human body after oxygen.
136. Hydrolysis is the opposite of a condensation reaction, as it involves breaking bonds using water.
137. Water makes up about three-fourths of body weight, playing a crucial role in biological functions.
138. Water high heat capacity helps regulate temperature, providing thermal stability to organisms.
139. Hydrophobic exclusion maintains the integrity of lipid bilayers by preventing water penetration.
140. The heat of vaporization of water regulates heat produced by oxidation processes in metabolism.
141. Hydrogen bonds must be broken for water to vaporize, requiring significant energy input.
142. Unlike most substances, water becomes less dense when it freezes, making ice float.
143. Heat of vaporization is the energy needed to convert water into vapor at its boiling point.
144. Both starch and cellulose are polymers of glucose but differ in bonding and function.
145. Monosaccharides are the sweetest carbohydrates due to their simple structure and high solubility.
146. Ribofuranose is a five-membered ring formed by ribose in solution.
147. Lactose is a disaccharide composed of glucose and galactose.
148. Glucose is a monosaccharide, the simplest form of carbohydrate.
149. Sucrose is hydrolyzed into glucose and fructose, its component monosaccharides.
150. Hydrolysis breaks down proteins into amino acids by adding water molecules.
151. Collagen forms the structural matrix of bones and cartilage, providing strength and support.
152. Proteins are the most abundant organic compounds in mammalian cells, essential for various functions.
153. Collagen provides structural support and strength to connective tissues such as tendons, ligaments, and skin.
154. Fibrous proteins do not participate in oxygen transport, which is the function of hemoglobin.
155. In sickle cell anemia, glutamic acid is replaced by valine, altering hemoglobin structure.
156. Chitin is a structural polysaccharide found in the exoskeleton of crabs and insects.
157. Amino acids differ from each other based on their R-group, which determines their properties.
158. A triglyceride consists of three fatty acid tails and a glycerol molecule, forming a major energy storage lipid.
159. Oleic acid is an unsaturated fatty acid, containing at least one double bond in its hydrocarbon chain.
160. The C-H bonds in lipids store high energy, making them a key energy source.
161. Ribose is the sugar found in ribonucleic acid (RNA), differentiating it from DNA.
162. Purines (adenine and guanine) are double-ringed nitrogenous bases in nucleotides.
163. Glycoproteins and glycolipids are present on cell surface and function as markers for cell recognition, distinguishing different cell types. These molecules play a crucial role in cell signaling.
164. Lipoproteins form the basic structural framework of all types of membranes in the cells.
165. Glycoproteins are integral component of the plasma membrane. They are also present in egg albumin.

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166. Bone cells contain 20% water, with the rest composed of minerals (calcium phosphate) and collagen for strength.
167. At 25°C, pure water has equal H^+ and OH^- concentrations, both at 10^{-7} M, maintaining a neutral pH.
168. Water excludes non-polar molecules, helping lipids self-assemble into a stable bilayer membrane.
169. Monosaccharides follow the formula $C_x(H_2O)_x$, showing a 1:2:1 ratio of carbon, hydrogen, and oxygen.
170. Polysaccharides form by condensation, where monosaccharides join, and releasing water molecules.
171. In solution, glucose forms a stable six-membered pyranose ring due to intramolecular interactions.
172. Sugarcane contains sucrose, a disaccharide composed of glucose and fructose.
173. Glucose is an aldehyde (aldose) hexose sugar, while fructose is a ketose.
174. Glycogen gives a reddish-brown color with iodine, while starch turns blue-black.
175. Sucrose is a non-reducing sugar due to both anomeric carbons being involved in the glycosidic bond formation.
176. Sucrose is used for transport as it does not react easily and remains chemically stable.
177. Normal blood glucose concentration is around 80-120 mg/dL, which equals 0.08%.
178. Starch is the main storage polysaccharide in grains and seeds.
179. The liver stores the highest amount of glycogen for energy regulation.
180. Stereoisomers have the same molecular formula and bonding, but different spatial arrangements.
181. Proteins break down into amino acids via hydrolysis, using water to cleave peptide bonds because of hydrolysis of polymers to monomer required water.
182. Sickle cell anemia occurs due to glutamic acid being replaced by valine in hemoglobin.
183. Hair contains fibrous proteins (keratin), not globular proteins.
184. A peptide bond forms between the amino ($-NH_2$) and carboxyl ($-COOH$) groups, releasing water.
185. Myoglobin and actin has a tertiary structure but lacks multiple subunits, so no quaternary structure.
186. Proteins with tertiary structures function as hormones for cell signaling.
187. Rebounding of hair targets disulfide bonds (S-S bonds) to change hair structure.
188. As hemoglobin has two alpha chains and each α-chain contains 141 amino acids.
189. Dipeptides form via condensation, releasing water (OH^{-1} from carboxylic group of one amino acid and H from amino group of another amino acid) and forming a peptide bond.
190. Fibrinogen helps in blood clot formation by converting into fibrin.
191. Glycerol and fatty acids form ester bonds in lipids by releasing OH from fatty acids and H- from glycerol. As a result water molecules are released according to no. of fatty acid used.
192. Phospholipids have a polar phosphate head, making them hydrophilic as PO^{-3} has negative charge making it polar.
193. Waxes are fatty acid esters with long-chain alcohols (other than glycerol).
194. Steroids like cholesterol are lipids but lack fatty acids because they belong to terpenes and terpenes lacks fatty acids.
195. Lecithin (a phospholipid) is a major component of the plasma membrane as it is frequently associated with membrane.
196. Saturated fatty acids like stearic acid have higher melting points due to no double bonds.
197. Plants use waxes for waterproofing to prevent water loss.
198. Both RNA and DNA share a sugar-phosphate backbone structure.
199. RNA polymerase synthesizes RNA from DNA during transcription.
200. Nucleoproteins (DNA + proteins) are present in chromosomes and help transmit genetic information.

4 CELL STRUCTURE AND FUNCTION

TOPIC >> PRACTICE EXERCISE

Q.1 The postulates of cell theory are not applicable to:
A. Fungi
B. Bacteria
C. Algae
D. Virus

Q.2 Plant cells are distinguishable from animal cells in containing:
A. Mitochondria
B. Endoplasmic reticulum
C. Ribosomes
D. Cell wall

Q.3 Pick the correct one with reference to plant cell:

	Mitochondria	Peroxisomes	Centrioles
A.	✓	×	✓
B.	✓	✓	×
C.	×	✓	✓
D.	×	✓	×

Q.4 The layers of cellulosic fibers in cell wall are arranged with each other at:
A. Obtuse angle
B. Parallel angle
C. Right angle
D. Horizontal angle

Q.5 Which of the following is related to prokaryotic cell wall?
A. Murein
B. Sacculus
C. Peptidoglycan
D. All A, B, C

Q.6 It is absent in secondary cell wall:
A. Silica
B. Pectin
C. Waxes
D. Cutin

Q.7 Cellulose is usually not found in:
A. Primary cell wall
B. Secondary cell wall
C. Middle lamella
D. All contain cellulose

Q.8 Holding neighboring cells together is the function of:
A. Primary cell wall
B. Secondary cell wall
C. Middle lamella
D. Tertiary cell wall

Q.9 All of following are common molecules in membrane of all type of cells except:
A. Globular protein
B. Traces of carbohydrates
C. Cholesterol
D. Phospholipid

Q.10 Hydrophobic portion of plasma membrane is present in/at:
A. Towards extracellular matrix
B. Inner core of plasma membrane
C. Towards cytoplasm
D. Towards the cytoskeleton

Q.11 Which of the following describes the fluid mosaic model of plasma membrane structure?
A. Phospholipid monolayer with embedded proteins
B. Phospholipid bilayer with embedded proteins
C. Triglyceride bilayer with embedded proteins
D. Triglyceride monolayer with embedded proteins

Q.12 In plasma membrane, carbohydrates combine with the lipids and proteins to form glycolipids and glycoproteins and are oriented:
A. Towards inside
B. Towards inside and outside
C. Towards outside
D. Randomly distributed

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Q.13 Which of the following is not a characteristic feature of animal cell membrane?
A. Provides mechanical shape
B. Regulate passage of molecules
C. Maintain cellular homeostasis
D. Prevent from osmotic lysis

Q.14 Which of the following acts as receptor site on plasma membrane?
A. Head of phospholipid molecules
B. Tail of phospholipid molecules
C. Cholesterol molecules
D. Glycoproteins

Q.15 Which structure is most important for cellular life?
A. Nucleus
B. Cell membrane
C. Chromosome
D. Mitochondria

Q.16 Which of the following is not the function of cell membrane?
A. Protection of cytoplasm
B. Regulating the passage of different molecules
C. Protein synthesis
D. Cellular communication

Q.17 An enzyme that is attached to cell membrane of cell:
A. Adenylate cyclase
B. Cytochrome oxidase
C. Succinate dehydrogenase
D. Glucokinase

Q.18 Which of the following is not associated with both prokaryotic and eukaryotic cell membrane?
A. Receptors
B. Enzymes
C. DNA replication
D. Antigens

Q.19 Peripheral parts of the cell are often _____ like.
A. Sol
B. Gel
C. Solid
D. Normal saline

Q.20 It is false about cytoplasm of eukaryotic cell:
A. Glycolysis
B. Transcription
C. Site of glycogen storage
D. Translation

Q.21 Which of the following is true about cytoplasm?
A. It can exist only in gel form
B. It is the region between nucleus and cell membrane
C. 70% of the cytoplasm is water
D. Both prokaryotes and eukaryotes show cyclosis

Q.22 All of the following organelles contain DNA except:
A. Ribosomes
B. Nucleus
C. Chloroplast
D. Mitochondria

Q.23 40S is the smaller ribosomal sub-unit, associated with _____.
A. *E. coli*
B. Yeast
C. *C. botulinum*
D. *T. pallidum*

Q.24 Identify non-membranous organelle from the following:
A. Endoplasmic reticulum
B. Nucleus
C. Ribosome
D. Chloroplast

Q.25 Which of the following best describes the function of RER in eukaryotic cells?
A. Glycosylation of proteins
B. Synthesis of proteins
C. Synthesis of lipids
D. Synthesis of ribosomes

Q.26 Which of the following statement is incorrect regarding endoplasmic reticulum?
A. Plasma cells have RER in abundance
B. RER is more abundant than SER in adipose tissue
C. RBCs lack both RER and SER
D. Hepatocytes have both RER and SER

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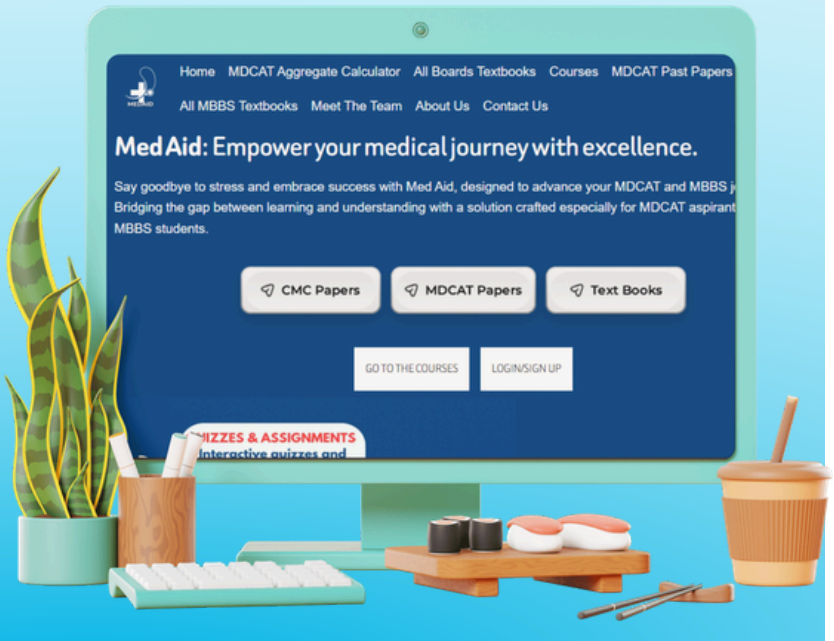

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Q.27 A function that is not related to smooth endoplasmic reticulum:
A. Calcium storage
B. Enzyme synthesis
C. Steroid synthesis
D. Mechanical support

Q.28 Which of the following organelle is associated with the single membrane?
A. Mitochondria
B. Nucleus
C. Endoplasmic Reticulum
D. Chloroplast

Q.29 Which of the following function is performed by both types of endoplasmic reticulum?
A. Protein synthesis
B. Muscle contraction
C. Mechanical support
D. Detoxification of harmful drugs

Q.30 Which of the following organelle is responsible for the production of steroid hormones?
A. Mitochondria
B. Smooth endoplasmic reticulum
C. Golgi bodies
D. Rough endoplasmic reticulum

Q.31 Identify the correct pair from the following options:
A. DNA replication - Ribosome
B. Anaerobic respiration - Cristae
C. Protein synthesis - SER
D. Modification - Golgi apparatus

Q.32 Modification of proteins and lipids into glycoproteins and glycolipids is the function of:
A. Mitochondria
B. Lysosome
C. Ribosomes
D. Golgi apparatus

Q.33 Golgi complex is involved in the formation of _____.
A. Lysosomes
B. Ribosomes
C. Rough endoplasmic reticulum
D. Smooth endoplasmic reticulum

Q.34 The transport of secretory proteins takes place through organelles in which of the following order?
A. RER → SER → Golgi apparatus → Secretory vesicles
B. SER → RER → Golgi apparatus → Secretory vesicles
C. RER → SER → Secretory vesicles → Golgi apparatus
D. RER → Golgi apparatus → Secretory vesicles → SER

Q.35 Which of the following does not originate from Golgi complex?
A. Lysosome
B. Glyoxysome
C. Peroxisome
D. All originate from Golgi complex

Q.36 Phragmoplast is associated with:
A. ER
B. Golgi complex
C. Mitochondria
D. Chloroplast

Q.37 Which of the following organelle is most abundant in those animal cells which exhibit phagocytic activity?
A. Glyoxysomes
B. Lysosomes
C. Microbodies
D. Peroxisome

Q.38 It is a disease characterized by the accumulation of lipids in the brain cells leading to mental retardation and even death:
A. Graves' disease
B. Glycogenosis type II disease
C. Addison's disease
D. Tay-Sach's disease

Q.39 Strictly speaking, autophagosomes are actually:
A. Primary lysosomes
B. Tertiary lysosomes
C. Secondary lysosomes
D. Quaternary lysosomes

Q.40 Suicidal bags are:
A. Peroxisomes
B. Lysosomes
C. Mitochondria
D. Chloroplast

Q.41 Which of the following eukaryotic organelle has symbiotic origin with bacteria?
A. Endoplasmic reticulum
B. Lysosomes
C. Chloroplast
D. Golgi apparatus

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Q.42 **Chlorophyll molecule resembles:**
A. Carotenoids
B. Globin chains of hemoglobin
C. Xanthophylls
D. Haem part of hemoglobin

Q.43 **Which of the following statement is incorrect?**
A. CO_2 fixation occurs in stroma
B. Chloroplasts are self-replicating
C. Inter-granum is photosynthetic
D. Chloroplasts have 70S ribosomes

Q.44 **_____ provides support for the individual plant cell and contributes to the turgidity of the leaves and younger parts of plants.**
A. Vacuole
B. Endoplasmic reticulum
C. Golgi apparatus
D. Cytoskeleton

Q.45 **Which of the following cell organelle can be viewed with the help of high-power light microscope?**
A. Endoplasmic reticulum
B. Mitochondria
C. Ribosomes
D. Golgi apparatus

Q.46 **It is the correct location of ATP synthase in mitochondria:**
A. Mitochondrial matrix
B. Outer mitochondrial membrane
C. Inner mitochondrial membrane
D. Inter membrane space

Q.47 **Which of the following structure is involved in oxidative phosphorylation?**
A. Inner mitochondrial membrane
B. Outer mitochondrial membrane
C. Mitochondrial matrix
D. Thylakoid membrane

Q.48 **Krebs cycle occurs in the _____ of mitochondria.**
A. Matrix
B. Stroma
C. F_1 particles
D. Cristae

Q.49 **Which of the following cell type is more appropriate to study mitochondria?**
A. RBC
B. Mesophyll cell
C. Muscle cell
D. *E. coli*

Q.50 **It precisely describes the function of nucleoli:**
A. Formation and breakdown of nuclear envelope
B. Formation of ribosomes
C. Formation of centromere
D. Organization of spindle during nuclear division

Q.51 **How many nuclear pores are present in a typical differentiated cell, such as RBCs?**
A. About 30,00 per nucleus
B. About 1-2 per nucleus
C. About 30,000 per nucleus
D. About 3-4 per nucleus

Q.52 **It makes nucleoli during interphase:**
A. Primary constriction
B. Secondary constriction
C. Centromere
D. Telomeres

Q.53 **Which of the following statement is true?**
A. Prokaryotic cells are bigger than eukaryotic cells
B. Prokaryotic cells evolved before eukaryotic cells
C. Eukaryotic cells do not have a nucleus, prokaryotic cell do
D. Eukaryotic cells are simple, prokaryotic cells are complex

Q.54 **What is the main difference between prokaryotes and eukaryotes?**
A. Prokaryotes cannot undergo cell division
B. Prokaryotes do not have internal membranes
C. Prokaryotes have no DNA
D. Prokaryotes have no organelle/s

Q.55 **Prokaryotic and eukaryotic cells generally have which of the following feature in common?**
A. A membrane bounded nucleus
B. A cell wall made up cellulose
C. Presence of ribosomes
D. Linear genome

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Q.56 The distinguishing feature of prokaryotic cell is its:
A. Chemical nature of DNA
B. Ribosomes
C. Cell wall
D. Cytoplasmic Streaming movement

Q.57 From the following list, identify the total number of single membranous organelles found in *E. coli*: Endoplasmic reticulum, Golgi complex, Lysosomes, Microbodies, Vacuoles
A. 5
B. 4
C. 1
D. 0

Q.58 Which of the following is not found in eukaryotic cells?
A. Mesosomes
B. Nucleus
C. Division of labor
D. Tubulin

Q.59 Lipid bilayer is present in:
A. Cell membrane
B. Cisternal membrane
C. Cristae
D. All A, B, C

Q.60 Find out the correct statements from the following:
1. All cells have a cell wall
2. Cell wall in plants is made up of cellulose
3. Chromosomes carry DNA
4. Cell wall contain starch
5. All cells have a cell membrane
6. A sap of vacuole helps an animal cell maintain its turgor
7. Chromosomes are found in the cytoplasm
Which three statements are correct?
A. 1, 3 and 7
B. 2, 3 and 5
C. 2, 4 and 6
D. 4, 5 and 7

Q.61 Which cell has more nuclear pores as compared to others?
A. Epidermal cell
B. Egg cell
C. Red blood cell
D. Nerve cell

Q.62 Which of the following is an anucleated living plant cell?
A. Vessel
B. Sieve tube cell
C. Tracheid
D. All A, B, C

Q.63 No living cell can survive for a longer period without:
A. Chloroplast
B. Ribosomes
C. Mitochondrion
D. Nucleus

Q.64 During the process of translation, ribosomes are attached with_____end of mRNA.
A. 3'
B. 2'
C. 5'
D. 1'

Q.65 RER are associated with:
A. Transcription
B. Detoxification
C. Translation
D. Glycosylation

Q.66 Which of the following pair of functions are not associated with lysosomes?
A. Autolysis and autophagy
B. Metamorphosis and recycling
C. Necrosis and erythroblastosis
D. Extracellular and intracellular digestion

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4 CELL STRUCTURE AND FUNCTION

TOPIC PAST PAPER MCQ'S

Q.67 Out of the given options, choose the one which shows the structures found only in plants? (MDCAT-2016)

A. Vacuole, chloroplast, ribosomes
B. Chloroplast, cell wall, large vacuole
C. Chloroplast, microtubules, peroxisomes
D. Chloroplast, cell wall, mitochondria

Q.68 Which features do animal cells share with plant cells? (NTS-2017)

	Chloroplast	Cytoplasm	Nucleus	Mitochondria
A.	✓	✓	✓	✓
B.	✓	×	✓	×
C.	×	✓	✓	✓
D.	×	×	×	✓

Q.69 Select the organelle which is only present in animal cells: (MDCAT-2017)

A. Centrioles
B. Microtubules
C. R.E.R
D. Ribosomes

Q.70 Which of the following structure is present in both plant and animal cells but is absent in prokaryotic cells? (MDCAT-2017)

A. Centrioles
B. Plastids
C. Microtubule
D. Sieve tubes

Q.71 In which type of cells, cell wall is not present? (PMC-2020)

A. Plant cells
B. Bacterial cells
C. Fungal cells
D. Liver cells

Q.72 Cell wall may be absent in which of the following? (UHS-2022)

A. Plant and algae
B. Algae and fungi
C. Fungi and archaea
D. Bacteria and archaea

Q.73 The cell wall of bacteria is made up of: (UHS-2022)

A. Chitin
B. Murein
C. Cellulose
D. Hemicellulose

Q.74 Which of the following is correct for cell wall? (NUMS-2022)

A. Semi-permeable
B. Differentially permeable
C. Permeable
D. Not permeable

Q.75 Chemically, cell wall of fungi is made up of: (SZABMU-2022)

A. Cellulose
B. Lignin
C. Chitin
D. Murein

Q.76 Cell without cell wall would burst in: (BUMHS-2022)

A. Hypotonic solution
B. Hypertonic solution
C. Isotonic solution
D. Solution having more electrolytes

Q.77 Plant cell wall is mainly made up of: (DUHS-2022)

A. Lignin
B. Murein
C. Cutin
D. Cellulose

Q.78 Cell become dead due to the deposition of: (DUHS-2022)

A. Cellulose
B. Cutin
C. Chitin
D. Lignin

Q.79 The intake of liquid materials across the cell membrane is: (MDCAT-2018)

A. Phagocytosis
B. Pinocytosis
C. Endocytosis
D. Exocytosis

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Q.80 **Which substance from the following is important for the mechanical stability of cell membranes, as without it membranes quickly break and cells burst open? The hydrophobic region of these molecules help to prevent ion or polar molecules from passing through the cell membrane?** (KMDC-2014)

A. Protein
B. Phospholipids
C. Glycolipids
D. Cholesterol

Q.81 **Fluid mosaic model of plasma membrane states that protein molecules float in a fluid like _____ layer.** (MDCAT-2015)

A. Galactose
B. Glucose
C. Phospholipid
D. Carbohydrate

Q.82 **Taking in of solid particle by cell is called:** (MDCAT-2017)

A. Phagocytosis
B. Exocytosis
C. Pinocytosis
D. Endocytosis

Q.83 **Self-eating ability of the cells by using lysosomes is called:** (MDCAT-2017)

A. Phagocytosis
B. Autophagy
C. Pinocytosis
D. Exocytosis

Q.84 **Passive processes for the movement of molecules across cell surface membrane are:** (MDCAT-2019)

A. Facilitated diffusion and osmosis
B. Diffusion and exocytosis
C. Pinocytosis and facilitated diffusion
D. Osmosis and phagocytosis

Q.85 **The fluid mosaic model of cell membrane is:** (AJK-2019)

A. Protein layers having scattered phospholipids
B. Phospholipid bilayer is enclosed in protein layer
C. Carbohydrate chains are attached with phospholipid bilayer
D. In which protein molecules are free to move about in a fluid bilayer of phospholipid molecules

Q.86 **Cell permeability and transport processes of cell membrane depend upon its _____ component.** (NTS-2019)

A. Phospholipid
B. Carbohydrate
C. Polysaccharide
D. Cellulose

Q.87 **According to the fluid mosaic model of cell membrane, which zone is embedded inside?** (PMC-2020)

A. Hydrophobic
B. Globular
C. Hydrophilic
D. Filamentous

Q.88 **When plant cell receives a signal for death, it commits suicide by rupturing:** (NTS-2019)

A. Nucleus
B. Cell membrane
C. Tonoplast
D. Chloroplast

Q.89 **Movement of molecules against the concentration gradient is:** (UHS-2022)

A. Passive transport
B. Active transport
C. Facilitated diffusion
D. Filtration

Q.90 **Why it is said that plasma membrane is asymmetrical?** (NUMS-2022)

A. Proteins are not fixed at their position
B. Hydrophobic tail facing inward and hydrophilic head facing outward
C. The two surface and halves are not identical
D. Cholesterol molecules are only present inside

Q.91 **The _____ part of plasma membrane controls the fluidity of the membrane.** (NUMS-2022)

A. Glycoprotein
B. Carrier proteins
C. Lipids
D. Carbohydrates

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Q.92 Which molecules do not contribute to the formation of biological membranes? (NUMS-2022)

A. Glycoproteins
B. Glycolipids
C. Phospholipids
D. Nucleoproteins

Q.93 A group of ribosomes attached to mRNA is known as polysome and the attachment is controlled by: (NUMS-2022)

A. Na^{+}
B. Mg^{+2}
C. Ca^{+2}
D. K^{+}

Q.94 Adenylate cyclase, in the cell membrane acts as: (SZABMU-2022)

A. Channel protein
B. Carrier protein
C. Enzyme
D. Receptor

Q.95 The statement 'the membrane is like a sea of lipids in which proteins are floating' represents: (ETEA-2022)

A. Gortel and Grendel model
B. J. F. Danielle and Davison model
C. Robertson model
D. S. J. Singer and Nicholson model

Q.96 Facilitated diffusion involves carrier molecules. The carrier molecules are chemically _____ in nature. (BUMHS-2022)

A. Glycolipids
B. Lipids
C. Proteins
D. Carbohydrates

Q.97 Who proposed fluid mosaic model? (BUMHS-2022)

A. Lorenz Oken and Brown
B. Robert Brown and Palade
C. Singer and Nicolson
D. Singer and De-Duve

Q.98 Plasma membrane is: (DUHS-2022)

A. Permeable
B. Selective permeable
C. Impermeable
D. Sub-permeable

Q.99 Glycolysis is the common stage in both aerobic and anaerobic respiration and it occurs in _____ of the cell. (AJK-2019)

A. Inner membrane of mitochondria
B. Mitochondrial matrix
C. Chloroplast
D. Cytoplasm

Q.100 Which of the following are single membranous organelles? (UHS-2022)

A. Mitochondria and ribosomes
B. Cytosol, mitochondria and ribosomes
C. Golgi bodies, lysosome and ER
D. Golgi bodies, lysosome and mitochondria

Q.101 Glycogen, lipid droplets form the most important _____ of the cell. (SZABMU-2022)

A. Cell organelles
B. Cell inclusions
C. Cytoplasmic matrix
D. Non-membranous organelles

Q.102 Ribosomes present in prokaryotes are: (MDCAT-2017, MDCAT-2019)

A. 80S
B. 50S
C. 60S
D. 70S

Q.103 Group of ribosomes attached to mRNA is called: (MDCAT-2017)

A. Polyploid
B. Polynucleotide
C. Polysome
D. Polysaccharide

Q.104 Which of the following organelle consist of two subunits? (MDCAT-2017)

A. Golgi body
B. Ribosome
C. Mitochondria
D. Plastid

Q.105 Ribosomes are made up of _____ and _____. (MDCAT-2019)

A. RNA and proteins
B. RNA and carbohydrates
C. RNA and lipids
D. Proteins and carbohydrate

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Q.106 The cytoplasmic organelle commonly found both in prokaryotes and eukaryotes is: (AJK-2019)
A. Flagellum
B. Ribosome
C. Mitochondria
D. Nucleoid

Q.107 70S sized ribosomes are found in the cells of: (PMC-2020)
A. Algae
B. Protozoans
C. Fungi
D. Bacteria

Q.108 Within the nucleus, _____ are made by the nucleolus. (NUMS-2022)
A. Ribosomes
B. mRNA
C. Proteins
D. Enzymes

Q.109 Which one of the following cell structures is involved in the synthesis of lipids? (MDCAT-2015)
A. Endoplasmic reticulum
B. Centriole
C. Golgi complex
D. Mitochondria

Q.110 Nuclear membrane is continuous with: (MDCAT-2017)
A. Endoplasmic reticulum
B. Lysosome
C. Golgi Body
D. Peroxisome

Q.111 Smooth endoplasmic reticulum is responsible for the metabolism of: (MDCAT-2019)
A. Carbohydrates
B. Nucleic acids
C. Proteins
D. Lipids

Q.112 Select the one which is not a function of smooth endoplasmic reticulum: (PMC-2020)
A. Metabolism of lipids
B. Transport of materials
C. Transmission of impulses
D. Processing of glycoproteins

Q.113 The organelle which provides neurotransmitters in the nervous pathway is: (SZABMU-2022)
A. Glyoxisome
B. Peroxisome
C. Golgi apparatus
D. Endoplasmic reticulum

Q.114 What is true about smooth endoplasmic reticulum? (BUMHS-2022)
A. Involved in transmission of impulses
B. Involved in protein metabolism
C. Involved in removal of storage and waste products
D. Involved in intracellular digestion

Q.115 The cisternae break up into vesicles from _____ and _____ of Golgi complex. (MDCAT-2018)
A. Convex, forming face
B. Convex, maturing face
C. Concave, forming face
D. Concave, maturing face

Q.116 Which cell organelle is responsible for cell secretion? (MDCAT-2014, 2019)
A. Mitochondrion
B. Ribosomes
C. Chloroplast
D. Golgi body

Q.117 Which of the following organelles are involved in the synthesis of plant cell wall? (PMC-2020)
A. Endoplasmic reticulum
B. Lysosomes
C. Golgi complex
D. Peroxisomes

Q.118 Which organelles would be more abundant in a secretory cell than non-secretory cell? (NUMS-2022)
A. Lysosomes
B. Golgi complex
C. Vacuoles
D. Centrioles

Q.119 When and who discovered Golgi apparatus? (BUMHS-2022)
A. 1888-Camillo Golgi
B. 1898-Camillo Golgi
C. 1988-Camillo Golgi
D. 1998-Camillo Golgi

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Q.120 Which of the following cell does not possess Golgi apparatus? (BUMHS-2022)
A. Bacterial cell
B. Animal cell
C. Plant cell
D. Fungal cell

Q.121 These structures are involved in the breakdown of old organelles: (MDCAT-2018)
A. Leucoplasts
B. Glyoxysomes
C. Lysosomes
D. Peroxisomes

Q.122 The digestive vacuoles and autophagosomes are also known as: (UHS-2022)
A. Phagocytosis
B. Primary lysosomes and autophagy
C. Secondary lysosomes
D. Peroxisomes

Q.123 _____ are spherical sacs surrounded by a single membrane and contain hydrolytic enzyme. (NUMS-2022)
A. Mitochondria
B. Golgi bodies
C. Lysosomes
D. Chloroplast

Q.124 Intracellular digestion of food is done by the organelle: (SZABMU-2022)
A. Vacuole
B. Lysosome
C. Golgi apparatus
D. Ribosome

Q.125 Which statement is correct about mitochondria and chloroplast? (MDCAT-2018)
A. Chloroplast and mitochondria cannot live independently
B. 70S ribosome is attached with the inner membrane of mitochondria and chloroplast
C. Chloroplast and mitochondria are single membrane structure
D. Number of mitochondria and chloroplast are same in all cells

Q.126 The chloroplasts contain: (ETEA-2022)
A. Proteins only
B. Ribosomes only
C. Small circular DNA only
D. Proteins, Ribosomes and small circular DNA

Q.127 Presence of large central vacuole is the characteristic of: (MDCAT-2016)
A. Prokaryotes
B. Fungi
C. Protists
D. Plants

Q.128 Which of these is solely present in plant cell only? (AJK-2019)
A. Peroxisomes
B. Smooth endoplasmic reticulum
C. Cytoskeleton
D. Central vacuole

Q.129 The membrane separating the vacuole from cytoplasm is called: (MDCAT-2018, PMC-2020)
A. Cristae
B. Tonoplast
C. Cisternae
D. Vacuolar membrane

Q.130 Which organelle is bounded by two membranes? (MDCAT-2015)
A. Ribosome
B. Lysosome
C. Mitochondria
D. Nucleolus

Q.131 Functionally, mesosomes can be compared with: (MDCAT-2017)
A. Ribosomes
B. Polysomes
C. Mitochondria
D. Golgi bodies

Q.132 Which organelle is required for aerobic respiration? (NTS-2018)
A. Plastids
B. Mitochondria
C. ER
D. Nucleus

Q.133 The finger like infoldings which are formed by inner membrane of mitochondria are called: (MDCAT-2019)
A. Matrix
B. Cristae
C. Porins
D. Ribosomes

Q.134 Power house of the cell is: (DUHS-2022)
A. Ribosomes
B. Endoplasmic reticulum
C. Chloroplasts
D. Mitochondria

Q.135 Ribosomal RNA is synthesized in: (MDCAT-2017)
A. Nucleolus
B. Golgi body
C. Peroxisome
D. Nucleoplasm

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Q.136 The structure present in a eukaryotic cell but absent in prokaryotic cells is: (MDCAT-2019)
A. Nucleus
B. Ribosomes
C. DNA
D. Cell surface membrane

Q.137 The structure which disappears during cell division is: (NUMS-2022)
A. Vacuole
B. Lysosome
C. Nucleolus
D. Endoplasmic reticulum

Q.138 Except during nuclear division, nucleus has the chromosomes in loosely coiled state known as: (NUMS-2022)
A. Genes
B. Ribosome
C. DNA
D. Chromatin

Q.139 The colloidal mixture of ions, organic and inorganic salts present in the nucleus is called: (ETEA-2022)
A. Nuclear membrane
B. Nucleolus
C. Nucleoplasm
D. Chromosome

Q.140 Peptidoglycan or murein is a special or distinctive feature of cell wall in: (MDCAT-2014)
A. Algae
B. Bacteria
C. Fungi
D. Plants

Q.141 DNA molecule in prokaryotes is: (MDCAT-2017)
A. Single, circular, double stranded molecule not bound by membrane
B. Double, circular molecule
C. Linear, double stranded molecule
D. Single, circular, double stranded and membrane bound

Q.142 Structure formed by invagination of plasma membrane and involved in cell division and DNA replication of prokaryotic cell: (UHS-2022)
A. Lysosome
B. Mesosome
C. Golgi bodies
D. Phragmoplast

Q.143 Which one is common in both prokaryotic and eukaryotic cell? (UHS-2022)
A. Cytoplasmic streaming movement
B. Ribosome
C. Binary fission
D. Nuclear envelope

Q.144 Secondary cell wall in plants is present: (NUMS-2023)
A. Outer to primary cell wall
B. In between two primary cell walls
C. Between the primary cell wall and plasma membrane
D. Inner to plasma membrane

Q.145 What distinguishes prokaryotic cell wall from fungal cell wall? (NUMS-2023)
A. Prokaryotic cell wall contains cellulose
B. Prokaryotic cell wall contains peptidoglycan
C. Prokaryotic cell wall contains cutin
D. Prokaryotic cell wall contains silica

Q.146 Which of the following is absent from membrane of prokaryotes?
A. Glycolipid
B. Cholesterol
C. Glycoprotein
D. Phospholipid

Q.147 Cell membrane also contain _____ through which movement of substances take place by active and passive transport. (NUMS-2023)
A. Lipids
B. Corner Proteins
C. Charged pores
D. Carbohydrates

Q.148 According to the fluid mosaic model of cell membrane, which zone is embedded inside? (NUMS-2023)
A. Hydrophobic
B. Hydrophilic
C. Globular
D. Filamentous

Q.149 Which part of plasma membrane controls the fluidity of the membrane? (SZABMU-2023)
A. Glycoprotein
B. Carrier protein
C. Lipid
D. Carbohydrates

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Q.150 Many enzymes are secreted in inactive form to protect: (SZABMU-2023)
A. Mitochondria
B. Cell DNA
C. Cell membrane
D. Vacuole

Q.151 Where do phospholipids arrange themselves in a cell? (ETEA-2023)
A. Inside the nucleus
B. Inside the cytoplasm
C. Inside the plasma membrane
D. Inside the mitochondrial matrix

Q.152 An additional covering surrounds the cell wall of some bacteria that either prevents the bacteria from being phagocytosed by host cells or helps them to make biofilm, which of the following term used for the covering? (ETEA-2023 Retake)
A. Capsule
B. Slime
C. Glycocalyx
D. Spore

Q.153 _____ regulates the selective permeability of the plasma membrane, allowing movement of molecules according to the needs of the cells. (ETEA-2023 Retake)
A. Membrane proteins
B. Membrane carbohydrates
C. Membrane glycolysis
D. Membrane cholesterol

Q.154 Peripheral parts of cell are often like a: (SZABMU-2023)
A. Sol
B. Gel
C. Colloidal
D. True solution

Q.155 The cytoplasm contain/s: (ETEA-2023)
A. Cell organelle only
B. Insoluble waste only
C. Storage products only
D. All A, B, C

Q.156 Function of the nucleus is to form: (ETEA-2023 Retake)
A. Nuclear envelope
B. Chromosomes
C. tRNA
D. Cytoplasm

Q.157 Sarcoplasmic reticulum for muscle fibers is mainly responsible for: (NUMS-2023)
A. Calcium storage
B. Protein synthesis
C. Lipid metabolism
D. Storing cell wastes

Q.158 Select the one which is not a function of smooth endoplasmic reticulum? (NUMS-2023)
A. Metabolism of lipids
B. Transmission of impulses
C. Transport of materials
D. Processing of glycoproteins

Q.159 Lipid synthesis occurs in which one of the following organelles of the cell? (ETEA-2023)
A. Ribosomes
B. Golgi bodies
C. Mitochondria
D. Endoplasmic Reticulum

Q.160 Outer membrane of mitochondria and chloroplast resembles as both are: (SZABMU-2023)
A. Freely permeable to large molecules
B. Freely permeable to small molecules
C. Impermeable
D. Semipermeable

Q.161 In mitochondria, ATP synthase is located on its: (SZABMU-2023)
A. Outer Membrane
B. Inter membrane space
C. Inner membrane
D. Matrix

Q.162 The folds of inner mitochondrial membrane of mitochondria are called: (NUMS-2023)
A. Cisternae
B. Cristae
C. Mesosome
D. Infolds

Q.163 Which of the following organelle is regarded as self-replicating organelle? (ETEA-2023)
A. Endoplasmic reticulum
B. Golgi bodies
C. Mitochondria
D. Vacuoles

Q.164 Mitochondria is usually absent in: (ETEA-2023)
A. Muscle cells
B. Cardiac cells
C. Mature RBCs
D. WBCs

Q.165 Proteins and lipids are modified into glycolipids and glycoproteins by which cell organelles? (UHS-2023)
A. Golgi complex
B. Rough endoplasmic reticulum
C. Smooth endoplasmic reticulum
D. Ribosomes and chromosomes

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Q.166 _____ consists of units called dictyosomes. (ETEA-2023)
A. Ribosomes
B. Lysosomes
C. Glyoxysomes
D. Golgi complex

Q.167 Which of the following is not the function of lysosomes? (SZABMU-2023)
A. Intracellular digestion
B. Autophagy
C. Autolysis
D. Processing of cell secretions

Q.168 _____ are spherical sacs, surrounded by a single membrane and contain hydrolytic enzymes. (NUMS-2023)
A. Mitochondria
B. Golgi bodies
C. Lysosomes
D. Chloroplast

Q.169 Tay-Sach's disease particularly results from the malfunctioning of: (ETEA-2023)
A. Cell membrane
B. Nucleus
C. Lysosomes
D. Vacuole

Q.170 Storage diseases are caused by the excessive accumulation of substances within the cell, due to defects (mutations) in one of the _____ enzymes. (ETEA-2023 Retake)
A. Amylase
B. Lysosomal
C. Lyase
D. Lipase

Q.171 Pollination is facilitated by: (NUMS-2023)
A. Chloroplast
B. Chromoplast
C. Leucoplast
D. Amyloplast

Q.172 The process of photophosphorylation takes place in: (ETEA-2023)
A. Nucleolus
B. Chloroplast
C. Nucleus
D. Golgi bodies

Q.173 Which is the factory for the synthesis of sugar in autotrophic eukaryotes? (ETEA-2023 Retake)
A. Mitochondria
B. Chloroplast
C. Ribosome
D. Amyloplastic

Q.174 The membrane separating the vacuole from cytoplasm is called: (SZABMU-2023)
A. Cristae
B. Cisternae
C. Tonoplast
D. Vacuolar membrane

Q.175 Tonoplast is the membrane separating: (NUMS-2023)
A. Vacuole and nucleoplasm
B. Cytoplasm and nucleoplasm
C. Vacuole and stroma
D. Vacuole and cytoplasm

Q.176 Cell wall of prokaryotic cell is composed of: (UHS-2023)
A. Carbohydrates
B. Carbohydrates & Proteins
C. Proteins
D. Proteins & Lipids

Q.177 Cyclosis and amoeboid movements are due to: (UHS-2023)
A. Microtubule
B. Cilia
C. Microfilaments
D. Intermediate filaments

Q.178 Each centriole is composed of _____ microtubules. (NUMS-2023)
A. Seven triplets
B. Eleven triplets
C. Nine triplets
D. Five triplets

Q.179 Cell death due to tissue damage is called? (ETEA-2023 Retake)
A. Apoptosis
B. Necrosis
C. Cancer
D. Metastasis

Q.180 Middle lamella is composed of: (SZAMBU-2024-Reconduct)
A. Magnesium + sodium salts + pectin
B. Magnesium + potassium salts + pectin
C. Magnesium + calcium salts + pectin
D. Magnesium + calcium phosphate + pectin

Q.181 In which type of cells, cell wall is not present? (SZAMBU-2024-Reconduct)
A. Plant cells
B. Fungal cells
C. Bacterial cells
D. Liver cells

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Q.182 The cells in our body are all genetically identical, apart from the: (SZAMBU-2024-Reconduct)
A. Somatic cells
B. Reproductive cells
C. Muscle fibers
D. White blood cells

Q.183 Plasma membrane is differentially permeable membrane due to the presence of: (KMU-2024)
A. Carbohydrates
B. Lipids
C. Proteins
D. Vitamins

Q.184 Amoeba engulfs liquid food across its membrane by a process: (SZAMBU-2024)
A. Endocytosis
B. Exocytosis
C. Phagocytosis
D. Pinocytosis

Q.185 Which function cannot be attributed to plasma membrane lipids? (NUMS-2024)
A. Recognition of cells having non-self-surface markers
B. Maintaining cell membrane flexibility
C. Control of metabolic reaction across cell membrane
D. Binding ligands for intracellular response

Q.186 Which one is the function of plasma membrane proteins? (NUMS-2024)
A. Restrict entry of polar molecules
B. Prevention of freezing during cold weather
C. Movement of ions in and out of the cell
D. Maintenance of membrane flexibility

Q.187 Choose the correct sequence for permeability of molecules across the plasma membrane: (SZAMBU-2024-Reconduct)
A. Sodium > Lipids > Water/Glucose
B. Water/ Glucose > Lipids > Sodium
C. Sodium > Water/Glucose >Lipids
D. Lipids >Water/Glucose >Sodium

Q.188 The active mass movement of mitochondria in the cytoplasm is due to: (KMU-2024)
A. Cyclosis
B. Endoplasmic streaming movements
C. Golgi apparatus
D. Transfer RNA

Q.189 The nucleus takes dyes due to the presence of: (UHS-2024)
A. Chromatin
B. Lipid
C. Metal ions
D. Thylakoids

Q.190 Chromosome is typically made up from a combination of: (KMU-2024)
A. DNA and protein
B. DNA and RNA
C. RNA and lipids
D. RNA and proteins

Q.191 Where are spindle fibres attached during cell division on a chromosome? (KMU-2024)
A. Centromere
B. Histone proteins
C. Nucleolus
D. Telomere

Q.192 The exchange of materials between nucleus and cytoplasm takes place through: (SZAMBU-2024)
A. Nucleoplasm
B. Nuclear pores
C. Nucleolus
D. Nuclear Lamella

Q.193 Which organelle contributes towards steroid production? (KMU-2024)
A. Endoplasmic Reticulum
B. Golgi apparatus
C. Lysosome
D. Ribosomes

Q.194 Which of the following is the function of Golgi Complex? (UHS-2024)
A. Intracellular digestion
B. Autophagy
C. Autolysis
D. Processing of cell secretions

Q.195 Follow the route of pepsinogen secreted by zymogen cells: (NUMS-2024)
A. SER → RER → Golgi complex → Secretory vesicles
B. SER → Mitochondria → Golgi complex → Secretory vesicles
C. RER → SER → Golgi complex → Secretory vesicles
D. Golgi complex → RER → SER → Secretory vesicles

Q.196 Cristae in mitochondria serve as a site for: (SZAMBU-2024-Reconduct)
A. Glycolysis
B. Calvin cycle
C. Photophosphorylation
D. Electron transport chain

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Q.197 Golgi complex is responsible for: (SZAMBU-2024-Reconduct)
A. Processing of cell secretions
B. Synthesis of proteins
C. Detoxification of alcohol
D. Oxidation of glucose

Q.198 The lysosomes found in eukaryotes contain: (KMU-2024)
A. Hydrolytic enzymes
B. Meiotic enzymes
C. Oxidative enzymes
D. Mitotic enzymes

Q.199 Tay-Sach's is related to the malfunctioning of which of the following organelle? (SZAMBU-2024)
A. Golgi complex
B. Lysosomes
C. Endoplasmic reticulum
D. Glyoxysomes

Q.200 Which enzyme is missing in the patient of Tay-Sach's disease? (SZAMBU-2024-Reconduct)
A. Protein digesting enzyme
B. Carbohydrate digesting enzyme
C. Fatty acid digesting enzyme
D. Lipid digesting enzyme

Q.201 Which one of the following describes best the autophagy? (SZAMBU-2024-Reconduct)
A. Decomposition of hydrogen peroxide
B. Intracellular food digestion
C. Self-eating process
D. Disintegration of cell

Q.202 Chloroplast are membrane bound bodies containing: (UHS-2024)
A. Linear ds-DNA
B. Cisternae
C. Pigments
D. Cristae

Q.203 Which of the following type of plastids is involved in dispersal of seed and pollination? (SZAMBU-2024)
A. Chloroplast
B. Chromoplast
C. Leucoplast
D. Amyloplast

Q.204 Which cytoplasmic organelles make their own proteins? (KMU-2024)
A. Chromosomes
B. Golgi apparatus
C. Mitochondria
D. Smooth endoplasmic reticulum

Q.205 In the inner membrane of mitochondria which has many folds called cristae, there are granular particles called: (SZAMBU-2024)
A. ATP Synthetase
B. Cytochrome c
C. Porins
D. Ubiquinone

Q.206 A group of ribosomes attached to mRNA is known as polysome and the attachment is controlled by: (SZAMBU-2024-Reconduct)
A. Na^{+}
B. Mg^{+2}
C. Ca^{+2}
D. K^{+}

Q.207 The organelles only found at seeding stage in oil seed plants are: (UHS-2024)
A. Peroxisomes
B. Glyoxyosomes
C. Microbodies
D. Vacuoles

Q.208 A lizard detaches its tail when attacked by a predator. This is an example of: (NUMS-2024)
A. Autophagy
B. Autolysis
C. Phagocytosis
D. Intracellular digestion

Q.209 Choose the option showing the correct set of characteristics for intermediate filaments: (NUMS-2024)

	Diameter	Composition	Function
A.	8-10nm	Vimentin	Mechanical support
B.	0.2-25μm	Vimentin	Cilia, flagella
C.	8-10nm	Tubulin	Muscle contraction
D.	7nm	Tubulin	Cyclosis

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ANSWER KEY

PRACTICE EXERCISE

1	D	11	B	21	B	31	D	41	C	51	D	61	B
2	D	12	C	22	A	32	D	42	D	52	B	62	B
3	B	13	D	23	B	33	A	43	C	53	B	63	D
4	C	14	D	24	C	34	A	44	A	54	B	64	C
5	D	15	B	25	B	35	D	45	B	55	C	65	C
6	B	16	C	26	B	36	B	46	C	56	C	66	C
7	C	17	A	27	B	37	B	47	A	57	D		
8	C	18	C	28	C	38	D	48	A	58	A		
9	C	19	B	29	C	39	C	49	C	59	D		
10	B	20	B	30	B	40	B	50	B	60	B		

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67	B	85	D	103	C	121	C	139	C	157	A	175	D	193	A
68	C	86	A	104	B	122	C	140	B	158	D	176	B	194	D
69	A	87	A	105	A	123	C	141	A	159	D	177	C	195	C
70	C	88	B	106	B	124	B	142	B	160	B	178	C	196	D
71	D	89	B	107	D	125	B	143	B	161	C	179	B	197	A
72	D	90	C	108	A	126	D	144	C	162	B	180	C	198	A
73	B	91	C	109	A	127	D	145	B	163	C	181	D	199	B
74	C	92	D	110	A	128	D	146	B	164	C	182	B	200	D
75	C	93	B	111	D	129	B	147	C	165	A	183	B	201	C
76	A	94	C	112	D	130	C	148	A	166	D	184	D	202	C
77	D	95	D	113	C	131	C	149	C	167	D	185	C	203	B
78	D	96	C	114	A	132	B	150	C	168	C	186	C	204	C
79	B	97	C	115	D	133	B	151	C	169	C	187	D	205	A
80	B	98	B	116	D	134	D	152	A	170	B	188	A	206	B
81	C	99	D	117	C	135	A	153	A	171	B	189	A	207	B
82	A	100	C	118	B	136	A	154	B	172	B	190	A	208	B
83	B	101	B	119	B	137	C	155	D	173	B	191	A	209	A
84	A	102	D	120	A	138	D	156	C	174	C	192	B		

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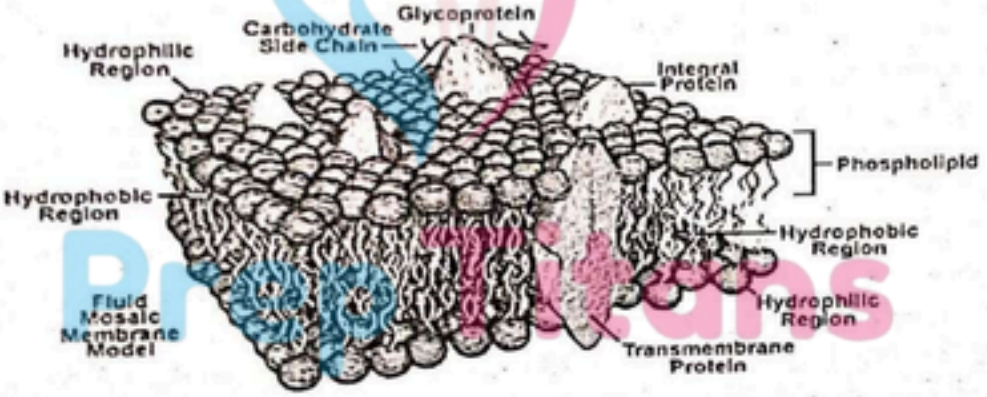
EXPLANATORY NOTES

PRACTICE EXERCISE

1. Cell theory is a fundamental concept in biology. It explains basis of living unit of life that is cell. Virus is not considered a living organism.
2. Plants contain cell wall as outer most boundary whereas in animal cell, it is absent. It maintains the shape of plant cell.
3. Centrioles are absent in higher plant cells. Peroxisomes and mitochondria are present in plant cell.
4. Cellulose fibers are responsible for strengthening of cell wall of plants in crisscross manner and placing these fibers at right angle with each other gives more strength.
5. Cell wall of prokaryotes is composed of polysaccharide chains bounded to shorter chains of amino acid forming peptidoglycan or murein. The entire cell wall is often regarded as a single huge molecule called sacculus.
6. All are present in secondary cell wall except pectin, as it is component of primary cell wall.
7. Cellulose is present in both primary cell wall and secondary cell wall. Middle lamella is composed of sticky, gel-like magnesium and calcium salts and pectin.
8. Middle lamella is composed of sticky, gel-like magnesium and calcium salts (pectates) and pectin. The middle lamella holds neighboring cell walls together.
9. Globular proteins, polysaccharides and phospholipids are present in both prokaryotic and eukaryotic cell membranes while cholesterol is present only in eukaryotic cell membrane.
10.



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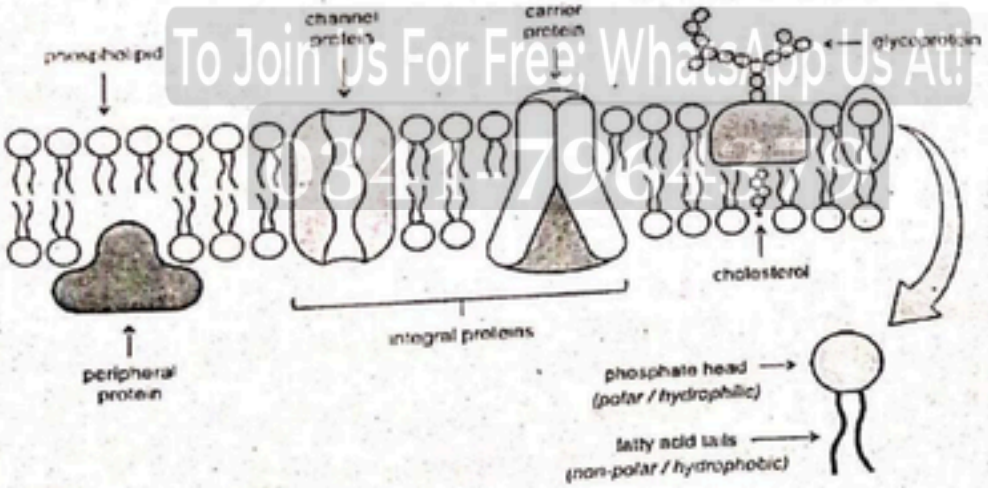

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12. Glycolipids and glycoproteins are oriented towards outer surface of plasma membrane, form glycocalyx, and act as receptors.
13. The animal cell membrane provides mechanical support, maintain cellular homeostasis, and regulate passage of molecules across the membrane. It does not prevent the animal cell from osmotic lysis, it is the function of cell wall, which is absent in animal cells.
14. Glycoproteins, which are present on plasma membrane, can act as receptors for hormones and various other molecules.
15. Cell membrane is the most important structure because it is responsible for identity and integrity of the cell.
16. Protein synthesis is the function of ribosomes. Ribosomes are ribonucleoprotein.
17. This enzyme is attached with cell membrane of cell and it converts ATP into cyclic AMP.
18. Receptors, enzymes and antigens all are found in both prokaryotic and eukaryotic cell membrane. However, only prokaryotic cell membrane is associated with DNA replication.
19. Consistency of cytoplasm is both like sol and gel, but peripheral part is more gel like while central is sol like.
20. Cytoplasm is a site for many important biochemical reactions such as glycolysis, protein synthesis etc. in both prokaryotic and eukaryotic cells. Transcription in eukaryotic cell takes place in nucleus.
21. It is the region between nucleus and cell membrane. Cytoplasm exists in sol and gel form. It contains about 90% water. Cyclosis is shown only in eukaryotes.
22. Nucleus contains linear DNA, chloroplast and mitochondria also have their own circular DNA while ribosomes are made up of rRNA and protein.
23. *E. coli*, *C. botulinum* and *T. pallidum* are prokaryotic organisms having 30S smaller ribosomal subunit, while yeast is eukaryotic organism having 40S smaller ribosomal subunit and 60S larger sub-unit.
24. Endoplasmic reticulum is single membrane bounded organelle. Nucleus and chloroplast both are double membrane bounded organelles, while ribosomes are non-membranous organelles. Ribosomes are factory of protein synthesis; nucleolus is a factory of ribosomes synthesis.
25. Due to presence of ribosomes on RER, it is involved in protein synthesis, while lipids are synthesized by SER. Ribosomes synthesized by nucleolus.
26. Adipose tissue is concerned with conversion, synthesis and storage of lipids that is why it contains more SER than RER.
27. Calcium storage and steroid synthesis is the function of SER, while enzyme synthesis is the function of RER. Mechanical support is, however, related to both SER and RER.
28. Nucleus, chloroplast and mitochondria are double membranous organelles while endoplasmic reticulum is single membrane bounded organelle.
29. Detoxification of drugs is the function of SER while protein synthesis is the function of RER. Mechanical support, however, is the function of both RER and SER.
30. SER is responsible for lipid metabolism (steroid hormones), detoxification, nerve impulse conduction and transport of material in the cell.
31. DNA replication occurs in nucleus, proteins are synthesized by RER and anaerobic respiration occurs in cytoplasm. Chemical modification of biological molecules is the function of Golgi apparatus.

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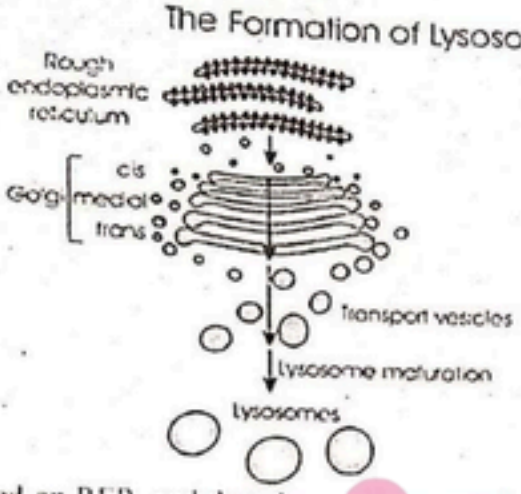
32. The enzymes required for proteins glycosylation are solely found in Golgi complex. Hence, the more appropriate answer is "D". Golgi bodies are center for modifications and packaging.

33.



34. Proteins are synthesized on RER, and then they are transported toward Golgi apparatus with the help of SER, where these proteins are modified. Modified proteins are transported out of the cell in the form of secretory vesicles.
35. Certain organelles, such as lysosomes, peroxisomes and Glyoxysomes originate from Golgi complex.
36. At cytokinesis, in plants, Golgi vesicles from Golgi complex are arranged on the cell equator, fuse together and form a structure called Phragmoplast.
37. Lysosomes are most abundant in those cells which are specialized for phagocytic activities, for example neutrophils.
38. Storage diseases are due to the absence of lysosomal enzymes. If a lysosomal enzyme responsible for lipid metabolism is absent, it leads to the accumulation of lipids in brain cells which causes mental retardation and death, such storage disease is known as Tay-Sach's disease.
39.



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40. In programmed cell death, lysosomes burst and their enzyme contents are quickly dispersed throughout the cytoplasm. In this way, the cell is disintegrated into fragments, which are phagocytosed by other cells. Due to this function, lysosomes are also called suicidal bags.
41. Two most important organelles e.g., chloroplast and mitochondria, are thought to be originated from prokaryotes and are explained with the help of endosymbiont hypothesis.
42. The only difference between chlorophyll and haemoglobin is that chlorophyll has Mg^{++} while haem has Fe^{++} as the central atom.

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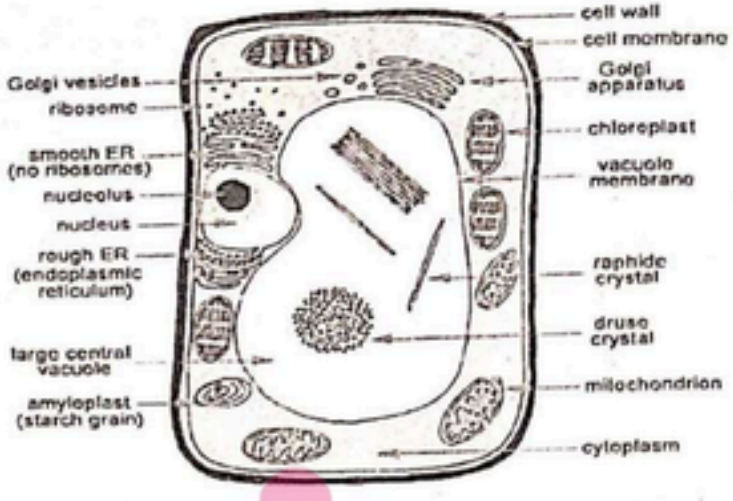
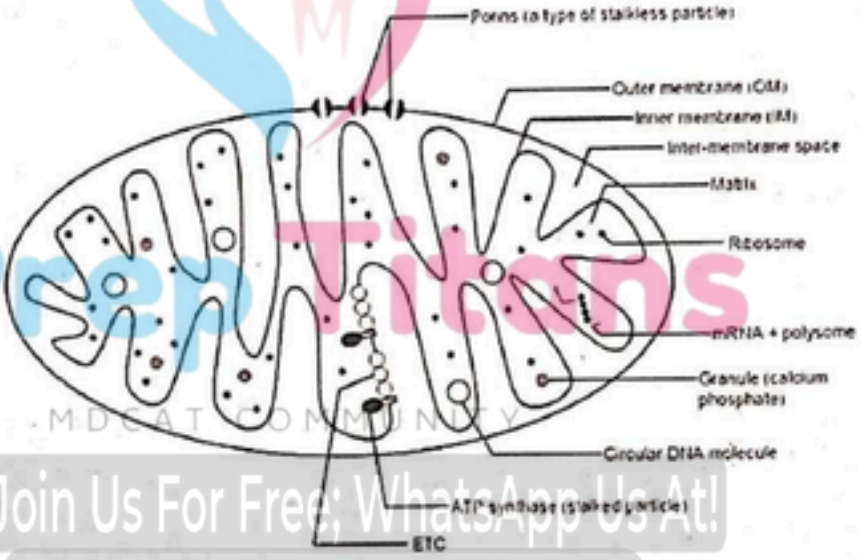
43. Inter-granum is non-green part that connects two grana. The process of photosynthesis does not occur in inter-granum because of absence of chlorophyll.

44. A large central vacuole in plants provide support and turgidity to the leaves and younger parts of plants.



45. Due to large size of mitochondria as compared to endoplasmic reticulum, Golgi apparatus and ribosomes, it can be visualized easily with the help of light microscope.

46.



47. E.T.C occurs in inner mitochondrial membrane which provides the site for pumping of protons across it. Oxidative phosphorylation is associated with ETC.

48. Krebs cycle occurs in the matric of the mitochondria. Cristae is involved in ETC. Stroma is the site of Calvin cycle in chloroplast. F1 particles are involved in ATP synthesis.

49. Mitochondria are most abundant in muscle cells because of the strenuous metabolic activities. *E. coli* is a prokaryotic organism and lack mitochondria. RBCs also lack mitochondria.

50. Nucleolus is the darkly stained area within the nucleus and without any membranous boundary to separate it from the rest of the nuclear material. These are said to be the factory of ribosomes while ribosomes are said to be the factory of protein synthesis.

51. Number of nuclear pores is more in undifferentiated cells as compared to differentiated cells. Since RBCs are fully differentiated cells so they have 3-4 nuclear pores, but the number of nuclear pores in egg cells is about 30,000.

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52. Secondary constriction is also called as nucleolar organizer. It gives rise to nucleoli during interphase.
53. Prokaryotic cells may have arisen more than 3.5 billion years ago while eukaryotes are thought to have first appeared about 1.5 billion years ago.
54. Besides nuclear envelope, the main difference between prokaryotic and eukaryotic cell is the absence of membrane bounded organelles.
55. Both prokaryotic and eukaryotic cells have ribosomes while membrane bound nucleus, cellulosic cell wall and linear chromosomes are found only in eukaryotic cells.
56. The most distinguished feature of a prokaryotic cell is its cell wall. Chemically, it is composed of carbohydrates and short peptides. This complex molecule is called peptidoglycan/murein.
57. *E.coli* is a prokaryote and it lacks membrane bounded organelles. So, none of the above list would be present in *E.coli*.
58. Mesosomes are found in prokaryotic cells and are involved in cell division; they are not present in eukaryotic cells.
59. The cell membrane's structure consists of a lipid bilayer that forms the boundary of the cell and its membrane bounded organelles. So, (D) is the correct answer.
60. Statement 2 is correct (Cell walls are made of cellulose in plants).
Statement 3 is correct (Chromosomes carry DNA).
Statement 5 is correct (All cells have a cell membrane).
Other statements are incorrect or not applicable to all cells.
61. Nuclear pores result from the fusion of outer and inner membranes. They act as a gateway for the exchange of materials with the cytoplasm. Their number is variable depending upon the differentiation of the cell i.e. undifferentiated cells like eggs have 30,000 pores / nucleus while erythrocyte, well-differentiated cells has 3- 4 pores/nucleus.
62. • Sieve tube cell is living without nucleus and other organelles.
• Tracheid and vessel cells are non-living cells.
63. The nucleus contains essential genetic material, vital for cell survival and function.
64. During translation, ribosomes attach to the 5' end of the mRNA and move toward the 3' end.
65. The rough endoplasmic reticulum (RER) is involved in the translation of proteins due to the presence of ribosomes on its surface.
66. Necrosis and erythroblastosis are not related to lysosomal functions.

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67. Chloroplast, cell wall and large central vacuole are the organelles which are absent in an animal cell but present in plant cells.
68. Chloroplast is not present in animal cells, while nucleus, cytoplasm and mitochondria are present in both plants and animal cells.
69. Microtubules, RER and ribosomes are present in animals as well as in plants but centrioles are absent in plants.
70. Centrioles are only present in animals. Plastids and sieve tube are present only in plants. Microtubules are present in both animal and plant cells but absent in prokaryotes.
71. In animal cells, the outer most boundary is cell membrane, liver cells are present in animals where as in plants, bacteria and fungi, cells have cell wall.
72. Plants, algae and fungi have cell wall but bacteria and archaea have some exceptions. Some of their members do not have cell wall, like genus *Mycoplasma*.
73. Cell wall of bacteria lacks cellulose; its strengthening material is peptidoglycan or murein.
74. Term such as semipermeable and differentially permeable are used for plasma membrane. Cell wall does play its role in transport of materials. That's why it is permeable.

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75. Cell wall of fungi is made of homopolysaccharide which is referred as chitin. Chitin is a tough structure.

76. In hypotonic solution, excessive water from surrounding move inside the cell, first cell becomes turgid then burst. If cell wall is present, cell would not burst.

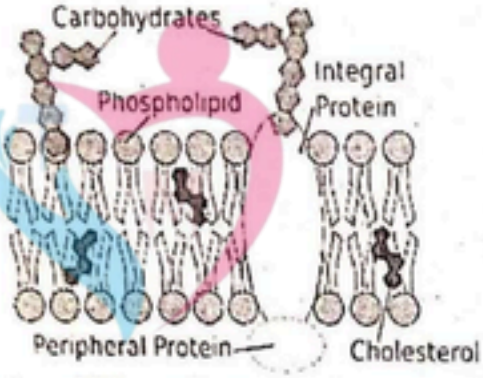
77. Primary cell wall is composed of cellulose and some deposition of pectin and hemicellulose. Cell wall is chiefly made up of cellulose.

78. Lignin is tough structure and it is present in secondary cell wall. Due to its deposition, secondary cell wall becomes thick and cell loses its protoplasm. Cell becomes dead.

79. The ingestion of liquid material into a cell by the budding of small vesicles from the cell membrane is called pinocytosis while the process by which certain living cells called phagocytes ingest or engulf other cells or solid particles is called phagocytosis.

80. Fluid mosaic model of the plasma membrane describes the arrangement of phospholipids in two layers. this hydrophobic region formed by phospholipids prevent ion or polar molecules from passing through the cell membrane.

81.

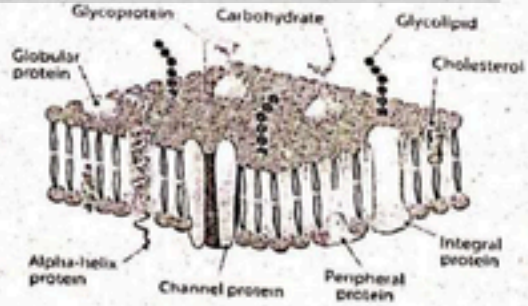


82. Phagocytosis is the process by which a cell uses its plasma membrane to engulf a large solid particle, giving rise to an internal compartment called the phagosome. It is one type of endocytosis while pinocytosis, otherwise known as fluid endocytosis is a mode of endocytosis in which small particles suspended in extracellular fluid are brought into the cell through an invagination of the cell membrane, resulting in a suspension of the particles within a small vesicle inside the cell.

83. Autophagy is the natural, regulatory mechanism of the cell that removes unnecessary or dysfunctional components. It allows the orderly degradation and recycling of cellular components with the help of lysosomes.

84. Osmosis, diffusion and facilitated diffusion are passive processes of passage of molecules across the cell membrane but exocytosis and endocytosis (Pinocytosis and phagocytosis) are active processes of molecules across the cell.

85.



86. Permeability of membrane depends upon phospholipids and proteins in plasma membrane.

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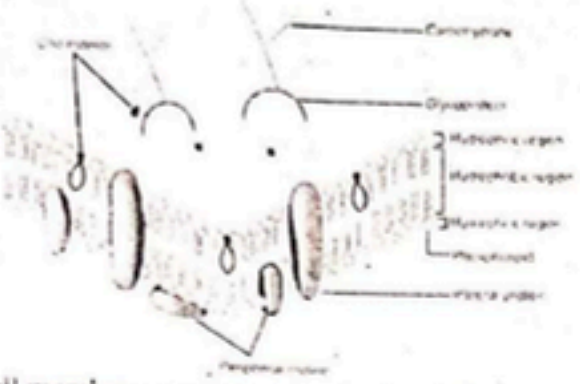
87.



88. Any type of damage in cell membrane can cause death of cell of an organism.

89. Facilitative diffusion and filtration are examples of passive transport. In active transport, movement of molecules against the concentration gradient with the expenditure of energy.

90. Plasma membrane is not symmetrical. Proteins are embedded in mosaic manner.

91. Fluidity of the membrane is controlled by the presence of saturated and unsaturated fatty acids in phospholipids which form the lipid bilayer in which proteins are embedded.

92. Nucleoproteins are not involved in cell membrane formation. While other molecules contribute in cell membrane formation.

93. Generally, sub units of ribosomes are separated from each other. These are joined with the help of Mg^{+2} when cell demands.

94. Adenylate cyclase, in plasma membrane acts as enzymes. It converts ATP to cyclic AMP.

95. S. J. Singer and Nicolson stated that proteins are floating in sea of lipids. This statement shows the fluidity of plasma membrane.

96. Chemical nature of carrier molecules is protein. Theses protein carriers perform facilitative diffusion.

97. Singer and Nicolson gave the fluid mosaic model. According to this model, "protein layers are not continuous and are not confined to the surface of the membrane but are embedded in lipid bilayers in mosaic manner".

98. One of the important functions of plasma membrane is transport of materials. It allows only selective material in cell. That's why, it is referred as selective permeable.

99. Pyruvate oxidation and Krebs' cycle occur in mitochondrial matrix. Photosynthesis occurs in chloroplast.

100. Out of the following options, Golgi bodies, lysosomes and ER are single membranous while mitochondria are double membranous organelles, ribosomes are non-membranous organelles.

101. The cytosol of the cell consists of living part (Organelles) and non-living part (Inclusion bodies including glycogen and lipid droplets).

102. The size of the ribosomes present in prokaryotic and eukaryotic cells is 70S and 80s, respectively. 70S ribosomes are, however, present in some eukaryotic organelles like mitochondria and chloroplasts.

103. Group of ribosomes attached to mRNA are called polysome/polyribosomes which is shown in diagram.



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104. A ribosome is made up of two sub-units, larger and smaller subunits. In case of eukaryotic cell, larger subunit is 60S and smaller subunit is 40S while prokaryotic cell has 50S and 30S larger and smaller sub-units, respectively.

105. Chemically, ribosomes are composed of an almost equal amount of RNA and proteins; hence, they are ribonucleo-protein particles.

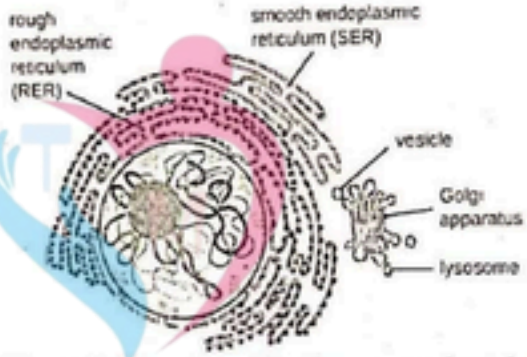
106. Membrane bounded organelles are absent in prokaryotic cells but present in eukaryotic cells. Ribosomes are non-membranous and are present in both prokaryotic and eukaryotic cells.

107. There are two types of ribosomes in living world. Small sized ribosome is 70S that is present in prokaryotes/bacteria while large sized ribosome is present in eukaryotes.

108. Nucleoli are factories of ribosomes. Nucleolus is present in nucleoplasm. A darkly stained structure.

109. Endoplasmic reticulum is involved in the synthesis of lipids, while centrioles are involved in spindle formation. Golgi complex contributes in cell secretions. Power house of cell is mitochondrion.

110.



111. SER is responsible for lipid metabolism, detoxification, nerve impulse conduction and transport of material in the cell.

112. Secretory proteins are synthesized on RER, then transferred to Golgi apparatus through SER for final processing and packaging and finally released as secretory vesicles.

113. Neurotransmitter are synthesized by RER then transported to Golgi apparatus. Golgi complex provides neurotransmitter in the nervous pathway.

114. SER is involved in transmission of impulses while protein synthesis is performed by RER. Lysosomes are involved in intracellular digestion.

115. Maturing, concave and inner face of the Golgi complex is the site from where Golgi vesicles after processing are budded off.

116. Golgi complex is considered as secretory organelle of the cell. Secretory proteins are synthesized on RER, then transferred to Golgi apparatus through SER for final processing and packaging and finally released as secretory vesicles.

117. The vesicles formed from Golgi complex secrete plant cell wall.

118. Secretory cells have abundant Golgi complexes as compared to non-secretory cells.

119. Golgi apparatus was discovered by Camillo Golgi 1898. This apparatus is found in all eukaryotic cells.

120. Golgi apparatus is present in eukaryotic cell. Bacteria are prokaryotes, they do not have Golgi apparatus.

121. Lysosomes are membrane bound, dense granular structures containing hydrolytic enzymes responsible mainly for intracellular and extracellular digestion.

122. The digestive vacuoles and autophagosomes are also known as secondary lysosomes that are formed by the fusion of primary lysosomes with the endosome and old organelle (subjected to autophagy) respectively.

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123. Lysosomes are spherical sacs surrounded by a single membrane and contain hydrolytic enzymes. Mitochondria appear as vesicle, rods or filament. Golgi bodies are flattened membrane bound sacs. Chloroplast appear as discoid shape.

124. During intracellular digestion, ingested food particles are stored in vesicle called food vacuole. Once a lysosome has fuse with the food vacuole, the resulting structure is called secondary lysosomes in which food begins to digest. Vacuoles store substances. Ribosomes synthesize proteins. Golgi complex contributes in secretion.

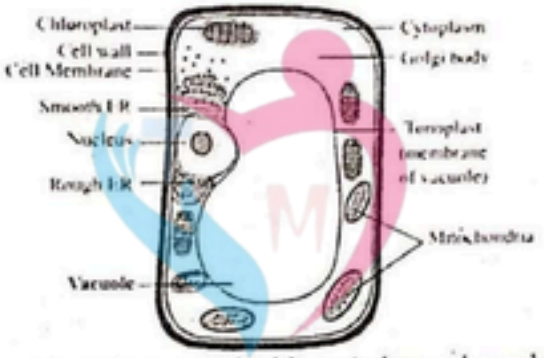
125. Mitochondria and chloroplasts both are considered as semiautonomous organelles, as they have their own circular DNA and 70S ribosomes. Mitochondria are present in both plant and animal cells but chloroplast is present in autotrophic eukaryotes.

126. Chloroplasts contain proteins, ribosomes and small circular DNA.

127. Plants have large central vacuole and it stores waste and useful substances.it is absent in prokaryotes. Protists and fungi have smaller vacuole as compared to plants.

128. Peroxisomes and Smooth endoplasmic reticulum are present in both animal cells and plant cells but central large vacuole is unique feature of plant cell.

129.



130. Mitochondria, chloroplast and nucleus are double membrane bounded organelles. Lysosomes, Golgi complex, endoplasmic reticulum and micro-bodies are single membranous organelles while ribosomes lack membrane.

131. Mesosomes are membrane infoldings in bacterial cell and are more prominent in Gram negative bacteria. Mesosomes are the sites of cellular respiration. Electron transport chain occurs in mesosomes as mitochondria is absent in bacteria.

132. Mitochondria are power house of a cell. Aerobic cellular respiration takes place in mitochondria.

133.



134. Cellular respiration is occurred in mitochondria. This process release energy in the form of ATP. ATP is cell energy currency.

135. Ribosomal RNA is synthesized and stored in nucleolus. Central fibril area of nucleolus has large molecular weight RNA and rDNA.

136. The term 'prokaryotes' is derived from the Greek word 'pro-meaning before' and 'karyon meaning nucleus'. Prokaryotic cells are cells that do not have a true nucleus and membrane-bound organelles. Ribosomes are non-membranous organelle which present in both prokaryotes and eukaryotes.

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137. Nucleus and nucleolus are visible during interphase only because in mitotic phase, nuclear envelope disintegrates and mixing of nuclear contents with cytoplasm does occur.
138. Chromosomes in nucleus during nuclear division exist in loosely coiled state known as chromatin. Gene is specific sequence of DNA. Ribosome is a factory of protein formation. DNA is a polymer of nucleotides.
139. The colloidal mixture of ions, organic and inorganic salts present in the nucleus is Nucleoplasm. Nuclear membrane is referred as nuclear envelop. Nucleolus is a darkly stained structure. Condensed from of chromatin is chromosome.
140. Bacteria cell wall is made up of peptidoglycan which has glycan with short chain of amino acids. Fungi cell wall is made up of chitin, while plants have cellulose in their cell wall.
141. Genomic DNA molecules in prokaryotes is single, circular, double stranded and not bounded by any membrane and it is freely dispersed in cytoplasm.
142. Mesosomes are involved in the cell division and DNA replication of prokaryotic cell. Lysosomes, Golgi bodies and Phragmoplast are not present in prokaryotes.
143. Ribosomes are the only organelles that are common in both prokaryotic and eukaryotic cell. Cytoplasmic streaming and nuclear envelope are shown by eukaryotic cell. Binary fission is feature of prokaryotic cell but it does occur in eukaryotes (cell division).
144. The secondary cell wall forms between primary cell wall and the plasma membrane.
145. The prokaryotic cell wall is made of peptidoglycan, whereas fungal cell walls contain chitin, not peptidoglycan.
146. Prokaryotic cell membranes lack cholesterol, unlike eukaryotic membranes, which contain it for stability.
147. The cell membrane contains charged pores (channels, carriers and pumps) that allow the movement of substances through active and passive transport processes.
148. In the fluid mosaic model, the hydrophobic (water-repelling) region of phospholipid tails is embedded inside the membrane, while the hydrophilic heads face outward.
149. The lipid component, particularly cholesterol, controls the fluidity of the plasma membrane by preventing it from becoming too rigid or too fluid.
150. Enzymes are secreted in inactive forms to prevent them from damaging the cell membrane before reaching their target site.
151. Phospholipids arrange themselves in the plasma membrane, forming a bilayer that separates the cell's interior from its external environment.
152. The capsule is an additional covering around the cell wall of some bacteria that helps prevent phagocytosis and assists in biofilm formation.
153. Membrane proteins regulate the selective permeability of the plasma membrane, controlling the movement of molecules in and out of the cell.
154. Peripheral parts of the cell often behave like a gel, with a semi-solid consistency, allowing for structural support and flexibility.
155. The cytoplasm contains cell organelles, insoluble waste, and storage products, all of which are essential for cellular functions.
156. The nucleus is responsible for the synthesis of ribosomal RNA (rRNA), which is essential for protein synthesis in the cell.
157. The sarcoplasmic reticulum in muscle fibers primarily stores calcium ions, which are crucial for muscle contraction.
158. The smooth endoplasmic reticulum (SER) is involved in lipid metabolism, transport of materials, and other processes, but it does not process glycoproteins.
159. Lipid synthesis primarily occurs in the smooth endoplasmic reticulum (SER) of the cell. So, endoplasmic reticulum is the right answer.
160. The outer membrane of both mitochondria and chloroplasts is freely permeable to small molecules, allowing their easy passage.
161. ATP synthase is located on the inner membrane of mitochondria, where it synthesizes ATP during cellular respiration.
162. The folds of the inner mitochondrial membrane are called cristae, and they increase the surface area for ATP production.

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163. Mitochondria are considered self-replicating organelles because they contain their own DNA and can reproduce independently within the cell.
164. Mitochondria are absent in mature red blood cells (RBCs) as they lose their organelles during maturation to maximize space for hemoglobin.
165. The Golgi complex modifies proteins and lipids into glycolipids and glycoproteins by adding carbohydrate groups to them.
166. The Golgi complex consists of units called dictyosomes, which are stacks of membrane-bound structures responsible for modifying and packaging proteins and lipids in plants.
167. Lysosomes are involved in intracellular digestion, autophagy, and autolysis, but they do not process cell secretions, which is a function of the Golgi apparatus.
168. Lysosomes are spherical sacs surrounded by a single membrane that contain hydrolytic enzymes for breaking down waste materials and cellular debris.
169. Tay-Sachs disease results from the malfunctioning of lysosomes, due to deficiency of hexosaminidase A, which is responsible for breaking down of lipids in the brain.
170. Storage diseases are caused by defects in lysosomal enzymes, leading to the excessive accumulation of substances within the cell.
171. Chromoplasts are responsible for the coloration in plants, which attracts pollinators like insects, facilitating the pollination process.
172. Photophosphorylation, the process of ATP production using light energy, occurs in the chloroplasts during photosynthesis.
173. Chloroplasts are the site of photosynthesis in autotrophic eukaryotes, where sugars are synthesized using light energy, carbon dioxide, and water.
174. The membrane separating the vacuole from the cytoplasm is called the tonoplast, which regulates the movement of substances in and out of the vacuole.
175. The tonoplast is the membrane that separates the vacuole from the cytoplasm, regulating the exchange of materials between them.
176. The cell wall of prokaryotic cells is primarily composed of carbohydrates and short peptide fragments, with peptidoglycan being the key component in bacteria.
177. Cyclosis and amoeboid movements are driven by microfilaments, which are part of the cytoskeleton, providing flexibility and enabling movement.
178. Each centriole is composed of nine triplets of microtubules arranged in a cylindrical structure.
179. Necrosis is the uncontrolled cell death due to tissue damage, often resulting from injury or infection.
180. The middle lamella, which binds plant cells together, is primarily composed of magnesium and calcium salts along with pectin.
181. Liver cells, being animal cells, do not have a cell wall, unlike plant, fungal, and bacterial cells which possess cell walls for structural support.
182. Reproductive cells are different from all other cells (somatic cells) because they are formed as a result of meiosis.
183. Plasma membrane is differentially permeable because of lipids in membrane which restrict movement of polar substances while allow passage of non-polar substances.
184. Amoeba engulfs liquid food through **pinocytosis**, a form of endocytosis where the cell membrane forms vesicles to absorb extracellular fluids.
185. Control of metabolic reactions across the cell membrane cannot be attributed to plasma membrane lipids, as this function is primarily carried out by proteins.
186. The function of plasma membrane proteins is to move ions in and out of the cell by acting as channels or transporters.
187. Lipids can easily pass through the lipid bilayer, while water, glucose, and other small polar molecules follow, with sodium having the lowest permeability due to its charged nature.
188. The active mass movement of mitochondria in the cytoplasm is due to cyclosis. It involves the flow of cytoplasm, facilitating the movement of organelles within the cell.
189. The nucleus takes dyes due to the presence of chromatin, which is composed of DNA and proteins that bind to stains, allowing the nucleus to absorb dyes.

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190. Chromosomes are typically made up of DNA and protein. The DNA is wrapped around histone proteins, forming chromatin that compacts to form chromosomes.
191. Spindle fibers attach to the centromere of a chromosome during cell division. This allows the chromatids to be pulled apart during mitosis or meiosis
192. The exchange of materials between the nucleus and cytoplasm takes place through nuclear pores. These pores regulate the transport of molecules like RNA and proteins.
193. The endoplasmic reticulum contributes to steroid production. It contains enzymes that synthesize steroids, particularly in the smooth ER.
194. The function of the Golgi complex is the processing of cell secretions. It modifies, sorts, and packages proteins and lipids for secretion or delivery to other parts of the cell.
195. Pepsinogen is synthesized in the rough endoplasmic reticulum (RER), processed in the smooth endoplasmic reticulum (SER), modified in the Golgi complex, and finally stored in secretory vesicles for release.
196. The cristae in mitochondria serve as a site for the electron transport chain. This is where ATP is generated during cellular respiration.
197. The Golgi complex is responsible for the processing of cell secretions. It modifies, sorts, and packages proteins and lipids for secretion or transport within the cell.
198. The lysosomes in eukaryotes contain hydrolytic enzymes. These enzymes break down waste materials and cellular debris through hydrolysis.
199. Tay-Sach's disease is related to malfunctioning of lysosomes. It occurs due to deficiency in the enzyme needed to break down certain lipids, leading to their accumulation in the brain.
200. The enzyme missing in the patient of Tay-Sach's disease is a lipid-digesting enzyme. Specifically, it is the enzyme hexosaminidase A, which is required to break down certain lipids in the brain.
201. Autophagy is best described as the self-eating process. It involves the degradation and recycling of the cell's own components to maintain cellular homeostasis.
202. Chloroplasts are membrane-bound bodies containing pigment, primarily chlorophyll, which is essential for photosynthesis.
203. Chromoplasts are involved in dispersal of seeds and pollination. They contain pigments like carotenoids that give color to fruits and flowers for pollination and seed dispersal.
204. Mitochondria make their own proteins. They have their own DNA and ribosomes, allowing them to synthesize proteins essential for their function.
205. In the inner membrane of mitochondria, the granular particles found in the folds called cristae are ATP synthase. These enzymes are responsible for synthesizing ATP during cellular respiration.
206. Magnesium ions help stabilize the interaction between ribosomes and mRNA during protein synthesis.
207. The organelles found only at the seeding stage in oil seed plants are glyoxysomes. These specialized organelles are involved in conversion of lipids into carbohydrates.
208. The most appropriate answer is Autolysis. The tail is detached by the death of the cells through which tail was attached to the lizard.
209. The correct set of characteristics for intermediate filaments is A. 8-10nm, Vimentin, Mechanical support. Intermediate filaments, composed of proteins like vimentin, provide structural support to the cell.

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5 TOPIC COORDINATION & CONTROL NERVOUS / CHEMICAL COORDINATION

PRACTICE EXERCISE

Q.1 **Information received by different receptors of body is analyzed by:**
A. Autonomic nervous system
B. Central nervous system
C. Parasympathetic nervous system
D. Sympathetic nervous system

Q.2 **Ectoderm mainly gives rise to:**
A. Musculo-skeletal system
B. Nervous system
C. Respiratory system
D. Cardiovascular system

Q.3 **A motor nerve carries impulses from:**
A. Spinal nerves to effectors
B. Effectors to cranial nerves
C. Effectors to CNS
D. CNS to effectors

Q.4 **Pressure is felt by your body immediately after it is applied. This is achieved with the help of:**
A. Mechanoreceptors
B. Thermoreceptors
C. Nociceptors
D. Chemoreceptor

Q.5 **Stimulus of touch, pain, cold and heat are recognized differently because:**
A. For each sensation, different form of nerve impulse is generated
B. Different receptors are present for detection of stimuli
C. All nerves send their impulse to same part of brain
D. Each stimulus acts on different parts of body

Q.6 **Which of following is associated with sense of touch?**
A. Pacinian's corpuscles
B. Mechanoreceptors
C. Merkel disks
D. Both B and C

Q.7 **Non-neuronal cells encapsulating mainly axons of peripheral neurons are:**
A. Microglia
B. Oligodendrocytes
C. Astrocytes
D. Schwann's cell

Q.8 **Myelinated, single and long fiber that takes message towards the cell body is:**
A. Dendron
B. Axon
C. Dendrite
D. Soma

Q.9 **The largest number of the cell bodies of neurons are found in:**
A. Brain
B. Spinal cord
C. Sensory organs
D. Effectors

Q.10 **Which of the following is not correct about myelin sheath?**
A. Composed of specialized lipids
B. Responsible for saltatory conduction
C. Conduct impulses
D. Absent on nodes of Ranvier

Q.11 **Myelin sheath:**
A. Is found in all axons
B. Is found in all dendron
C. Speeds up conduction
D. Is proteinaceous

Q.12 **Which one of the following are also known as efferent neurons?**
A. Sensory
B. Associative
C. Motor
D. Mixed

Q.13 **Regeneration is possible in all parts of neurons except:**
A. Dendron
B. Axon
C. Dendrites
D. Cell body

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Q.14 It is not true about cell body of neuron:
A. Main nutritional part
B. It contains axoplasm
C. Biosynthesis of materials
D. Regenerate axonal and dendrite fiber

Q.15 Which organelle cannot be found in synaptic knob of a neuron?
A. Mitochondria
B. Ribosomes
C. Secretory vesicles
D. Nucleus

Q.16 Which of the following is most abundant type of neurons in CNS?
A. Sensory neurons
B. Associative neurons
C. Motor neurons
D. Neuroglial cells

Q.17 Which one of the following gives a tree-like appearance to neurons?
A. Dendron
B. Soma
C. Dendrites
D. Axons

Q.18 Which of the following is not a part of neuron?
A. Axon
B. Dendrons
C. Nissl's granules
D. Synapse

Q.19 Which of the following is not a component of reflex arc?
A. Afferent nerve
B. Brain
C. Efferent nerve
D. Effectors

Q.20 Which of the following describes the comprehensive pathway of reflex arc?
A. Prick on finger → Sensory nerve → Medulla → Motor nerve → Arm Muscle
B. Prick on finger → Sensory nerve → Spinal cord → Motor nerve → Finger muscles
C. Prick on finger → Sensory nerve → Cerebrum → Motor nerve → Finger muscle
D. Prick on finger → Sensory nerve → Cerebellum → Motor nerve → Finger muscle

Q.21 Depolarization is the result of:
A. Influx of K^+
B. Influx of Na^+
C. Efflux of K^+
D. Efflux of Na^+

Q.22 Which of the following causes the hyperpolarization across neurolemma?
A. Distribution of charge
B. Influx of Na^+
C. Late closing of K^+ channels
D. Outward diffusion of Na^+

Q.23 Which one of the following sets of ions is necessary for transmission of nerve impulse?
A. Na^+ and K^+
B. Ca^{2+} and Na^+
C. Ca^{2+} and K^+
D. Na^+ and Mg^{2+}

Q.24 Which of the following will restore original ion gradients and RMP after hyperpolarization in neurons?
A. K^+ channels
B. Na^+/K^+ pumps
C. Na^+ channels
D. Ca^{++} channels

Q.25 Microscopic gap between the neurons is called:
A. Synapse
B. Synaptic cleft
C. Collapse
D. Pre-synapse membrane

Q.26 Which ion is involved in release of Acetylcholine from pre-synaptic fiber into extracellular fluid?
A. Calcium
B. Potassium
C. Sodium
D. Magnesium

Q.27 Neurotransmitter molecule binds to receptors that are located on:
A. Synaptic knob
B. Pre-synaptic membrane
C. Post synaptic membrane
D. Synaptic cleft

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Q.28 After the depolarization of post synaptic neurolemma, neurotransmitters are mostly:
A. Taken up by Schwann cells
B. Remain in synaptic cleft
C. Degraded by enzymes
D. Taken up by post synaptic membrane

Q.29 Sense of hearing is concerned with:
A. Cerebral cortex
B. Medulla
C. Hypothalamus
D. Cerebellum

Q.30 In humans, this part is called as emotion center of brain:
A. Thalamus
B. Amygdala
C. Hypothalamus
D. Pons

Q.31 Lobe are present in:
A. Hypothalamus
B. Cerebrum
C. Pons
D. Amygdala

Q.32 CSF circulates in all of the following parts except:
A. Lateral ventricles
B. Corpus callosum
C. Dorsal ventricles
D. Central canal

Q.33 Spinal cord terminates at the level of:
A. Sacrum
B. Coccyx
C. 1st Lumber vertebra
D. 2nd Lumber vertebra

Q.34 Grey matter is composed of:
A. Schwann cells
B. Neuron fibres
C. Cell bodies of neuron
D. Nissl's granules

Q.35 The primary function of spinal cord is to:
A. Produce CSF
B. Produce hormones
C. Communicate two hemispheres
D. Communicate brain with rest of body

Q.36 Preparing the body for the "fight-or-flight" response is the role of:
A. Sympathetic nervous system
B. Autonomic nervous system
C. Parasympathetic nervous system
D. Somatic nervous system

Q.37 Vagus nerve arises from _____ region.
A. Cervical
B. Lumbar
C. Thoracic
D. Pelvic

Q.38 Bundle of axons or dendrites bounded by connective tissue inside CNS is:
A. Nerves
B. Tracts
C. Ganglia
D. Nuclei

Q.39 The incorrect statement regarding hormones is:
A. Endocrine secretion
B. Initiate biochemical reaction
C. Organic in nature
D. Transported by blood

Q.40 Cholesterol serves as precursor of:
A. Proteins hormones
B. Steroid hormones
C. Adenoid hormones
D. Glucocorticoids hormones

Q.41 Pick the system which transports hormone in the body:
A. Endocrine system
B. Nervous system
C. Circulatory system
D. Muscular system

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Q.42 Hypothalamus produces all of the following except:
A. CRF
B. TRF
C. ADH
D. ACTH

Q.43 Pituitary gland is attached to hypothalamus by:
A. Hypophysis
B. Axons
C. Corpus callosum
D. Infundibulum

Q.44 What results in production of large quantities of urine and great thirst?
A. Lack of aldosterone
B. Lack of oxytocin
C. Lack of ADH
D. Over-secretion of oxytocin

Q.45 Which of the following option correctly depicts neurosecretory hormone?
A. Oxytocin and ADH
B. ACTH and LH
C. ICSH and TRF
D. TSH and STH

Q.46 The pituitary gland is also called as:
A. Adenohypophysis
B. Hypophysis cerebri
C. Neurohypophysis
D. Epiphyses cerebri

Q.47 Term master gland is used for:
A. Anterior pituitary
B. Median pituitary
C. Posterior pituitary
D. Pituitary gland

Q.48 High level of TSH can be seen in all conditions except:
A. Stress
B. Low thyroxin in blood
C. Growth and development
D. Low TRF level

Q.49 All of the following are releasing factors except:
A. CRF
B. TRF
C. PIF
D. SRF

Q.50 Hyper functioning of anterior pituitary causes all except:
A. Hyperthyroidism
B. Gigantism
C. Hypercorticalsteriodism
D. Diabetes insipidus

Q.51 Diabetes insipidus is associated with:
A. Insulin
B. Glucagon
C. Glucocorticoid
D. Vasopressin

Q.52 Which one of the following is not a tropic hormone?
A. TSH
B. GH
C. ACTH
D. ADH

Q.53 High level of MSH can be seen in all except:
A. Addison's disease
B. Pregnancy
C. Strong sunlight exposure
D. Cushing's disease

Q.54 Active thyroxin is also called:
A. T_1
B. T_2
C. T_3
D. T_4

Q.55 Congenital under secretion of thyroxin causes:
A. Grave's disease
B. Myxedema
C. Addison's disease
D. Cretinism

Q.56 Hormones involved in ossification of bones:
A. Calcitonin
B. Oxytocin
C. Thyroxin
D. Parathormone

Q.57 High level of TSH can be seen in all conditions except:
A. Stress
B. Growth
C. Brain differentiation
D. High thyroxin level in blood

Q.58 Brain cells fail to differentiate in:
A. Cretinism
B. Dwarfism
C. Grave's disease
D. Addison's disease

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Q.59 **Metamorphosis in amphibians is under control of:**
A. Sex hormones
B. Pituitary hormone
C. Thyroid hormone
D. Parathyroid hormone

Q.60 **Due to hyper-secretion of thyroxin, there is increased BMR and exophthalmic goiter. This occurs in:**
A. Addison's disease
B. Graves' disease
C. Cushing's disease
D. Diabetes mellitus

Q.61 **Action of parathormone is antagonistic to:**
A. Insulin
B. Calcitonin
C. FSH
D. TSH

Q.62 **Underactivity of parathyroid gland leads to:**
A. Diabetes
B. Dwarfism
C. Kidney stones
D. Muscular tetany

Q.63 **Most portion of pancreas acts as:**
A. Endocrine
B. Exocrine
C. Mesocrine
D. Autocrine

Q.64 **Which of the following statement is incorrect regarding insulin?**
A. Inhibits glycogen hydrolysis
B. Increases glycolysis
C. Converts glucose to protein
D. Increases lipolysis

Q.65 **All are functions of glucagon except:**
A. Glucogenesis
B. Gluconeogenesis
C. Lipolysis
D. Protein synthesis

Q.66 **Major endocrine cells in pancreas are:**
A. Alpha cells
B. Beta cells
C. Gamma cells
D. Delta cells

Q.67 **Release of hormones from islets of Langerhans is under the influence of:**
A. STH
B. ACTH
C. Blood glucose level
D. All A, B, C

Q.68 **Tumor in beta cells result in all except:**
A. More insulin production
B. Low glucose in blood
C. Destruction of alpha cells
D. Low calcium in blood

Q.69 **Which of the following is not secreted by thyroid gland?**
A. Thyroxin
B. Tri-idothyronin
C. Calcitonin
D. Glucagon

Q.70 **Which of the following acts as a messenger in both chemical and nervous coordination?**
A. Acetylcholine
B. Nicotine
C. Dopamine
D. Epinephrine

Q.71 **Which one of the following is only glucocorticoid?**
A. Cortisol
B. Aldosterone
C. Corticosterone
D. Androgen

Q.72 **Which one of the following is exclusively a mineralocorticoid?**
A. Cortisol
B. Aldosterone
C. Corticosterone
D. Androgen

Q.73 **All of the following are produced in adrenal gland except:**
A. Epinephrine
B. Cortisol
C. Calcitriol
D. Androgens

Q.74 **Aggressive behavior during routine life can be a symptom of:**
A. Hyperthyroidism
B. Over production of STH
C. Over production of adrenal cortex
D. Over production of adrenal medulla

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Q.75 Peripheral vasoconstriction is a function of:
A. Vasopressin
B. Secretin
C. Epinephrine
D. Norepinephrine

Q.76 One which is not due to adrenal cortical abnormality:
A. Addison's disease
B. Cushing's disease
C. Failure to cope stress
D. Tay-Sach's disease

Q.77 A tumor in inner part of adrenal cortex in female results in all except:
A. Sterility
B. Male like characters in female
C. Over androgen production
D. High steroid level in blood

Q.78 Action of epinephrine and nor-epinephrine differs on vessels supplying blood to:
A. All parts of body
B. Skeletal muscle and gut
C. Brain and muscles
D. Skin and muscles

Q.79 Which of following neurotransmitters affect sleep, mood and learning?
A. Epinephrine and dopamine
B. Nor-epinephrine and serotonin
C. Dopamine and serotonin
D. Epinephrine and nor-epinephrine

Q.80 Stress conditions such as cold which normally be overcome, leads to collapse and death in:
A. Cushing's disease
B. Addison's disease
C. Diabetes
D. Cretinism

Q.81 Adrenalin and nor-adrenalin promote the release of glucose from the liver:
A. Protein
B. Fats
C. Glycogen
D. Starch

Q.82 Which one of the following glands produces steroidal hormones?
A. Pancreas
B. Gut
C. Hypothalamus
D. Testes

Q.83 If estrogen is deficient then possible reason would be less amount of:
A. Testosterone
B. FSH
C. Oxytocin
D. ICSH

Q.84 In castrated male, there is under-secretion of:
A. Testosterone
B. FSH
C. LTH
D. STH

Q.85 Testosterone is involved in production of primary sex organ in male:
A. Before birth
B. After puberty
C. After birth
D. Before puberty

Q.86 Estrogen is produced from all except:
A. Developing follicle
B. Maturing follicle
C. Follicle under FSH
D. Ruptured follicle

Q.87 A significant constant level of testosterone can be seen in male:
A. Before birth
B. After puberty
C. After birth
D. Before puberty

Q.88 Deficiency of which hormone causes sterility in humans?
A. Estrogen
B. Testosterone
C. Progesterone
D. Both A and B

Q.89 The hormones which works mostly on the basis of positive feedback mechanism:
A. ADH
B. Insulin
C. Oxytocin
D. Aldosterone

Q.90 Normal serum level of hormones is controlled by:
A. Target site
B. Feedback mechanism
C. Effector's response
D. Precursor activation

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Q.91 **Pick the false statement:**
A. Cellular functions need to be continuously regulate
B. Nerve fibers innervate all cells of body
C. Rate of chemical reactions is controlled by hormones
D. Glands always produce secretions

Q.92 **Which is not controlled directly by the nervous system?**
A. Blood glucose concentration
B. Heart rate
C. Dilation of the blood vessels
D. Pupil dilation

Q.93 **Classification of receptors is based on:**
A. Location
B. Type of stimulus
C. Type of cells
D. Type of response

Q.94 **Nissl's granules are found in _____ and _____:**
A. Neurons, help in protein synthesis
B. Sarcoplasm, help in contraction
C. Blood, help in nutrition and excretion
D. Mucous cells, secrete mucus

Q.95 **Mature neurons are unable to divide because after maturation they:**
A. Lack active nucleus
B. Enter S phase permanently
C. Enter G0 phase
D. Lack centrioles

Q.96 **The new potential developed on post-synaptic membrane is:**
A. Always excitatory
B. Always inhibitory
C. May be excitatory or inhibitory
D. Neither excitatory nor inhibitory

Q.97 **Receptors for proteinaceous hormones are located on/in:**
A. Nucleus
B. Cytoplasm
C. Cell surface membrane
D. Cisternal membranes

Q.98 **Which of the following are not endocrine glands?**
A. Pituitary gland
B. Pineal gland
C. Adrenal gland
D. Salivary gland

Q.99 **Which of the following is not a function of hormones produced by thyroid gland?**
A. Increase in BMR
B. Decrease blood calcium
C. Increase ATP production
D. Glucose → Glycogen

Q.100 **Pancreatic duct of healthy dog is blocked. Which one of the function of pancreas will not be affected?**
A. Protein digestion
B. Carbohydrate digestion
C. Neutralization of chyme
D. Maintenance of normal blood sugar level

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5 TOPIC COORDINATION & CONTROL NERVOUS & CHEMICAL COORDINATION

PAST PAPER MCQ'S

Q.101 Which of the following produce response? (MDCAT-2017)
A. Effectors
B. Nerve
C. Stimulators
D. Brain

Q.102 Touch receptors are: (NUMS-2022)
A. Paccinian's corpuscles
B. Olfactory receptors
C. Meissner's corpuscles
D. Nociceptors

Q.103 They detect pain and tissue damage: (DUHS-2022)
A. Baroreceptors
B. Chemoreceptors
C. Nociceptors
D. Mechanoreceptor

Q.104 Pick out the pressure receptors. (MDCAT-2017)
A. Chemoreceptors
B. Photoreceptors
C. Mechanoreceptors
D. Thermoreceptors

Q.105 Taste buds on the tongue are example of: (MDCAT-2018)
A. Thermoreceptors
B. Pressure receptors
C. Photoreceptors
D. Chemoreceptors

Q.106 _____ is considered as chief structural and functional unit of nervous system. (ETEA-2019)
A. Cell
B. Neuron
C. Nephron
D. Brain

Q.107 Which one of the following is common to all neurons? (PMC-2020)
A. A cell body which contains a nucleus
B. Presence of node of Ranvier
C. A thick myelin sheath
D. Presence of Schwann cells

Q.108 Neurons are cells adapted for the rapid transmission of electrical impulses. To do this, they have long thin processes called: (PMC-2020)
A. Axons
B. Myelin sheath
C. Dendrites
D. Schwann cell

Q.109 There is no clear difference between dendrites and axons in sensory neurons, except: (UHS-2022)
A. Thickness
B. Length
C. Terminal portions
D. None of above

Q.110 A long extension of nerve cell is called: (NUMS-2022)
A. Axon
B. Auxins
C. Schwann cells
D. Dendrites

Q.111 Which axon would transmit an action potential most rapidly? (SZABMU-2022)
A. 1 mm diameter neuron lacking myelin
B. 1 mm diameter neuron with myelin
C. 2 mm diameter neuron lacking myelin
D. 2 mm diameter neuron with myelin

Q.112 The type of neuron that carries nerve impulse from tissue and organ to the spinal cord and brain is: (ETEA-2022)
A. Sensory neuron
B. Motor neuron
C. Intermediate neuron
D. Associative neuron

Q.113 The reflex action is the phenomena which only involves: (MDCAT-2019)
A. Brain, receptors, spinal cord
B. Receptors, neurons, brain
C. Receptors, effectors and spinal cord
D. Receptors and effectors

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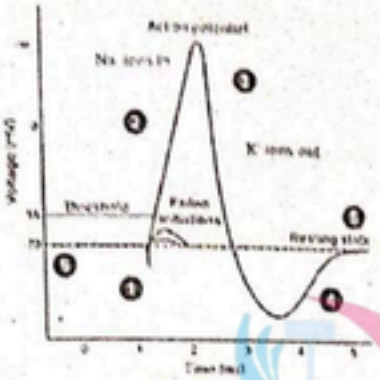
Q.114 An automatic, involuntary response to any change external or internal is called: (NUMS-2022)
A. Reflex
B. Instinct
C. Taxis
D. Tropism

Q.115 During an involuntary action, nerve impulse is passed through a pathway called: (BUMHS-2022)
A. Reflex action of nerve impulse
B. Reflex action of glands
C. Reflex arc and reflex action
D. Reflex arc

Q.116 Conduction of action potentials from one node of Ranvier to another in myelinated neurons is through: (MDCAT-2015)
A. Hyperpolarization
B. Depolarization
C. Resting Membrane Potential
D. Saltatory conduction

Q.117 In the following diagram of action potential in a neuron, '2' depicts: (MDCAT-2015)



A. Depolarization
B. Repolarization
C. Polarization
D. Hyperpolarization

Q.118 How many sodium ions are pumped out in response to two potassium ions transported into the membrane? (MDCAT-2018)
A. 4
B. 1
C. 2
D. 3

Q.119 In an action potential, the permeability of sodium ions in the neuron increases due to: (MDCAT-2019)
A. Repolarization
B. The action of the acetylcholinesterase enzyme
C. The opening of sodium channels/gates
D. Sodium ions forming an ionic bonding

Q.120 If stimulation is above _____, impulses travel to the brain along the sensory neuron. (MDCAT-2019)
A. Action Potential
B. Resting Potential
C. Threshold
D. Recovery Period

Q.121 The resting membrane potential of neuron is measured about: (ETEA-2022)
A. -30 millivolts
B. 50 millivolts
C. -70 millivolts
D. 100 millivolts

Q.122 Neurotransmitter secreted at synapse outside the central nervous system is: (MDCAT-2015)
A. Dopamine
B. Androgen
C. Polypeptide
D. Acetylcholine

Q.123 For the impulse to transfer from presynaptic to post synaptic neuron, the substance required is: (LUMMHC-2015)
A. Sodium
B. Potassium
C. Protein
D. Calcium

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Q.124 When a nerve impulse jumps from one node of Ranvier to the next in a myelinated neuron, it is called _____. (MDCAT-2018)
A. Saltatory conduction
B. Resting potential
C. Synapses
D. Membrane potential

Q.125 In nervous system, chemical messengers are called _____. (MDCAT-2018)
A. Enzymes
B. Chemoreceptors
C. Neurotransmitters
D. Hormones

Q.126 Impulses jump across synapse in the form of chemical messenger such as: (AJK-2019)
A. Glutamine
B. Arginine
C. Leucine
D. Dopamine

Q.127 The neurotransmitter active outside CNS (Central Nervous System) is: (UHS-2022)
A. Acetylcholine
B. Dopamine
C. Glutamate
D. Serotonin

Q.128 Molecules responsible for conveying message from one neuron to the next are called: (NUMS-2022)
A. Hormones
B. Activators
C. Neurotransmitters
D. Enzymes

Q.129 The gap between neurons at a synapse is: (NUMS-2022)
A. Synaptic knob
B. Synaptic cleft
C. Synaptic delay
D. Synaptic vesicle

Q.130 The part of brain which guides smooth and accurate motions and maintains body position is: (UHS-2022)
A. Cerebrum
B. Cerebellum
C. Pons
D. Medulla

Q.131 The feelings and emotions of love and hate are controlled by: (SZABMU-2022)
A. Amygdala
B. Hippocampus
C. Thalamus
D. Hypothalamus

Q.132 The hind brain is comprised of all of the following except: (ETEA-2022)
A. Pons
B. Cerebellum
C. Cerebrum
D. Medulla oblongata

Q.133 Long term controls such as rate of growth and sexually reproduction is controlled by: (BUMHS-2022)
A. Neurons
B. Hormones
C. Glands
D. Hypothalamus

Q.134 It is the site of all conscious activity: (DUHS-2022)
A. Hind brain
B. Cortex
C. Spinal cord
D. Mid brain

Q.135 Spinal cord comes out from the cranium though an opening known as: (DUHS-2022)
A. Foramen magnum
B. Lumen
C. Ganglion
D. Acetabulum

Q.136 Those nerves that originate from or lead to the brain are called cerebral nerves. These are _____ pairs of cerebral nerves in human. (ETEA-2022)
A. 6
B. 12
C. 14
D. 31

Q.137 Chemically hormones are: (ETEA-2019)
A. Carbohydrates
B. Proteins
C. Steroids
D. Both B and C

Q.138 Hormone produced by placenta is: (UHS-2022)
A. Follicle stimulating hormone (FSH)
B. Luteinizing hormone
C. Progesterone
D. Testosterone

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Q.139 Vasopressin is an example of: (SZABMU-2022)
A. Steroid hormone
B. Catecholamine
C. Peptide hormone
D. Glycoprotein

Q.140 Hormone are usually: (ETEA-2022)
A. Genetical messengers
B. Physical messengers
C. Chemical messengers
D. Biological catalyst

Q.141 Which of the following neurotransmitters function, both as neurotransmitter and hormones, decreasing our perception of pain? (PMC-2020)
A. Epinephrine
B. Dopamine
C. Serotonin
D. Endorphins

Q.142 A hormone that plays a major role in social bonding, childbirth, milk ejection and sexual reproduction is: (UHS-2022)
A. Estrogen
B. Oxytocin
C. Prolactin
D. Secretin

Q.143 Posterior lobe of pituitary gland produces: (SZABMU-2022)
A. Oxytocin
B. Thyroid stimulating hormone
C. Adrenocorticotrophic hormone
D. Follicle stimulating hormone

Q.144 Tetany is caused by _____ in blood. (SZABMU-2022)
A. Low Ca^{++}
B. High Ca^{++}
C. Low Mg^{++}
D. High Mg^{++}

Q.145 Which of the following lobes of the pituitary gland is known as master gland of the body? (ETEA-2022)
A. Anterior gland
B. Posterior gland
C. Intermediate gland
D. Anterio-posterial gland

Q.146 Acromegaly is caused due to over secretion of: (BUMHS-2022)
A. STH
B. TSH
C. ICSH
D. FSH

Q.147 It has neurosecretory cells that secrete releasing and inhibiting hormone: (DUHS-2022)
A. Pituitary gland
B. Thyroid gland
C. Adrenal gland
D. Hypothalamus

Q.148 When secretion of ADH is increased, the amount of water reabsorbed is: (AJK-2019)
A. Increased
B. Maintained
C. Decreased
D. Has no effect on reabsorption

Q.149 Pituitary gland releases _____ hormone and _____ hormone while ovaries produce _____ and progesterone. (NTS-2018)
A. FSH, LH and estrogen
B. Estrogen, FSH and LH
C. LH, estrogen and FSH
D. FSH, estrogen and LH

Q.150 In male luteinizing hormone is also known as _____. (ETEA-2019)
A. ACTH
B. ICSH
C. TRF
D. MSH

Q.151 The deficiency of which micro-nutrient causes goiter formation? (ETEA-2019)
A. Iron
B. Zinc
C. Iodine
D. Sodium

Q.152 Destruction of all beta cells in the pancreas would cause: (LUMMHC-2014)
A. Glucagon secretion to stop and a decrease in blood glucose
B. Glucagon secretion to stop and an increase in blood glucose
C. Insulin secretion to stop and an increase in blood glucose
D. Insulin secretion to stop and a decrease in blood glucose

Q.153 α-cells of pancreas secrete a hormone known as: (MDCAT-2015)
A. Glucagon
B. Gastrin
C. Insulin
D. Rennin

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Q.154 _____ hormone is antagonistic to insulin and causes increase in blood glucose level. (MDCAT-2016)

A. Glucagon
B. Calcitonin
C. Nor-epinephrine
D. Thyroxin

Q.155 A man has to face interview, but during his first five minutes before the interview he experiences sweating, increased heart rate and respiration. Which hormone is responsible for his restlessness? (ETEA-2019)

A. Adrenocorticotropic hormone
B. Insulin and glucagon
C. Epinephrine and nor-epinephrine
D. Aldosterone

Q.156 Which one of the following is a steroid hormone? (MDCAT-2014)

A. Glucagon
B. Epinephrine
C. Thyroxin
D. Estrogen

Q.157 Which body function is controlled through positive feedback mechanism? (PMC-2020)

A. Labour contractions
B. Insulin production
C. Body temperature
D. Thyroxin release

Q.158 What is true about Oxytocin? (UHS-2023)

A. Acts on kidney tubules
B. Stimulates ICSH
C. Perform cellular fun
D. Dilate milk ducts of mammary glands

Q.159 Hormone released during child birth and in nursing women is: (SZABMU-2023)

A. Estrogen
B. Progesterone
C. Calcitonin
D. Oxytocin

Q.160 Which is not a function of testosterone? (SZABMU-2023)

A. Inhibition of LH
B. Sperm production
C. Inhibition of FSH
D. Limit spermatogenesis

Q.161 FSH stimulates spermatogenesis by stimulating _____ cells to complete the development of sperms. (ETEA-2023)

A. Leydig
B. Inhibin
C. Sertoli
D. TSH

Q.162 Hormone secreted in bulk due to decreased water content of blood is: (NUMS-2023)

A. ADH
B. Oxytocin
C. Glucagon
D. Thyroxin

Q.163 The term polydipsia refers to: (ETEA-2023)

A. A condition in which abnormally large volume of urine is produced
B. A condition of excessive thirst
C. condition of excessive hunger
D. A condition in which the concentration of blood decreases in the body

Q.164 Endorphins are produced in: (NUMS-2023)

A. Brain
B. Adrenal gland
C. Stomach
D. Thymus

Q.165 The hormone responsible for production of sperm cells and male secondary sexual characteristics is: (NUMS-2023)

A. Estrogen
B. Progesterone
C. Testosterone
D. Thyroxin

Q.166 Which hormone is chemically steroid? (NUMS-2023)

A. ADH
B. Thyroxin
C. Cortisone
D. Insulin

Q.167 Production of Follicle-stimulating hormone and Luteinizing hormone from the pituitary gland of female is controlled by: (UHS-2023)

A. Ovary
B. Uterus
C. Stimulated follicles
D. Hypothalamus

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Q.168 Which body function is controlled through positive feed-back mechanism? (SZABMU-2023)
A. Labor pains
B. Body temperature
C. Insulin production
D. Thyroxin release

Q.169 Under activity of parathyroid glands causes a drop in blood of: (NUMS-2023)
A. Mg^{++}
B. Na^{+}
C. K^{+}
D. Ca^{++}

Q.170 Follicle Stimulating hormones (FSH) is secreted by: (SZABMU-2023)
A. Ovary
B. Pituitary gland
C. Adrenal gland
D. Testes

Q.171 Which of the following hormone is released by the posterior lobe of pituitary gland? (ETEA-2023)
A. Antidiuretic hormone
B. Growth hormone
C. Estrogen
D. Prolactin

Q.172 The hormone "calcitonin" is secreted by: (ETEA-2023)
A. Thyroid gland
B. Parathyroid gland
C. Pancreas
D. Adrenal gland

Q.173 In breast feeding mother, which hormone would be at an increased level? (ETEA-2023 Retake)
A. Prolactin
B. Thyroxine
C. Aldosterone
D. Insulin

Q.174 The activities like sleeping, walking and dreaming are controlled by which part of the brain: (ETEA-2023)
A. Pons
B. Cerebellum
C. Olfactory bulb
D. Hippocampus

Q.175 A shallow groove in cerebrum is called _____ and deep groove is called _____. (ETEA-2023 Retake)
A. Sulcus fissure
B. Fissure sulcus
C. Gyrus fissure
D. Fissure gyrus

Q.176 The cerebellum is primarily concerned with: (ETEA-2023 Retake)
A. Thinking and reasoning
B. Balancing during active movement
C. Temperature regulation
D. Initiation of muscular contraction

Q.177 The total number of cranial nerves in human body are: (ETEA-2023 Retake)
A. 12 pairs
B. 24 pairs
C. 31 pairs
D. 62 pairs

Q.178 Which part of the brain plays a key role in long term memory? (ETEA-2023 Retake)
A. Thalamus
B. Hippocampus
C. Hypothalamus
D. Amygdala

Q.179 In a typical nerve, the action potential duration is: (UHS-2023)
A. 1 millisecond
B. 1 microsecond
C. 1 second
D. 1 minute

Q.180 During resting membrane potential condition: (UHS-2023)
A. Outer surface of neuron is more positive
B. Inner surface of neuron is more positive
C. Both of these surfaces are equally positive
D. Both of these surfaces are equally negative

Q.181 The value of active membrane potential of the neuron is:
A. 0.01 volts
B. 0.02 volts
C. 0.05 volts
D. 0.07 volts

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Q.182 The chemical messengers that transmit action potential across the synapse in the form of chemicals are? (UHS-2023)

A. Synaptic knob of synapse
B. Reflex actions
C. Neurotransmitters
D. Acetylcholinestrase

Q.183 The junction between the axon ending of a neuron and the dendrites of another neuron is called: (SZABMU-2023)

A. Synapse
B. Nissl's body
C. Neuroglia
D. Myelin sheath

Q.184 During non-conducting state, the neuron membrane is permeable to efflux of: (SZABMU-2023)

A. K^+
B. Na^+
C. Ca^+
D. Cl^-

Q.185 GABA is an example of: (SZABMU-2023)

A. Enzyme
B. Inhibitory neurotransmitter
C. Excitatory neurotransmitter
D. Hormone

Q.186 What is the fate of neurotransmitters after provoking impulse in postsynaptic membrane? (SZABMU-2023)

A. Stay in synaptic cleft indefinitely
B. Recycled in synaptic cleft
C. Degraded by enzyme
D. Taken up by postsynaptic membrane

Q.187 The size of synaptic cleft in electrical synapse is: (ETEA-2023)

A. 0.2nm
B. 2nm
C. 20nm
D. 200nm

Q.188 Which type of nerve impulse occurs in non-myelinated neuron fibers? (ETEA-2023)

A. Saltatory impulse
B. Continuous impulse
C. Rapid impulse
D. Jumping impulse

Q.189 The neuron is said to be polarized when the: (ETEA-2023 Retake)

A. Inside of the plasma membrane has a negative energy compared to the outside
B. Inside of the plasma membrane has a positive energy compared to the outside
C. Inside of the plasma membrane has same energy compared to the outside
D. Positive charge moves inside the neuron

Q.190 What brings membrane potential to threshold? (ETEA-2023 Retake)

A. Influx of sodium ions across the post synaptic membrane
B. Outflow of odium ions across the post synaptic membrane
C. outflow of calcium ions across the post synaptic membrane
D. Influx of potassium ions the post synaptic membrane

Q.191 Site of the production of neurotransmitter is: (NUMS-2023)

A. Post synaptic neuron
B. Presynaptic neuron
C. Synaptic cleft
D. Dendrite

Q.192 The junction between two neurons is: (NUMS-2023)

A. Impulse
B. Synapse
C. Axon
D. Cleft

Q.193 The pressure receptors that receive deep pressure stimulus in human body are called: (UHS-2023)

A. Meissner Corpuscles
B. Pacinian Corpuscles
C. Red blood Corpuscles
D. Cholesterol

Q.194 Negative feedback mechanism is the characteristics of which class? (SZABMU-2023)

A. Class Fish
B. Class Amphibian
C. Class Reptilian
D. Class Mammalia

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Q.195 Which of the following gland/s is/are mostly responsible for releasing stress hormones? (SZAMBU-2024)

A. Adrenal glands
B. Thyroid gland
C. Pituitary gland
D. Thymus gland

Q.196 Which pathway will be followed by water soluble hormone for crossing plasma membrane? (SZAMBU-2024-Reconduct)

A. Receptor → 2nd messenger → Activation of energy
B. 2nd messenger → Receptor → Activation of energy
C. Activation of energy → Receptor → 2nd messenger
D. Receptor → Activation of energy → 2nd messenger

Q.197 Which is a steroid hormone? (SZAMBU-2024-Reconduct)

A. Cortisone
B. Adrenaline
C. Insulin
D. Thyroxin

Q.198 Posterior lobe of pituitary produce: (UHS-2024)

A. Antidiuretic Hormone (ADH)
B. Thyroid Stimulating Hormone (TSH)
C. Adreno Corticotrotric Hormone (ACH)
D. Follicle Stimulating Hormone (FSH)

Q.199 Insulin converts glucose into: (UHS-2024)

A. Vitamins
B. Minerals
C. Lipids
D. Cortisone

Q.200 Which of the following hormone has the greater influence on peripheral vasoconstriction? (SZAMBU-2024)

A. Parathormone
B. Epinephrine
C. Nor-epinephrine
D. Corticosteroids

Q.201 Which disorder would be diagnosed by a doctor on seeing a patient with thick and dry skin, puffy eyes and low metabolic rate? (NUMS-2024)

A. Cretinism
B. Crushing Cushing's disease
C. Myxedema
D. Addison's disease

Q.202 Choose the one related to hyperparathyroidism: (NUMS-2024)

A. Kidney stones
B. Hypercalcemia
C. Weakness of muscles
D. Tetany

Q.203 Which of the following is an example of negative feedback mechanism? (NUMS-2024)

A. Aggregation of platelets during wound healing
B. Labor contraction
C. Milk secretion during suckling
D. Control of body temperature

Q.204 A desert mammal faces severe dehydration in hot sunny day. Which internal condition would lead to secretion of ADH? (NUMS-2024)

A. High osmotic pressure of blood
B. High blood pressure
C. Low osmotic pressure of blood
D. Low solute potential of blood

Q.205 The neurosecretory cells are found in the: (SZAMBU-2024-Reconduct)

A. Hypothalamus
B. Pineal gland
C. Pituitary gland
D. Thalamus

Q.206 When a person intakes excess sugar diet his/her insulin level rises to: (SZAMBU-2024-Reconduct)

A. Increase permeability of surface membrane
B. Increase blood glucose level
C. Deactivates enzymes in cells
D. Converts glycogen to glucose

Q.207 Taste receptor is an example of: (UHS-2024)

A. Mechanoreceptors
B. Nociceptors
C. Photo receptors
D. Chemo receptors

Q.208 Nociceptors are concerned with sensation of: (SZAMBU-2024-Reconduct)

A. Pressure
B. Pain
C. Touch
D. Vibration

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Q.209 A reflex action does not involve the: (KMU-2024)
A. Brain
B. Motor neuron
C. Sensory neuron
D. Spinal cord

Q.210 Medulla Oblongata is a part of: (UHS-2024)
A. Forebrain
B. Mid brain
C. Hind brain
D. Hippocampus

Q.211 Which part of the brain is controlling your sense of balance? (KMU-2024)
A. Amygdala
B. Cerebellum
C. Hippocampus
D. Medulla Oblongata

Q.212 Which part of the brain is responsible for the sensation of pleasure, punishment, fear, rage and sexual arousal? (SZAMBU-2024)
A. Hippocampus
B. Amygdala
C. Hypothalamus
D. Cerebellum

Q.213 During complex activity of flight, birds required the coordination of many skeletal muscles which part of their brain has to be well developed? (NUMS-2024)
A. Amygdala
B. Cerebrum
C. Cerebellum
D. Thalamus

Q.214 Which part of the brain is actively used by mathematician trying to formulate a new equation? (NUMS-2024)
A. Hippocampus
B. Cerebrum
C. Amygdala
D. Pons

Q.215 Sleep wake cycle is controlled by which part of brain? (SZAMBU-2024-reconduct)
A. Hypothalamus
B. Hippocampus
C. Thalamus
D. Amygdalae

Q.216 Which of the following is NOT a feature of Autonomic Nervous System? (UHS-2024)
A. Regulate response of visceral organs
B. Regulate response of skeletal muscles
C. Regulate response of glands
D. Regulate response of smooth muscles

Q.217 The following function/activity is NOT controlled by the autonomic nervous system: (KMU-2024)
A. Cardiac muscles contraction
B. Salivation
C. Smooth muscles contraction
D. Thoughts and emotions

Q.218 In human myelinated fibers nerve impulse travels at _____meters per second. (UHS-2024)
A. 100-120
B. 130-150
C. 160-180
D. 190-210

Q.219 During non-conducting state, the neuron membrane is permeable to efflux of: (UHS-2024)
A. K+
B. Na+
C. Ca+
D. Cl-

Q.220 Depolarization during conduction of nerve impulse is due to: (UHS-2024)
A. Inward movement of Na+
B. Inward movement of K+
C. Outward movement of K+
D. Outward movement of Na+

Q.221 In a resting membrane, the concentration of K+ ions on inside of the membrane is _____ times greater than outside the membranes. (SZAMBU-2024)
A. Ten times
B. Fifteen times
C. Twenty times
D. Twenty-five times

Q.222 Which immediate change is brought about in the postsynaptic membrane on binding with excitatory neurotransmitter? (NUMS-2024)
A. Calcium gates open
B. Sodium gates open
C. Sodium gets gates close
D. Sodium Potassium pump ceases to work

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Q.223 During the conduction of nerve impulse, hyperpolarization would not occur if: (NUMS-2024)
A. Sodium gates did not close in time
B. Potassium gates were not so lousy
C. Sodium Potassium pump stopped working
D. Calcium gets open instantly

Q.224 Which option given below characterizes refractory period? (NUMS-2024)
A. Reversal of charges across neural (neuronal) membrane
B. Change in the type of ions across the membrane
C. Next impulse can be conducted
D. Membrane potential +50mV

Q.225 Nerve impulse conducted from one node of Ranvier to another skipping the myelinated regions moves up to_____ times faster than unmyelinated axons: (SZAMBU-2024-Reconduct)
A. 50
B.120
C.100
D.30

Q.226 Which of the following neurotransmitters is lying outside the central nervous system? (UHS-2024)
A. Acetylcholine
B. Endorphins
C. Dopamine
D. Gamma - aminobutyric acid

Q.227 The neurotransmitter _____ is hydrolyzed by monoamine oxidase. (KMU-2024)
A. Acetylcholine
B. Adrenaline
C. Glutamate
D. Serotonin

Q.228 Diffusion of _____ across the post synaptic membrane causes it to depolarize. (KMU-2024)
A. Calcium ions
B. Chloride ions
C. Sodium ions
D. Potassium ions

Q.229 The neurotransmitters bind to the receptors on the postsynaptic membrane, triggering an action potential in the postsynaptic membrane by causing changes in: (SZAMBU-2024)
A. Concentration of calcium ions
B. Permeability of calcium ions
C. Concentration of certain ions
D. Permeability of certain ions

Q.230 What is the fate of our neurotransmitter after the transmission of nerve impulse across synapse? (NUMS-2024)
A. It is taken into post synaptic neuron
B. Remains bound to post synaptic membrane
C. Remains stray in the synaptic cleft
D. Broken down by enzyme

Q.231 Which sequence will be followed when impulse travel from receptor to effector? (SZAMBU-2024-Reconduct)
A. Motor neuron → Inter neuron → Sesory neuron
B. Inter neuron → Sesory neuron → Motor neuron
C. Sesory neuron → Inter neuron → Motor neuron
D. Sesory neuron → Motor neuron → Inter neuron

Q.232 Nissl's granules are groups of: (UHS-2024)
A. Mesosomes
B. Lysosomes
C. Ribosomes
D. Chromosome

Q.233 A motor neuron: (KMU-2024)
A. Carries impulse from effectors to CNS
B. Carries impulse from receptors to CNS
C. Carries impulse from CNS to muscles
D. Connects sensory nerves to ganglions.

Q.234 The groups of ribosomes associated with rough endoplasmic reticulum and Golgi apparatus in the cell body of neuron is called: (SZAMBU-2024)
A. Neuroglia
B. Nissl's Granules
C. Soma
D. Axofibrils

Q.235 Which body function is controlled through positive feedback mechanism? (SZAMBU-2024-Reconduct)
A. Labor contractions
B. Body temperature
C. Insulin production
D. Thyroxin release

Q.236 Most of the neurons in the CNS are: (KMU-2024)
A. Bipolar
B. Multipolar
C. Pseudounipolar
D. Unipolar

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ANSWER KEY

PRACTICE EXERCISE

1	B	11	C	21	B	31	B	41	C	51	D	61	B	71	A	81	C	91	B
2	B	12	C	22	C	32	B	42	D	52	D	62	D	72	B	82	D	92	A
3	D	13	D	23	A	33	D	43	D	53	D	63	B	73	C	83	B	93	B
4	A	14	B	24	B	34	C	44	C	54	D	64	D	74	D	84	A	94	A
5	B	15	D	25	A	35	D	45	A	55	D	65	D	75	D	85	A	95	C
6	D	16	B	26	A	36	A	46	B	56	A	66	B	76	D	86	A	96	C
7	D	17	C	27	C	37	D	47	A	57	D	67	D	77	A	87	B	97	C
8	A	18	D	28	C	38	B	48	D	58	A	68	D	78	B	88	D	98	D
9	A	19	B	29	A	39	B	49	C	59	C	69	D	79	C	89	C	99	D
10	C	20	B	30	B	40	B	50	D	60	B	70	D	80	B	90	B	100	D

PAST PAPER MCQ'S

101	A	120	C	139	C	158	D	177	A	196	A	215	A	234	B
102	C	121	C	140	C	159	D	178	B	197	A	216	B	235	A
103	C	122	D	141	D	160	D	179	A	198	A	217	D	236	B
104	C	123	D	142	B	161	C	180	A	199	C	218	A		
105	D	124	A	143	A	162	A	181	D	200	C	219	A		
106	B	125	C	144	A	163	B	182	C	201	C	220	A		
107	A	126	D	145	A	164	A	183	A	202	D	221	A		
108	A	127	A	146	A	165	C	184	A	203	D	222	B		
109	C	128	C	147	D	166	C	185	B	204	A	223	B		
110	A	129	B	148	A	167	D	186	C	205	A	224	A		
111	B	130	B	149	A	168	A	187	A	206	A	225	A		
112	A	131	A	150	B	169	D	188	B	207	D	226	A		
113	C	132	C	151	C	170	B	189	A	208	B	227	B		
114	A	133	B	152	C	171	A	190	A	209	A	228	C		
115	D	134	B	153	A	172	A	191	B	210	C	229	D		
116	D	135	A	154	A	173	A	192	B	211	B	230	D		
117	A	136	B	155	C	174	A	193	B	212	B	231	C		
118	D	137	D	156	D	175	A	194	D	213	C	232	C		
119	C	138	C	157	A	176	B	195	A	214	B	233	C		

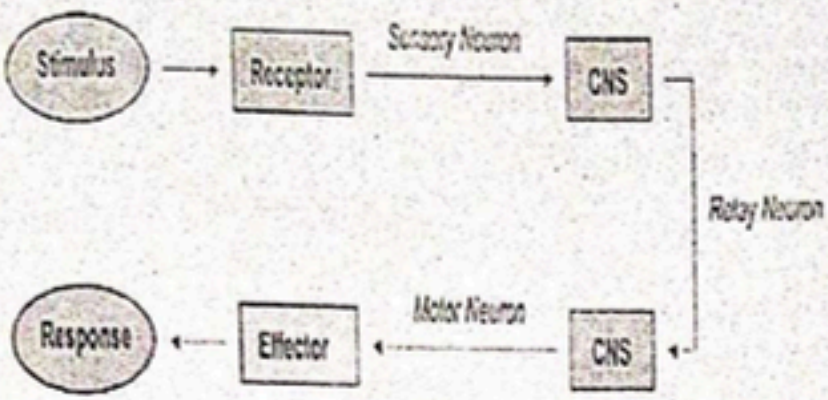
Physicians

CamScanner

EXPLANATORY NOTES

PRACTICE EXERCISE

1.



2. Ectoderm mainly gives rise to nervous system and integumentary systems while mesoderm give rise to all other tissues of the body, including heart, the muscle system, the urogenital system, bones, and bone marrow and therefore the blood.
3. Efferent neurons are meant to conduct messages from CNS to the effectors as they are emerging from CNS. That is why they are known as motor neurons.
4. Mechanoreceptors detect stimuli of touch, pressure, hearing and equilibrium. They have different type of receptors.
5. Stimuli are always detected by specific receptors present in different parts of the body. Stimulus of touch, pain, cold and heat are recognized differently because these stimuli are detected by different receptors present in different parts of the body. This is due modalities of sensations.
6. Merkel disks are touch receptors. Receptors for touch and pressure are also called mechanoreceptors. Pacinain's corpuscles detect stimulus of pressure.
7. Some cells are attached with the neurons, along the length of axon that are specialized for the production of myelin sheath; these are type of neuroglia cells in PNS named as Schwann cells.
   - Microglia: are resident cells of the brain that regulate brain development, maintenance of neuronal networks, and injury repair.
   - Oligodendrocytes: are the myelinating cells of the central nervous system (CNS).
   - Astrocytes: are specialized glial cells which are present in (CNS).
8. Dendrons receive electrochemical impulses from other neurons, and carry them inwards and towards the soma, while axons carry the impulses away from the soma. Dendrons are short and heavily branched in appearance, while axons are much longer.
9. Brain contains the highest number of neurons and spinal cord comes on second number.
10. Myelin is a fatty substance that surrounds the axon of nerve cells, forming an electrically insulating layer. It facilitates the saltatory conduction of impulses but since, it is lipid in nature, it itself does not conduct impulses.
11. Myelin sheath is a mixture of proteins and lipids, and not present in all types of axons and dendron, and it is meant to increase the speed of conduction.
12. Efferent neuron is another name used for motor neurons which are meant for the conduction of messages from CNS to the effectors.
13. Extensions of neuron have the ability to regenerate only when if its cell body is intact because the nucleus of the neurons is present in it but cell body is devoid of that property.

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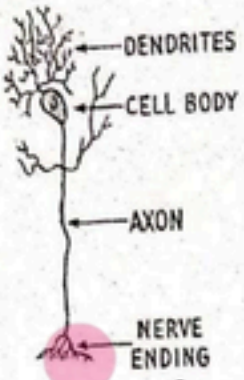
14. Cell body of a neuron is main nutritional part. It is the part where biosynthesis of required materials is taking place. It also provides the genetic information for the regeneration of neuronal processes. Axoplasm is the cytoplasm of nerve axon.

15. Mitochondria, ribosomes and secretary vesicles are found in synaptic knob while nucleus is present in the cell body of neuron.

16. Associative neurons, also called inter-neurons or relay neurons are found exclusively in the central nervous system. It means that they are found in the brain and spinal cord and not in the peripheral segments of the nervous system.

17.

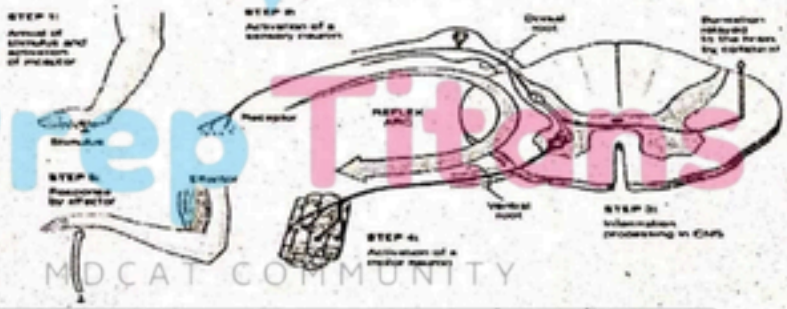


18. Axon, Nissl's granules and dendron are the parts of a neuron while synapse is a structure that permits a neuron to pass an electrical or chemical signal to another neuron or to the target effector cell/tissue.

19. The simplest arrangement of a reflex arc consists of the receptor, an interneuron, and an effector; together these units form a functional reflex group. Brain is, however, excluded in the reflex arc.

20.

Review of reflex arc.



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21. The influx of Na^+ increases the concentration of positively charged ions in the cell and causes depolarization, where the potential of the cell is higher than the cell's resting potential. The sodium channels close at the peak of the action potential, while potassium continues to leave the cell.

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22. Hyperpolarization is a change in a cell's membrane potential that makes it more negative. It is the opposite to that of a depolarization. It is mainly caused by late closing of K^+ channels.

23. Sodium and potassium play key role in the conduction of nerve impulse by their respective movement across the membrane.

24. In neurolemma, a specialized ATP dependent Na^+-K^+ pump is present which will restore original ion gradient and hence the resting membrane potential.

25. In the nervous system, a synapse is a structure that permits a neuron to pass an electrical or chemical signal to another neuron or to the target effector cell. Synaptic cleft is the space between neurons at a nerve synapse across which a nerve impulse is transmitted by a neurotransmitter.

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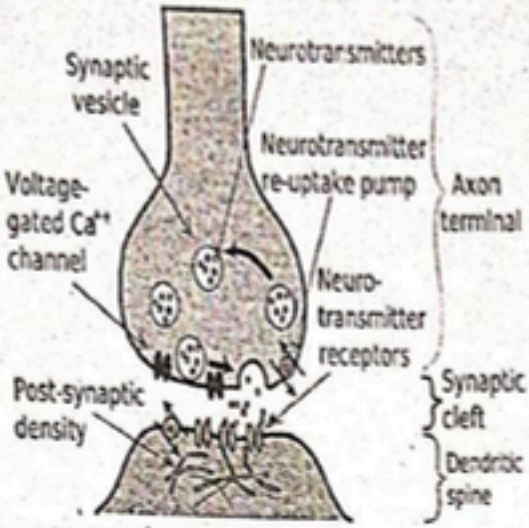
26. When the action potential reaches the nerve terminal, voltage dependent Ca^{2+} channels will open and Ca^{2+} rushes into the neuron terminal due to a greater extracellular concentration, causing release of neurotransmitter molecules from pre-synaptic membrane into synaptic cleft.

27.



28. After the depolarization of postsynaptic neurolemma, neurotransmitters are mostly degraded by the enzymes or taken up actively by pre-synaptic neurolemma. For example, acetylcholinesterase is an enzyme that degrades acetylcholine after synaptic transmission.
29. Cerebral cortex contains primary sensory areas where signals originating in sensory organs such as eyes and ears are received and converted into subjective impressions, such as light and sound.
30. Amygdala is part of limbic system and it receives sensation for pleasure, punishment, fear, rage and sexual arousal.
31. Cerebrum is the largest part of brain. It has four lobes. Frontal, occipital, parietal, and temporal.
32. Cerebrospinal fluid is present between ventricles of brain and central canal of vertebral column.
33. The spinal cord extends from the occipital bone of the skull until it terminates near the second lumbar vertebra.
34. Grey matter is mainly composed of cell bodies of neurons while white matter is composed of myelin sheath.
35. The spinal cord functions primarily in the transmission of nerve signals from the motor cortex to the body, and from the afferent fibers of the sensory neurons to the sensory cortex. It is also a center for communication between body and brain.
    - Neuroglial cells produce CSF.
    - Glands produce hormones.
    - Corpus callosum joins both hemispheres of cerebrum.
36. Fight and flight response is also known as emergency response of body. Sympathetic Nervous system that is subdivision of peripheral nervous system prepares body for emergency response.
37. Vagus nerve is part of parasympathetic subdivision and it arises from pelvic region.
38.

Tracts	Bundle of axons or dendrites bounded by connective tissue in CNS.
Nerves	Bundle of axons or dendrites bounded by connective tissue in PNS.
Nuclei	Collection of cell bodies of neurons in CNS.
Ganglia	Collection of cell bodies of neurons in PNS.

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39. Hormones are the organic secretion produced by the endocrine glands, which are transported to the target tissue via blood stream, and they cannot initiate a chemical reaction, but they can only regulate.

40. Cholesterol is the precursor of the five major classes of steroid hormones; progesterone, glucocorticoids, mineralocorticoids, androgens, and estrogens. These hormones are powerful signaling molecules that regulate many functions.

41. Endocrine glands are ductless glands and release their secretions into blood. They reach the target site through bloodstream.

42. Adrenocorticotropic hormone is a polypeptide tropic produced and secreted by the anterior pituitary gland.

43. Pituitary gland is attached to hypothalamus by a stalk called infundibulum, which is composed of blood vessels and the fibers of neurosecretory cells.

44. ADH is responsible for reabsorption of H_2O from collecting tubules and lack of ADH results in production of large quantities of urine and increased thirst.

45. Neurosecretory cells in the hypothalamus release oxytocin and ADH into the posterior lobe of the pituitary gland. These hormones are stored or released into the blood.

46. The term hypophysis (from the Greek for "lying under")-another name for the pituitary-refers to the gland's position on the underside of the brain.

47. The anterior pituitary gland is often dubbed the "master gland" because its hormones control other parts of the endocrine system, namely the thyroid gland, adrenal glands, ovaries, and testes.

48. More the thyrotrophin releasing factor (TRF) from hypothalamus more will be thyroid stimulating hormone (TSH). TSH is released under stress condition; its level is high during growth and development.

49. Prolactin-inhibiting hormone (PIH) inhibits the secretions of prolactin hormone from anterior lobe of pituitary gland.

50. ADH is released from posterior lobe of pituitary. It's under secretion causes diabetes insipidus.

51. Under secretion of vasopressin or ADH causes diabetes insipidus, which is characterized by excessive production of diluted urine and frequent thirst.

52. The hormones released from anterior lobe of pituitary glands are called tropic hormones as they control the secretions from other glands in the body.

53. In Cushing's disease, too much cortical hormone is produced. MSH is produced from median lobe of pituitary gland and it is produced under sun light, its level is increased during pregnancy and in Addison's disease.

54. T_4 is main thyroid hormone, also called as thyroxin, it is tetraiodothyronin. T_3 is produced in small quantity, is unstable, and is degraded during its travelling.

55. Congenital under secretion of thyroxin results in a severe hypothyroidism in infants called cretinism.

56. Calcitonin acts to reduce blood Ca^{2+}, opposing the effects of parathyroid hormone, by deposition of Ca^{2+} in the bones.

57. Low level of thyroxin stimulates hypothalamus to release thyrotrophin releasing factor, which stimulates the production of thyroid stimulating hormone from anterior lobe of pituitary gland. TSH acts on thyroid gland, which starts producing thyroxin. If the level of thyroxin is already high, then the TSH will not be produced.

58. Cretinism is a condition of severely stunted physical and mental growth owing to untreated congenital deficiency of thyroid hormone (congenital hypothyroidism) usually owing to maternal hypothyroidism.

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59. Metamorphosis is regulated by thyroid hormones, promoting the remodeling of the aquatic larvae into an adult tetrapod, means that the dramatic structural and functional changes of larval tissues can be readily applied as parameters reflecting endocrine disruption.
60. Grave's disease is an autoimmune disease that affects the thyroid. It frequently results in increased BMR. It also often results in an enlarged thyroid.
61. Calcitonin brings about release of calcium ions from bones while parathormone removes calcium from blood to bone.
62. Muscular tetany results from low calcium in blood plasma. It can be due to under secretion of parathormone.
63. The pancreas is divided into an exocrine portion and an endocrine portion (islets of Langerhans). The exocrine portion, comprising 85% of the mass of the pancreas, and secretes pancreatic juice into the duodenum while about 15% of the mass of pancreas is the endocrine portion which secrete various hormones into the bloodstream.
64. Insulin is responsible to decrease glucose by the conversion of glucose into glycogen. It is also responsible for increased glucose uptake by the cell and converts glucose into lipids and proteins.
65. Glucagon strongly opposes the action of insulin; it raises the concentration of glucose in the blood by promoting breakdown of glycogen by stimulating production of glucose from lipids.
66. Pancreatic islets house two major cell types, each of which produces a different endocrine product: Alpha cells secrete the hormone glucagon. Beta cells produce insulin and are the most abundant of the islet cells.
67. Release of hormones from islets of Langerhans is under control of the pituitary trophic hormones, STH and ACTH and also responds directly to the level of blood glucose
68. Beta cells have no relation with calcium regulation. They produce insulin which controls blood sugar level.
69. Thyroxin and Calcitonin are released by thyroid gland while glucagon is released by pancreas.
70. Epinephrine or adrenaline produced both by adrenal gland as well as by brain and acts both as a hormone and neurotransmitter.
71. Cortisol brings about the increase in blood glucose level. It is principal glucocorticoid.
72. Corticosterone is responsible for the increase of mineral and glucose level in blood. Aldosterone is principal mineralocorticoid, brings about increase in mineral level in blood mainly Na^+.
73. Epinephrine is produced form adrenal medulla. Cortisol and androgens are produced from adrenal cortex. Calcitriol is produced form kidneys.
74. Over secretion of adrenal medullary hormones (adrenaline and noradrenaline) may cause hypertension and aggressive behavior during routine life.
75. Epinephrine is a stimulator of metabolic activities, bronchial dilation, and increased blood flow to skeletal muscles and the heart. But norepinephrine has the greater influence on peripheral vasoconstriction. The net effect is the rise in blood pressure.
76. Tay-Sach's is due to abnormality in lysosomes non-functioning. In this condition, lysosomes do not have digestive enzymes for lipids break down.
77. Tumor in adrenal cortex leads to the excessive secretions of androgen hormone, which results in the development of secondary sex characters in female and results in high steroid level in the blood. It has no role in sterility of an individual.
78. Adrenaline dilates the blood vessels in certain parts of the body such as skeletal muscles. But nor-adrenaline constricts blood vessels in certain parts of the body such as gut, so the effect of the two hormones is synergistic in raising blood pressure.
79. Dopamine and serotonin affect sleep, mood, attention and learning. Epinephrine and nor epinephrine are release during stress conditions.

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80. Destruction of the adrenal cortex such as, occurs in Addison's disease, will lead to general metabolic disturbance, in particular weakness of muscle action and loss of salts.
81. These hormones provide glucose to handle stress. Glucose provides energy through cellular respiration.
82. Mammalian testes produce testosterone, which is steroid in nature. Pancreas produces insulin and glucagon, which are protein hormones. Hypothalamus produces neuro-secretions, which are polypeptide in nature.
83. Follicle stimulating hormone is secreted by the anterior pituitary in response to gonadotropin-releasing hormone (GnRH) released by the hypothalamus. In women, LH stimulates estrogen production from the ovary.
84. At puberty, testosterone helps in the development of secondary sex characteristics in males. When testes are surgically removed then the level of testosterone is lower and leads to sterile male.
85. In fetus, the testosterone hormone initiates the development of primary sex organs but at puberty its secretion helps in the development of secondary sex characters.
86. Estrogen is produced from developing follicles under the action of FSH. Ruptured follicles are responsible for progesterone production.
87. After puberty, the supply of LH (ICSH) is constant and therefore the level of testosterone remains constant.
88. Deficiency of estrogen causes sterility in females while deficiency of testosterone causes sterility in males.
89. Positive feedback system, the output enhances the original stimulus. A good example of a positjve feedback system is childbirth. During labour, a hormone called oxytocin is released that intensifies and speeds up contractions.
90. Most hormones are regulated by feedback mechanisms. A feedback mechanism is a loop in which a product feeds back to control its own production. Most hormone feedback mechanisms involve negative feedback loops. Negative feedback keeps the concentration of a hormone within a narrow range.
91. Not all cells in the body are directly innervated by nerve fibers; for example, many cells, like those in certain connective tissues, do not have direct nerve connections.
92. It is primarily regulated by hormones like insulin and glucagon, not directly by the nervous system.
93. Receptors are classified based on the type of stimulus they respond to, such as light, pressure, temperature, or chemicals, which determines their function in sensory perception.
94. Nissl's granules are groups of ribosomes associated with rough endoplasmic reticulum and Golgi apparatus in neurons.
95. Mature neurons enter the G0 phase of the cell cycle, which is a resting phase where the cell does not actively divide. This is why neurons are unable to divide once they are fully mature.
96. The potential can be excitatory (EPSP) or inhibitory (IPSP) depending on the type of neurotransmitter and receptor involved.
97. Receptors for proteinaceous (peptide) hormones are located on the cell surface membrane.
98. Secretion of endocrine glands are transported to their target site via blood.
99. Glucose → Glycogen, as thyroid hormones do not directly control the conversion of glucose to glycogen.
100. The pancreas maintains normal blood sugar levels through its endocrine function (insulin and glucagon secretion).

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101. Effector is a structure or organ that brings about an action of 'effect' as a result of a stimulus received through a receptor which can come from the CNS or from a hormone.

102. Baroreceptors are type of machinal receptors and they detect blood pressure.
- Chemoreceptors: they detect ions or molecules. E.g., receptors in nose for olfaction.
- Mechanoreceptors: detect changes in pressure, position, or acceleration; include receptors for touch (Meissner's corpuscles), stretch or pressure (Pacinain's corpuscles in skin).

103. Pacinian's corpuscles in skin and they detect pressure. Olfactory receptors sense smell. Pain receptors are nociceptors.

104. Mechanoreceptors are in the skin and on other organs that detect sensations of touch. They are called mechanoreceptors because they are designed to detect mechanical sensations or differences in pressure.

105. The taste receptors are located around the small structures known as papillae found on the upper surface of the tongue, these are chemoreceptors.

106. Neurons are structural and functional unit of nervous system; nephrons are structural and functional unit of kidney.

107. The cell body or soma is the main nutritional part of the cell and is concerned with the biosynthesis of materials necessary for the growth and maintenance of the neuron.

108. Axons are the protoplasmic part of the cell body of neuron and are responsible for carrying the impulses away from the cell body.

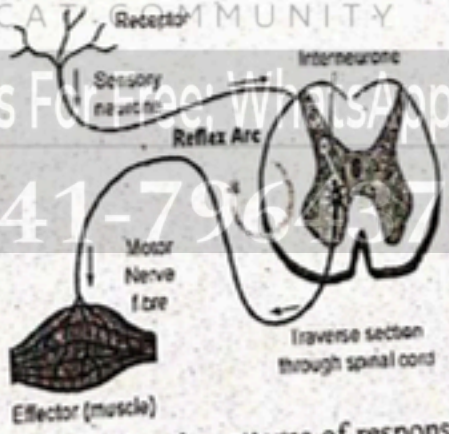
109. Sensory neuron conduct impulse from receptors to C.N.S. Dendrites are associated with receptors and effectors are associated with spinal cord.

110. Auxins are plant hormone. Schwann cells produce myelin sheath. Dendrites are short and thin, often highly branched cytoplasmic extensions.

111. Velocity of impulse (action potential) in axon fibres depends upon the diameter, length, and myelin sheath.

112. Motor neuron carries information from C.N.S to effectors. Associative or inter neuron are present in C.N.S.

113.



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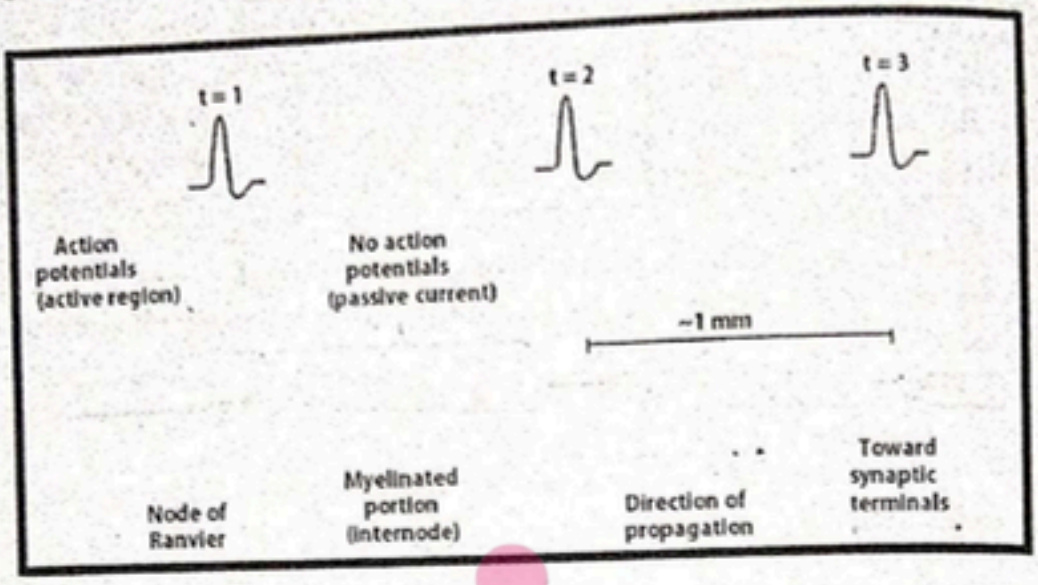
114. **Instinct**: are unlearned, inherited fixed actin patterns of responses or reactions to certain kinds of stimuli.
Taxis: is a directional movement towards or away from the stimulus such as light, chemicals or heat.
Tropism: are growth movements related to directional stimuli.

115. The pathway of nerve impulse during the reflex action is called reflex arc. Reflex actions are immediate and autonomic or involuntary responses to the external and internal environmental changes.

116.



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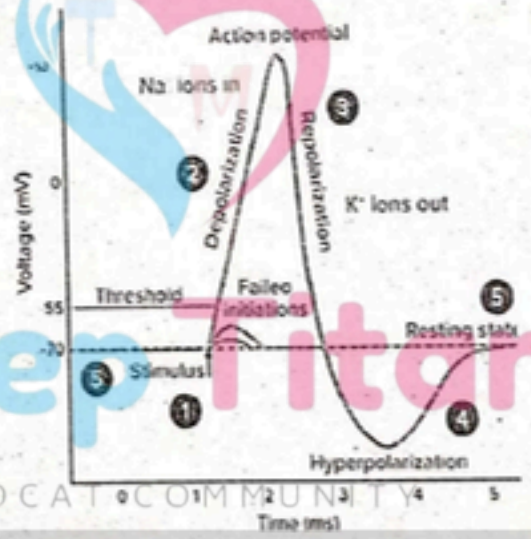

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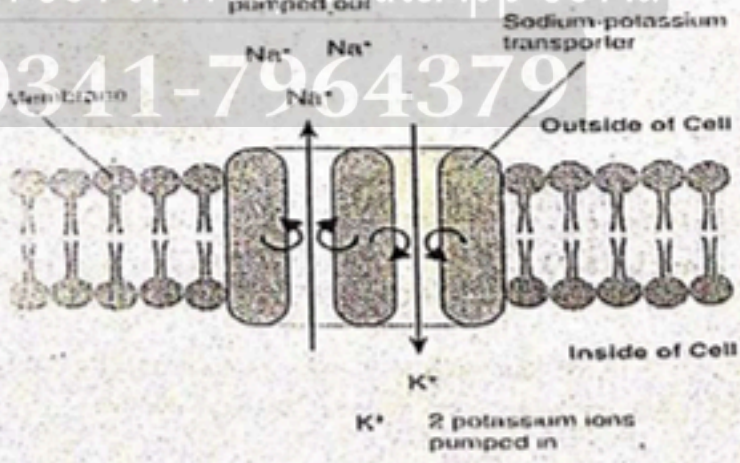

119. The passage of nerve impulse is associated with increase in permeability of Na^+ due to the opening of Na^+ channels, moving inwards upsetting the potential momentarily, making the inside more positive than outside.

120. Minimum intensity of stimulus that is required to initiate a nerve impulse is called threshold stimulus.

121. Resting membrane potential is -70 millivolts. During RMP, neurolemma is more positive outside and more negative inside.

122. Acetylcholine is neurotransmitter for synapse outside CNS while adrenalin, nor-epinephrine, Serotonin and dopamine for synapse in CNS.

123. Calcium is a vital element in the process of neurotransmitter release; when Ca^{2+} channels are blocked, neurotransmitter release is inhibited. When the action potential reaches the nerve terminal, voltage-dependent Ca^{2+} channels open and Ca^{2+} rushes into the neuron terminal due to a greater extracellular concentration.

124. The nerve impulse is conducted from node to node in jumping manner. This kind of jumping nerve impulse is called saltatory impulse.

125. Neurotransmitters are endogenous chemicals acting as signaling molecules that enable the transmission of nerve impulse.

126. Glutamine, arginine and leucine are amino acids, while dopamine is a neurotransmitter.

127. Acetylcholine is an organic chemical that functions in the brain as a neurotransmitter i.e. a chemical message released by nerve cells to send signals to other cells, such as neurons, muscle cells and gland cells.

128. Hormones are chemicals that are released from glands. Metal ions are activators for enzymes. Enzymes are biocatalyst.

129. Consecutive neurons are so arranged that the axon endings of one neuron are connected to the dendrites of the next neuron. There is no cytoplasmic connection between the two neurons and microscopic gaps are left between them. Each of these contact points is known as synapse.

130. **Cerebrum:** It receives sensory information.
Pons: Acts as bridge between the cerebellum, medulla and cerebrum.
Medulla: Controls autonomic functions of body.

131. Hippocampus stores long term memories.
- Thalamus receives sensory information.
- Hypothalamus play many important roles, e.g., hunger, sleep, body temperature etc.

132. Cerebrum is part of forebrain. It is largest part of forebrain. It controls many functions. Thinking, memory and sensory information are the role of cerebrum.

133. Hormones are chemical messengers that regulate long-term processes such as growth, metabolism, and reproduction.

134. Cerebral cortex contains primary sensory areas where signals originating in sensory organs such as eyes and ears are received and converted into subjective impression, such as light and sound.

135. The spinal cord extends from the foramen magnum (a hole in the bottom of skull) where it is continuous with the medulla to the level of the first or second lumbar vertebrae.

136. Twelve pairs of cranial nerves are originated from brain and spinal nerves are thirty-one. Some cranial nerves are motor, some cranial nerves sensory and some cranial nerves mixed.

137. No hormone is carbohydrate in nature. With respect to chemical nature, all hormones are protein in nature except few, which are steroid in nature.

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138. When placenta is established, it becomes glandular structure. It secretes progesterone, which maintains pregnancy.
139. Vasopressin is secreted by hypothalamus and stored in posterior lobe of pituitary. It a peptide hormone.
140. Hormones are chemical messengers which are secreted by specific glands. Hormones are chemically protein, and steroid in nature.
141. The endorphins are peptides that function as both neurotransmitters and hormones, decreasing our perception of pain.
142. Oxytocin is released from pituitary gland. It is produced by hypothalamus. Oxytocin is peptide hormone. Secretin is released from duodenum.
143. Posterior lobe stores two hormones. ADH and oxytocin. While remaining hormones are released from anterior lobe.
144. Under activity of parathormone promotes muscular tetany due to drop of calcium in blood.
145. Anterior lobe of pituitary acts master gland. Because its hormones control other endocrine glands.
146. Acromegaly is due to over secretion after growing age. During this condition, bones are no longer capable of increasing in length but grow in thickness.
147. Hypothalamus secretes both releasing and inhibitory hormones. Somatostatin and prolactin inhibiting factor are inhibitory hormones.
148. During low blood osmotic concentration ADH secretion will increase and act on distilled part of nephron to increase water reabsorption.
149. FSH and LH collectively called gonadotrophic hormones, are released from anterior lobe of pituitary and act on gonads for further secretions.
150. Luteinizing hormone causes ovulation in human females. In male, it is named as ICSH and stimulates interstitial cells of testis for testosterone production.
151. Iodine is involved in formation of thyroxin. Deficiency of iodine means deficiency of thyroxin.
152. Due to destruction of Beta cells of pancreas activity of alpha-cells will increase, due to which glucose level in blood will increase.
153. Pancreatic islets house two major cell types, each of which produces a different endocrine product. Alpha cells secrete the hormone glucagon. Beta cells produce insulin and are the most abundant of the islet cells.
154. Glucagon is essentially antagonistic to insulin and causes an increase in blood glucose levels. It does this mainly by:
    - Promoting breakdown of glycogen to glucose in the liver and muscles.
    - Increasing the rate of breakdown of fats.
155. Hormones of adrenal medulla are called as emergency hormones. Both will increase blood pressure during an emergency case.
156.

Chemical Nature of Hormones	Glands	Examples
Protein	Islets of Langerhans	Insulin, Glucagon
Polypeptides	Posterior pituitary	ADH, Oxytocin
Amino Acids and Derivatives	Thyroid, Adrenal Medulla	T3, T4, Epinephrine, Nor-epinephrine
Steroid	Gonads, Adrenal Cortex	Estrogen, Testosterone, Cortisone

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157. Stretch-receptive neurons in the cervix respond to this extension by signaling the hypothalamus, which response by triggering the release of oxytocin that stimulates more and stronger uttering contractions.
158. Oxytocin stimulates the contraction of smooth muscles, helping to dilate milk ducts for milk ejection during breastfeeding.
159. Oxytocin is released during childbirth to stimulate uterine contractions and is also involved in milk ejection during nursing.
160. Testosterone supports spermatogenesis and inhibits FSH and LH secretion, but it does not limit spermatogenesis.
161. FSH stimulates Sertoli cells in the testes to support the development and maturation of sperm cells.
162. ADH (antidiuretic hormone) is released in response to low water content in the blood, helping to conserve water by reducing urine output.
163. Polydipsia refers to an excessive thirst condition, often seen in diabetes mellitus or insipidus.
164. Endorphins are produced in the brain and act as natural painkillers and mood enhancers.
165. Testosterone is responsible for sperm production and the development of male secondary sexual characteristics, such as facial hair and deep voice.
166. Cortisone is a steroid hormone, produced by the adrenal cortex, involved in stress response and inflammation regulation.
167. The hypothalamus regulates the release of FSH and LH from the pituitary gland through hormonal signals, controlling reproductive functions.
168. Labor pains are regulated by a positive feedback mechanism, where the release of oxytocin stimulates uterine contractions, which further increases oxytocin release.
169. Underactivity of the parathyroid glands leads to decreased secretion of parathyroid hormone (PTH), which results in a drop-in calcium (Ca^{++}) levels in the blood, leading to hypocalcemia.
170. Follicle-stimulating hormone (FSH) is produced and secreted by the anterior lobe of the pituitary gland, playing a key role in the regulation of reproductive processes.
171. The posterior pituitary gland releases antidiuretic hormone (ADH), which helps regulate water balance in the body by promoting water reabsorption in the kidneys.
172. Calcitonin is secreted by the thyroid gland and helps regulate calcium levels in the blood by inhibiting osteoclast activity and reducing calcium release from bones.
173. During breastfeeding, prolactin levels increase to stimulate milk production in the mammary glands.
174. The pons controls activities such as sleeping, walking, and dreaming, as it connects different parts of the brain and helps regulate sleep cycles.
175. A sulcus is a shallow groove in the cerebrum, while a fissure is a deep groove, such as the longitudinal fissure separating the brain's hemispheres.
176. The cerebellum is primarily responsible for coordinating balance, posture, and fine motor control, particularly during active movements.
177. Humans have 12 pairs of cranial nerves, which are responsible for sensory and motor functions of the head, neck, and other organs.
178. The hippocampus is critical for forming long-term memories and converting short-term memories into long-term ones.
179. The duration of an action potential in a typical nerve is about 1 millisecond, which is the time it takes for the electrical impulse to travel along the neuron.
180. During resting-membrane potential, the outer surface of the neuron is positively charged relative to the inside, which is negatively charged.

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181. The resting membrane potential of a neuron is typically around -0.07 volts (or -70 mV), reflecting the difference in charge across the membrane.

182. Neurotransmitters are chemical messengers that transmit action potentials across synapses from one neuron to another.

183. The synapse is the junction between the axon ending of one neuron and the dendrites or cell body of another neuron, where neurotransmission occurs.

184. During the non-conducting state (resting potential), the neuron membrane is more permeable to potassium ions (K+), which move out of the cell.

185. GABA (Gamma-Aminobutyric Acid) is an inhibitory neurotransmitter that reduces neuronal excitability by inhibiting action potentials.

186. After neurotransmitters have provoked an impulse in the postsynaptic membrane, they are typically degraded by enzymes or taken back up by the presynaptic neuron.

187. In electrical synapses, the synaptic cleft is typically about 2 nanometers wide, allowing for the direct transfer of electrical signals between neurons.

188. In non-myelinated neurons, nerve impulses travel continuously along the axon, unlike in myelinated neurons, where they jump from node to node (saltatory conduction).

189. When a neuron is polarized, the inside of the membrane has a negative charge relative to the outside, creating the resting membrane potential.

190. The influx of sodium (Na+) ions into the postsynaptic membrane brings the membrane potential closer to the threshold for generating an action potential.

191. Neurotransmitters are synthesized and stored in the presynaptic neuron before being released into the synaptic cleft to transmit signals.

192. The synapse is the junction between two neurons, where electrical impulses are transmitted through chemical signals via neurotransmitters.

193. Pacinian corpuscles are pressure receptors that detect deep pressure and vibration stimuli in the skin and other tissues.

194. Negative feedback mechanisms are characteristic of mammals, helping to maintain homeostasis by regulating processes like body temperature and hormone levels.

195. The adrenal glands release stress hormones like adrenaline and cortisol in response to stress, helping the body manage stress reactions such as fight or flight.

196. Water-soluble hormones cannot pass through the plasma membrane, so they bind to cell surface receptors, activating second messengers that help trigger cellular responses.

197. Cortisone is a steroid hormone produced by the adrenal glands that helps regulate metabolism and immune response by influencing gene expression.

198. The posterior lobe of the pituitary gland produces ADH, which helps regulate water balance by controlling the amount of water reabsorbed by the kidneys.

199. Insulin helps convert excess glucose into glycogen for storage and also promotes the conversion of glucose into lipids for energy storage in the body.

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200. Nor-epinephrine (Nor-adrenaline) has a strong effect on peripheral vasoconstriction, narrowing blood vessels to increase blood pressure in response to stress or physical activity.

201. Myxedema, a condition caused by hypothyroidism, results in symptoms like thick skin, puffy eyes, and a low metabolic rate, often due to a deficiency of thyroid hormones.

202. Hyperparathyroidism can lead to hypercalcemia, a condition where the blood calcium levels are abnormally high, potentially causing kidney stones and muscle weakness.

203. The regulation of body temperature is an example of a negative feedback mechanism, where the body counteracts deviations from normal temperature by activating cooling or warming mechanisms.

204. When blood osmotic pressure rises due to dehydration, the hypothalamus signals the release of ADH to conserve water by reducing urine production.

205. Neurosecretory cells, which produce hormones, are located in the hypothalamus and play a crucial role in regulating the release of hormones from the pituitary gland.

206. When a person consumes excess sugar, insulin helps lower blood glucose levels by increasing the permeability of cell membranes to glucose, allowing it to be absorbed by cells.

207. Taste receptors are a type of chemoreceptor, as they detect chemical substances (tastes) in food and transmit signals to the brain to interpret flavors.

208. Nociceptors are sensory receptors that detect harmful stimuli, specifically those related to pain, including thermal, mechanical, and chemical damage.

209. A reflex action bypasses the brain for quicker responses, involving only the spinal cord, sensory neurons, and motor neurons, without the need for brain involvement.

210. The medulla oblongata is part of the hindbrain and is responsible for controlling vital functions such as heart rate, breathing, and digestion.

211. The cerebellum is responsible for coordinating balance and fine motor control, ensuring smooth, coordinated movements.

212. The amygdala plays a crucial role in processing emotions such as fear, pleasure, rage, and sexual arousal.

213. The cerebellum is responsible for coordinating muscle movements and balance, which is essential for complex activities like flight in birds.

214. The cerebrum, particularly the frontal lobe, is involved in higher cognitive functions like problem-solving and mathematical reasoning.

215. The hypothalamus regulates the sleep-wake cycle, influencing circadian rhythms and promoting wakefulness or sleep.

216. The autonomic nervous system controls involuntary functions, such as the regulation of visceral organs, glands, and smooth muscles, but does not regulate skeletal muscles.

217. The autonomic nervous system does not control thoughts and emotions, which are primarily managed by the brain's higher centers.

218. In human myelinated nerve fibers, nerve impulses travel at speeds ranging from 100 to 120 meters per second due to the insulation provided by myelin.

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219. During the non-conducting state (resting potential), the neuron membrane is permeable to the efflux of potassium ions (K+), helping maintain the resting potential.

220. Depolarization occurs when sodium ions (Na+) move into the neuron, causing the membrane potential to become more positive.

221. In a resting neuron, the concentration of potassium ions (K+) inside the membrane is about ten times higher than outside, maintaining the resting membrane potential.

222. When an excitatory neurotransmitter binds to the postsynaptic membrane, it causes sodium channels to open, leading to depolarization.

223. If sodium gates do not close in time during the action potential, the neuron may not return to its resting potential, preventing proper repolarization.

224. The refractory period is a phase during which the neuron cannot fire another action potential due to the reversal of charges across the membrane and the resetting of ion concentrations.

225. Nerve impulses travel 50 times faster in myelinated fibers, jumping from node to node (saltatory conduction) compared to unmyelinated axons.

226. Acetylcholine is a neurotransmitter found both in the central nervous system and in peripheral nerves, especially at neuromuscular junctions.

227. Adrenaline (epinephrine) is broken down by the enzyme monoamine oxidase (MAO), which helps regulate its levels in the body.

228. Sodium ions diffuse across the postsynaptic membrane after neurotransmitter binding, leading to depolarization and the initiation of an action potential.

229. Neurotransmitter binding to postsynaptic receptors changes the permeability of certain ions, such as sodium or potassium, influencing the membrane potential.

230. After neurotransmitters transmit an impulse across the synapse, they are typically broken down by enzymes or reabsorbed into the presynaptic neuron.

231. When an impulse travel from a receptor to an effector, it follows the sequence: sensory neuron (detects stimulus), interneuron (processes information), and motor neuron (causes a response).

232. Nissl's granules are clusters of ribosomes found in the cell body of neurons, involved in protein synthesis necessary for neurotransmitter production.

233. Motor neurons transmit impulses from the central nervous system (CNS) to muscles or glands to elicit a response or action.

234. Nissl's granules are clusters of ribosomes and rough endoplasmic reticulum in the neuron cell body, involved in protein synthesis for neuron function.

235. Labor contractions are regulated by a positive feedback mechanism, where the release of oxytocin enhances uterine contractions, leading to further oxytocin release.

236. Most neurons in the central nervous system (CNS) are multipolar, meaning they have multiple dendrites and one axon, allowing for complex signal integration.

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PRACTICE EXERCISE

Q.1 **All are the features of kingdom animalia except:**
A. Heterotroph
B. Organic synthesis
C. Eukaryotes
D. Multicellular

Q.2 **A feature shared by all animals:**
A. Motile
B. Aquatic lifestyle
C. Locomotion by limbs
D. Heterotrophy

Q.3 **Animals of grade radiata are:**
A. Diploblastic
B. Acoelomate
C. Triploblastic
D. Pseudocoelomate

Q.4 **Reproductive system arises from:**
A. Germ layer
B. Ectoderm
C. Mesoderm
D. Endoderm

Q.5 **Pseudocoelom develops from:**
A. Blastostyle
B. Blastocoel
C. Blastocyst
D. Mesoderm

Q.6 **Reproductive system, excretory system, circulatory system and respiratory system developed from:**
A. Ectoderm
B. Endoderm
C. Mesoderm
D. Ectoderm and endoderm

Q.7 **Bilaterally symmetrical animals are:**
A. Lesser developed
B. Lacking mesoderm
C. Placed in one phylum only
D. Triploblastic

Q.8 **In coelomate, the layer that surround endoderm is:**
A. Coelomic epithelium
B. Ectoderm
C. Visceral mesoderm
D. Parietal mesoderm

Q.9 **All are correct about acoelomates except:**
A. Sac type digestive system
B. Well-developed respiratory system
C. Parenchyma fill the body space
D. Well-developed excretory system

Q.10 **A body cavity is absent in:**
A. Acoelomates
B. Pseudocoelomates
C. Acoelomates and pseudocoelomates
D. Coelomates

Q.11 **Which of the following are pseudocoelomates?**
A. Platyhelminthes
B. Echinoderms
C. Molluses
D. Aschelminthes

Q.12 **A fluid filled cavity which is mesodermal in origin but absent in nematodes is:**
A. Coelom
B. Gastrocoel
C. Pseudocoelom
D. Spongocoel

Q.13 **Everything is true about coelom except:**
A. Found between body wall and gut
B. Fluid filled
C. Lined by mesoderm
D. Bound internally by cuticle of intestine

Q.14 **Acoelomates do not lack:**
A. Coelom
B. Mesoderm
C. Special transport system
D. Coelomic fluid

Q.15 **In coelomates, gut is lined externally by:**
A. Visceral mesoderm
B. Parietal mesoderm
C. Splanchnic mesoderm
D. Endoderm

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Q.16 Which system is more developed in acoelomates?
A. Excretory system
B. Respiratory system
C. Digestive system
D. Osmoregulatory system

Q.17 Spiral and determinate type cleavage is present in:
A. Pinworm
B. Star fish
C. Cake urchin
D. Amphioxus

Q.18 Indeterminate cleavage is not a characteristic of:
A. Echinodermata
B. Mollusca
C. Chordata
D. Hemichordata

Q.19 Animals of grade _____ can be divided into equal halves in many planes.
A. Multigenecity
B. Polymorphism
C. Radiata
D. Bilateria

Q.20 _____ cells of cnidarians give rise to nematocyst.
A. Ectodermal
B. Endodermal
C. Mesodermal
D. Peridermal

Q.21 The animal which has false coelom is:
A. *Spongilla*
B. *Obelia*
C. Hookworm
D. *Planaria*

Q.22 An acoelomate is:
A. Flatworm
B. Molluscs
C. Annelids
D. Earthworm

Q.23 Sponges have special mobile cells called:
A. Pinacocytes
B. Flagellated cells
C. Choanocytes
D. Amoebocytes

Q.24 An animal found from ocean was observed to have no tissue organization. It is most likely to be the member of phylum:
A. Porifera
B. Coelenterate
C. Echinodermata
D. Hemichordate

Q.25 The skeleton of sponges consists of:
A. Carbonate of lime
B. Silicon
C. Calcium carbonate
D. Carbonate of lime & silicon

Q.26 Body of porifera is tubular which is opened at its anterior end called:
A. Culum
B. Osculum
C. Spongocoel
D. Ostia

Q.27 All are the uses of sponges except:
A. Washing and bathing
B. Air pollution indicator
C. In surgical operations
D. To absorb sound waves

Q.28 Asexual reproduction is more common in cnidarians. It is performed by:
A. Budding
B. Regeneration
C. Rarely by fragmentation
D. All A, B, C

Q.29 The existence of a single species in more than two morphological forms (individual types) is termed as:
A. Mutagenesis
B. Metagenisis
C. Polymorphism
D. Unicellular organism

Q.30 _____ develops gonads in which egg or sperms are formed.
A. Polyps
B. Medusae
C. Gastrozooids
D. Blastostyle

Q.31 It is not the importance of coral reef:
A. Provide ecosystem to marine life
B. Used as ornaments
C. Provide breeding habitat for fishes
D. Used as sound absorber

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Q.32 The animals in grade bilateria and triploblastic are all except:
A. Platyhelminthes, nematode
B. Annelida, mollusca
C. Arthropoda, and chordate
D. Cnidaria

Q.33 Gastrovascular cavity of coelenterates perform following function:
A. Digestion
B. Respiration
C. Excretion
D. All A, B, C

Q.34 The nematocysts are the organs of defense in _____.
A. Coelenterata
B. Echinodermata
C. Annelida
D. Tracheophytes

Q.35 It is not true for Phylum Platyhelminthes:
A. Bilaterally symmetrical
B. Triploblastic metazoan
C. Dorsoventrally compressed body
D. Radially symmetrical body

Q.36 The body of Aschelminthes is covered by a hard layer of:
A. Chitin
B. Cuticle
C. Cilia
D. Spongin

Q.37 _____ is a human parasite commonly known as pinworm.
A. *Fasciola hepatica*
B. *Taenia solium*
C. *Enterobius vermicularis*
D. *Aurelia aurita*

Q.38 The nervous system in Aschelminthes consists of a nerve ring which encircles the:
A. Mouth
B. Pharynx
C. Larynx
D. Anus

Q.39 Molluscs are soft bodied, triploblastic animals, most of them are protected by a shell of calcium carbonate secreted by:
A. Mantle
B. Ectoderm
C. Mesoderm
D. Ectoderm

Q.40 Locomotary organs are _____ in earthworm and _____ in *Neries* respectively.
A. Setae, parapodia
B. Parapodia, setae
C. Setae
D. Setae, chaetae

Q.41 The most successful group and the largest phylum of the animals:
A. Phylum Mollusca
B. Phylum Porifera
C. Phylum Annelida
D. Phylum Arthropoda

Q.42 Scavenger insects may eat:
A. Dead matter present on organism
B. Dead animals and plants
C. Dead plant matter only
D. Living animals only

Q.43 Members of this phylum are exclusively marine:
A. Porifera
B. Cnidaria
C. Mollusca
D. Echinodermata

Q.44 The organs of locomotion in echinoderms are:
A. Muscle feet
B. Jet propulsion
C. Parapodia
D. Tube feet

Q.45 Water enters the water vascular system through:
A. Radial canal
B. Ampulla
C. Ostia
D. Madreporite

Q.46 Fate of the blastomeres is foretold in:
A. Echinoderms
B. Hemichordates
C. Arthropods
D. Chordates

Q.47 Reptiles flourished throughout _____ era.
A. Cenozoic
B. Devonian
C. Proterozoic
D. Mesozoic

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Q.48 Birds do not have teeth so the function of teeth is performed by:
A. Beak
B. Pharynx
C. Stomach
D. Gizzard

Q.49 Which of them is not poikilotherm?
A. Spiny ant eater
B. Lizard
C. Crocodile
D. Snake

Q.50 The lower jaw is composed of only one large bone:
A. Reptiles
B. Amphibian
C. Chondrichthyes
D. Mammals

Q.51 All chordates share these features except:
A. Notochord
B. Gill slits
C. Post anal tail
D. Vertebral column

Q.52 The central nervous system of chordates is:
A. Ventral
B. Ventral and hollow
C. Lateral
D. Dorsal and hollow

Q.53 *Balanoglossus* and *Saccoglossus* are members of:
A. Echinodermata
B. Annelida
C. Nematoda
D. Hemichordata

Q.54 The word 'animalia' is derived from Latin language which means:
A. Soul
B. Cell
C. Tissue
D. Sub-cellular structures

Q.55 Arrange the sequence from ancestors to descendants:
1. Tetrapods 2. Vertebrates 3. Deuterostomes 4. Amniotes 5. Bilaterians
A. 5 → 3 → 2 → 4 → 1
B. 5 → 3 → 2 → 1 → 4
C. 5 → 3 → 4 → 2 → 1
D. 3 → 5 → 4 → 2 → 1

Q.56 A concentration of sense organs and nerve cells in the anterior end of the body is known as:
A. Fertilization
B. Anteriorization
C. Symmetry
D. Cephalization

Q.57 The most ancient branch point in animal phylogeny is that having:
A. Radial or bilateral symmetry
B. Well-defined head
C. Diploblastic or triploblastic embryos
D. True tissues or no tissues

Q.58 Radial and Diploblastic animals contain:
A. Sac-like digestive system
B. Closed circulatory system
C. Centralized nervous system
D. Respiratory system

Q.59 The best commercial sponges are found in warm water of:
A. Pacific Ocean
B. Atlantic Ocean
C. Mediterranean Sea
D. Indian sea

Q.60 Zooid which gives rise to medusae by asexual method is:
A. Gastrozooids
B. Gonozooids
C. Blastostyle
D. Dactylzooid

Q.61 In members of phylum platyhelminthes, mesoderm forms:
A. Mesoglea
B. Coelom
C. Mesenchyme
D. Parenchyma

Q.62 All of the following are endoparasite except:
A. *Ascaris lumbricoides*
B. *Enterobius vermicularis*
C. *Ancylostoma duodenale*
D. *Hirudo medicinalis*

Q.63 Just as the pseudopodia in Amoeba, so as:
A. Teeth in rabbit
B. Suckers in Tania
C. Legs in cockroach
D. Spicules in *Leucosolenia*

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6 TOPIC DIVERSITY AMONG ANIMALS
PAST PAPER MCQ'S

Q.64 The group of animals having a single celled body which performs all the vital activities of life are called: (ETEA-2022)
A. Protozoa B. Parazoa
C. Metazoa D. Nanozoa

Q.65 Which one of the following is an example of a free-living carnivorous flatworm? (MDCAT-2014)
A. Liver fluke B. Tapeworm
C. *Dugesia* D. *Schistosoma*

Q.66 *Ascaris* is which one of the following? (MDCAT-2014)
A. Ectoparasite B. Respiratory tract parasite
C. Intestinal parasite D. Urinogenital tract parasite

Q.67 Polymorphism is a feature exhibited by members of: (MDCAT-2014)
A. Coelenterates B. Porifera
C. Arthropoda D. Platyhelminthes

Q.68 _____ is a triploblastic organism. (MDCAT-2015)
A. Jelly Fish B. Tapeworm
C. Sea Anemone D. Corals

Q.69 Name of common gut roundworm parasite of human and pigs. (MDCAT-2015)
A. *Ascaris lumbericoides* B. *Pheretima posthuma*
C. *Lumbericus terresaris* D. *Hirudo medicinalis*

Q.70 In radial symmetry, all body parts are arranged around the central axis. Radial symmetry represents _____ mode of life. (MDCAT-2016)
A. Sessile B. Active
C. Streamlined D. Parasitic

Q.71 Pseudo-coelomates have a body cavity but it is not true coelom. Which one of the following is included in the group? (MDCAT-2016)
A. *Planaria* B. Earthworm
C. Tapeworm D. *Ascaris*

Q.72 *Taenia* is an endoparasite of human, pig and cattle, which belongs to phylum. (MDCAT-2016)
A. Cnidaria B. Annelida
C. Aschelminthes D. Platyhelminthes

Q.73 Following group is the example of acoelomates: (MDCAT-2018)
A. Platyhelminthes B. Aschelminthes
C. Molluscs D. Annelids

Q.74 The larva formed during the life cycle of Annelida is: (ETEA-2019)
A. Glochidium larva B. Bipinnaria larva
C. Trochophore larva D. Tornaria larva

Q.75 Platyhelminthes are: (ETEA-2019)
A. Bilaterally symmetrical and diploblastic B. Bilaterally symmetrical and triploblastic
C. Radially symmetrical and triploblastic D. Radially symmetrically and diploblastic

Q.76 *Pheretima posthuma* is the scientific name of: (LUMHS-2015)
A. Planaria B. Liver fluke
C. Earth worm D. Tape worm

Q.77 Platyhelminthes means: (NTS-2017)
A. Flat worms B. Round worms
C. Segmented worms D. None

Q.78 Water vascular system or ambulacral system is a unique and complex system especially present in: (UHS-2022)
A. Sponges B. Arthropods
C. Echinoderms D. Fishes

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Q.79 Round worms belong to which phylum? (UHS-2022)
A. Annelida
B. Coelenterata
C. Nematoda
D. Platyhelminthes

Q.80 Silver fish is a/an: (UHS-2022)
A. Insect
B. Mollusc
C. Jawless fish
D. Cartilaginous fish

Q.81 Tissues are not found in the following animal: (UHS-2022)
A. Flatworms
B. Sponges
C. Cnidarians
D. Roundworms

Q.82 The animal which is not having soft body: (BUMHS-2022)
A. *Hirudo*
B. *Unio*
C. *Sepia*
D. *Loligo*

Q.83 Animals having jointed legs and chitinous exoskeleton are known as: (BUMHS-2022)
A. Chordates
B. Arthropods
C. Annelids
D. Molluscs

Q.84 Alternation of generation is the character of _____ phylum. (BUMHS-2022)
A. Annelida
B. Arthropoda
C. Coelenterata
D. Echinodermata

Q.85 It provides protection of coastline from storm, shelter for marine organisms, assist in carbon and nitrogen fixing: (DUHS-2022)
A. Polyps
B. Coral reefs
C. Medusa
D. Aurelia

Q.86 Skeleton of marine shelled sarcodians give clues to possible deposit of: (DUHS-2022)
A. Potassium
B. Magnesium
C. Chromium
D. Calcium

Q.87 Opossum and koala bear belongs to sub-class: (ETEA-2019)
A. Prototheria
B. Eutheria
C. Metatheria
D. Monotremata

Q.88 The table shows some characteristics of four different vertebrates. Which vertebrate is a reptile? (NTS-2017)

	Fins	Legs	Scales	Hair
A.	✓	×	✓	×
B.	×	✓	✓	×
C	×	✓	×	×
D.	×	✓	×	✓

Q.89 Mammals become dominant in: (NUMS-2022)
A. Cenozoic period
B. Jurassic period
C. Mesozoic period
D. Paleozoic period

Q.90 Enteron is the characteristic feature of: (UHS-2023)
A. Phylum Porifera
B. Phylum Cnidaria
C. Phylum Platyhelminthes
D. Phylum Echinodermata

Q.91 The body of which is called metamerically segmented? (UHS-2023)
A. Cnidarians
B. Nematodes
C. Annelids
D. Sponges

Q.92 Excretion in Planaria takes place by? (UHS-2023)
A. Malpighian tubules
B. Protonephridia
C. Metanephridia
D. Nephron

Q.93 Four chambered hearts with right systemic arch only is present in? (UHS-2023)
A. Amphibians
B. Reptiles
C. Birds
D. Mammals

Q.94 Select an anamniotes from the following: (SZABMU-2023)
A. Snake
B. Parrot
C. Frog
D. Crocodile

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Q.95 Multicellular, heterotrophic nutrition, cell walls are never present in their cells, which kingdom do these organisms belong to? (SZABMU-2023)
A. Kingdom Protoctista
B. Kingdom Fungi
C. Kingdom Plantae
D Kingdom Animalia

Q.96 In phylum Aschelminths (Nematoda), nervous system consists of a nerve ring which encircles the _____ and sends its branches in different parts of the body. (ETEA-2023)
A. Lips
B. Teeth
C. Stomach
D. Pharynx

Q.97 Aquatic mammals belong to the order _____. (ETEA-2023)
A. Cetacea
B. Pholidota
C. Chiroptera
D. Proboscide

Q.98 Coral reefs are the characteristic feature of phylum: (ETEA-2023)
A. Porifera
B. Coelenterata
C. Arthropoda
D. Platyhelminthes

Q.99 The green glands found in arthropods are concerned with: (ETEA-2023)
A. Excretion
B. Respiration
C. Digestion
D. Circulation

Q.100 The cells of endoderm of coelenterate are specialized for: (ETEA-2023 Retake)
A. Excretion
B. Digestion
C. Defense
D. Respiration

Q.101 Which structure is responsible for the excretion in Arthropods? (ETEA-2023 Retake)
A. Nephron
B. Pronephridia
C. Metanephridia
D. Malpighian tubules

Q.102 Alternation of generation is the character of _____ phylum. (ETEA-2023 Retake)
A. Annelida
B. Arthropoda
C. Coelenterate
D. Echinodermata

Q.103 All animals begin life as a _____. (ETEA-2023 Retake)
A. Multicellular fertilized egg
B. Single fertilized egg
C. Hollow blastula
D. Gastrula

Q.104 Parazoa are simple multicellular animals which are believed to have evolved from? (ETEA-2023 Retake)
A. Bacteria
B. Protists
C. Fungi
D. Plants

Q.105 Which of the following belongs to chordates? (UHS-2024)
A. Spider
B. Earthworm
C. Trout Fish
D. Star Fish

Q.106 Malpighian tubules are found in: (KMU-2024)
A. Earthworm
B. Grasshopper
C. Leech
D. Slug

Q.107 Shark belongs to class _____. (KMU-2024)
A. Chondrichthyes
B. Echinodermata
C. Osteichthyes
D. Urochordata

Q.108 Canal system is a characteristic of: (KMU-2024)
A. Cnidarians
B. Protozoans
C. Porifera
D. Segmented worms

Q.109 Mantle is the feature of: (KMU-2024)
A. Annelids
B. Chordates
C. Echinoderms
D. Mussel

Q.110 Which of the following is an acoelomate? (SZAMBU-2024)
A. *Aurelia*
B. *Euplectella*
C. *Taenia*
D. *Chetopeteris*

Q.111 Select an anamniotes from the following: (SZAMBU-2024-Reconduct)
A. Snake
B. Parrot
C. Frog
D. Crocodile

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ANSWER KEY

PRACTICE EXERCISE

1	B	11	D	21	C	31	D	41	D	51	D	61	D
2	D	12	C	22	A	32	D	42	B	52	D	62	D
3	A	13	D	23	D	33	D	43	D	53	D	63	C
4	C	14	B	24	A	34	A	44	D	54	A		
5	B	15	A	25	D	35	D	45	D	55	B		
6	C	16	A	26	B	36	B	46	C	56	D		
7	D	17	A	27	B	37	C	47	D	57	D		
8	C	18	B	28	D	38	B	48	D	58	A		
9	B	19	C	29	C	39	A	49	A	59	C		
10	A	20	A	30	B	40	A	50	D	60	C		

PAST PAPER MCQ'S

64	A	74	C	84	C	94	C	104	B
65	C	75	B	85	B	95	D	105	C
66	C	76	C	86	D	96	D	106	B
67	A	77	A	87	C	97	A	107	A
68	B	78	C	88	B	98	B	108	C
69	A	79	C	89	A	99	A	109	D
70	A	80	A	90	B	100	B	110	C
71	D	81	B	91	C	101	D	111	C
72	D	82	B	92	B	102	C		
73	A	83	B	93	C	103	B		

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EXPLANATORY NOTES

PRACTICE EXERCISE

1. Organic synthesis is referred to as photosynthesis in which inorganic molecules (water and carbon dioxide) are converted into organic molecule (Glucose). This process takes place in autotrophs.
2. Some animals, such as sponges, are sessile. Animals occupy aquatic as well as terrestrial habitats and not all animals have limbs, such as invertebrates. However, all animals are heterotrophs.
3. Grade radiata includes only one phylum; Cnidaria. These animals are always diploblastic and have gastrovascular cavity with sac type digestive system.
4. Ectoderm form skin and nervous system. Endoderm form digestive system and rest of the systems in triploblastic animals are formed from mesoderm including reproductive system.
5. The body cavity that is formed from Blastocoel (cavity that is formed at blastula stage of developing embryo) is called pseudocoelom.
6. Ectoderm forms skin and nervous system. Endoderm forms lining of digestive system and rest of the systems in triploblastic animals originate from mesoderm.
7. All bilateral symmetrical animals are triploblastic. They have three germinal layers during gastrulation.
8. Coelom (body cavity) is formed due to splitting of mesoderm at embryonic stages. Its outer layer is called parietal layer which underlines the body wall, while inner layer of mesoderm is called visceral layer that surrounds the endoderm.
9. Acoelomate includes animals of Phylum Platyhelminthes in which respiratory and circulatory system is absent. Gaseous exchange takes place directly through body surface.
10. Acoelomates are those animals in which there is no body cavity or space between body wall and digestive system. This group includes only one phylum Platyhelminthes.
11. Aschelminthes or nematodes are pseudocoelomates. They are also referred as roundworms because their body has tapered ends.
12. Coelom is true body cavity, which is always formed from mesoderm. Nematodes are Pseudocoelomates so, they possess pseudocoelom.
13. Coelom is internally lined by visceral layer of mesoderm. In pseudocoelomates body cavity is internally bound by cuticle of intestine.
14. Acoelomates are triploblastic animals in which all the three germinal layers ectoderm, mesoderm and endoderm are present.
15. During embryonic development, mesoderm splits into outer parietal layer that internally lines the body wall and inner visceral layer (mesoderm) that externally surrounds gut.
16. Acoelomate has sac type digestive system, no respiratory and osmoregulatory systems. They have tubular excretory system called protonephridia having flame cells.
17. Spiral and determinate type cleavage is present in proterostomes. Pinworm belongs to phylum Aschelminthes that are proterostomes.
18. Molluscs are proterostomes and have determinate cleavage in which fate of blastomeres is foretold. Indeterminate cleavage is characteristic of deuterostomes.
19.



a beetle has bilateral symmetry | a coral polyp has radial symmetry | a sponge has no symmetry

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20. Cnidarians are essentially sac-like made of two cell layers. The outer ectoderm, or epidermis, contains the cnidocytes, the stinging cells that are characteristic of the phylum. In between epidermis and gastrodermis (endodermis) is the mesoglea, a layer of jellylike substance which contains scattered cells and collagen fibers.
21. False coelom is characteristic of Aschelminthes (nematodes). Hook worm belongs to this phylum.
22. All the Platyhelminthes (flatworm) are acoelomates. They have mesenchyme cells between ectoderm and endoderm.
23. Amoebocytes are amoeba-like cells found in sponges. They are totipotent (able to divide and form differentiate cells) in nature. They basically store, digest and transport food, excrete wastes, secrete skeleton and also may give rise to buds in asexual reproduction.
24. Unlike Protozoans, the Porifera are multicellular. However, unlike higher metazoans, the cells that make up a sponge are not organized into tissues. Therefore, sponges lack true tissues and organs; in addition, they have no body symmetry.
25. A sponge endoskeleton consists of short, sharp rods called spicules. Spicules are made of silica, calcium carbonate, or spongin, a tough protein.
26. 
27. Sponges are aquatic animals, commonly found in bottom of water bodies. They have no exposure to air; therefore, they cannot be used as air pollution indicators.
28. Due to simple organization the members of the genus Hydra reproduce by budding, fragmentation or regeneration.
29. 
30. Medusa is a mobile life cycle stage of the Cnidaria phylum, contracting with it muscular bell. Polyp has a tubular shape and are fixed at their base, with the mouth present at the other end of the tube facing the water.
31. Sound travels as a wave that can either absorb into a surface or reflect off it. Coral reefs do not have this ability.
32. General characteristics of Phylum coelenterate/cnidaria:
    - **Kingdom:** Animalia.
    - **Habitat:** aquatic, mostly marine
    - **Habit:** solitary or colonial
    - **Symmetry:** radially symmetrical
    - **Grade of organization**: tissue grade of organization
    - **Germ layer**: diploblastic, outer ectoderm and inner endoderm.
33. Functions of Gastrovascular cavity in coelenterates are;
    - Digestion & distribution of nutrients throughout the body
    - Gases exchange
    - Remove of waste
    - Serve as a hydrostatic skeleton.

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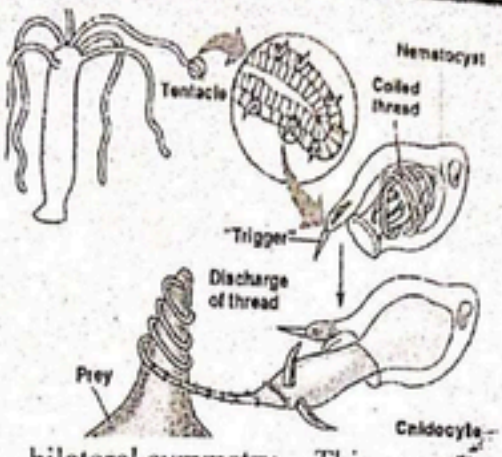
34.



35. Phylum Platyhelminthes have bilateral symmetry. This means there is only one plane of symmetry.

36. Intestinal parasites, generally do not absorb nutrients through the body surface as there is usually a thick cuticle to protect themselves from the host's digestive liquids.

37.

Scientific Name	Common name
Fasciola hepatica	Liver fluke
Enterobius vermicularis	Pin worm
Taenia solium	Tape worm
Aurelia aurita	Jelly fish

38. The nematode nervous system consists of a set of neuronal processes that run lengthwise on the nematode body. These processes consist of neurons that have a cell body also known as a neurocyte. A group of neurocytes is called a ganglion. These ganglia connect to the nerve ring which surrounds the Pharynx.

39. In shelled molluscs, the mantle is the organ that forms the shell, and adds to the shell to increase its size and strength as the animal grows. Shell material is secreted by the ectodermic (epithelial) cells of the mantle tissue.

40. Locomotary setae are for crawling and are the bristles that are visible on the exterior of the earthworm. Slow creeping movements of Neries are carried out by the action of parapodia only.

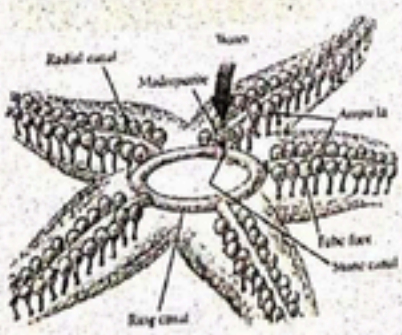
41. More than 50% of total biodiversity of our planet is formed by the Arthropods. They successfully adapted terrestrial environment.

42. Scavengers are those animals that feed on dead animals and plants e.g., *Drosophila* and Vulture.

43. The echinoderms are exclusively marine. Members of other phyla show diverse habitat. They show either marine or fresh water habitat.

44. Organs of locomotion in echinoderms are tube feet. These are present along the edges of grooves present in the arms.

45.



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46. Arthropods are proterostomes in which cleavage is determinate (fate of blastomeres is foretold). Each blastomere developed into its special structure.
47. The *Mesozoic Era* is an interval of geological time from about 252 to 66 million years ago. It is also called the Age of *Reptiles*
48. Birds do not have teeth. Birds "chew" their food in their gizzard.
49. A *poikilotherm* is an animal whose internal temperature varies considerably. It is the opposite of a *homeotherm*, an animal which maintains thermal homeostasis. Spiny ant eaters belong to homeotherm.
50. The lower jaw of mammals consists of only one bone, the dentary, and the jaw hinge connects the dentary to the squamosal (flat) part of the temporal bone in the skull. Working together, these muscles permit up-and-down and side-to-side movements of the jaw, making chewing possible which is unique to mammals.
51. Vertebral column is present only in vertebrates. Notochord, gill slits, post anal tail, and dorsal nervous system are common features chordates.
52. The central nervous system of all chordates is dorsal and hollow.
53. Balanoglossus and Saccoglossus belong to phylum hemichordata.
54. The term "Animalia" comes from the Latin word "anima," meaning "soul" or "breath," referring to living beings with the capacity for movement and sensation.
55. The evolutionary sequence starts with bilaterians, progresses to deuterostomes, then vertebrates, followed by amniotes, and finally tetrapods.
56. Cephalization refers to the concentration of sensory and neural structures at the head (anterior) end of the body, which is a key feature in the evolution of more complex animals.
57. The most ancient branch point in animal phylogeny distinguishes between animals with true tissues (EumetazoA. and those without tissues (e.g., Porifera), marking a key evolutionary divergence.
58. Radial and diploblastic animals, such as cnidarians, typically have a sac-like digestive system, where the mouth serves as both the entrance for food and the exit for waste.
59. The best commercial sponges are found in the **Mediterranean Sea,** known for its high-quality natural sponges.
60. Blastostyles are specialized zooids in colonial cnidarians that give rise to medusae by asexual reproduction. They develop into medusae through budding, a process different from gonozooids, which typically produce gametes.
61. Just below the pinacocyte layer of a sponge is a jelly-like layer called the mesohyl, containing amoeboid cells called mesenchyme cells.
    - Mesoglea is non cellular jelly layer in cnidarians.
    - Parenchyma is cellular layer in platyhelminthes.
62. *Hirudo medicinalis* (the medicinal leech) is an ectoparasite as it lives outside the host and feeds on blood. The other options (Ascaris lumbricoides, Enterobius vermicularis, and Ancylostoma duodenale) are endoparasites, living inside the host's body.
63. Just as pseudopodia in *Amoeba* are used for movement and capturing food, the legs of a cockroach serve a similar function, enabling movement.

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64. Protozoans are animal like protists. They are unicellular and eukaryotic. Parazoa simple multicellular animals which have no true tissues. Metazoa refers to multicellular animals which are further divided into Eumetazoa and Parazoa.
65. Dugesia are carnivores, and they eat other small invertebrates and dead or decaying animals.
66. Adult Ascaris worms inhabit the lumen of the small intestine, usually in the jejunum or ileus. They have a life span of 10 months to 2 years and then are passed in the stool.
67. Polymorphism refers to the occurrence of structurally and functionally more than two different types of individuals within the same organism. It is a characteristic feature of Cnidarians

(Coelenterates), particularly the polyp and medusa forms, or of zooids within colonial organisms like those in Hydrozoa.

68. The body of a Platyhelminthes (or tapeworm) consists of not only the ectoderm and the endoderm but also the mesoderm.

69. Ascaris worms inhabit the lumen of the small intestine, usually in the jejunum or ileus. They have a life span of 10 months to 2 years and then are passed in the stool.

70. In radial symmetry, all body parts are arranged around the central axis. Radial symmetry represents sessile mode of life.

71. Ascaris belong to the phylum Nematoda of super phylum Aschelminthes. They have a cylindrical body without showing any metamerism, a pseudocoel (false coelom) and a complete digestive tract lined by endodermal epithelium.

72. *Taenia* is a genus of *tapeworms* (a type of Platyhelminthes) that includes some important parasites of livestock.

73. Examples of acoelomates are found phylum Platyhelminthes, commonly known as flatworms. These invertebrate animals are unsegmented worms with bilateral symmetry.

74. Trochophore, also called trochosphere, small, translucent, free-swimming larva characteristic of marine annelids and most groups of mollusks.

75. Platyhelminthes have the following important characteristics:
- They are triploblastic, acoelomate, and bilaterally symmetrical.
- They may be free-living or parasites.
- The body has a soft covering with or without cilia.
- Their body is dorsoventrally flattened without any segments and appears like a leaf.

76. Pheretima is a genus of earthworms found mostly in New Guinea and parts of Southeast Asia.

77. Word Platyhelminthes (derived from the Greek platy, meaning "flat" while helminth, meaning "worm") are a phylum of relatively simple bilaterian, unsegmented, soft-bodied invertebrates.

78. The starfish's water vascular system provides the water pressure that operates the animal's tube feet. From madreporite, water moves unto the ring canal, then into the rays through radial canal and finally into tube feet. This system is absent in others phyla.

79. Round worms belong to nematoda. They have pointed ends. Peudocoelom is present. Annelids are segmented worms. Coelentrata is consisted of diploblastic animals which have special structure called nematocyst. Platyhelminthes are flat worms.

80. Sliver fish is an insect. It belongs to phylum Arthropoda. Its body is divide into three segments head, thorax and abdomen.

81. Sponges do not have true tissue and they belong to phylum Parazoa. While remaining phylum and organism have true tissues and belong to Eumetazoa.

82. Unio is a freshwater mussel, it has exoskeleton and hydrostatic skeleton inside the shells. While others have only hydrostatic skeleton.

83. Chordates have notochord, annelids have metameric segments and Molluscs have soft body.

84. Polymorphism or alternation of generation is a unique feature of phylum coelenterata. This feature is absent in all other phylum.

85. Coral or *madrepore*: the body is covered with hard calcareous skeleton formed of calcium carbonate. Their skeletons form large coral reefs and protect coastline.

86. Marine shelled sarcodians are actinopods and foraminiferans. They are basically protozoans.

87. Metatheria includes marsupials that possess a pouch and give birth to partially-developed young ones. Well-known marsupials include kangaroos, wallabies, koalas, opossums, wombats, Tasmanian devils, and the extinct Thylacine.

88. Fins are present in fishes. Legs are common in tetrapod. Hairs are unique feature of mammals.

89. Fossil records show that mammals were developed from reptiles. They become dominant in the Cenozoic era.

90. Cnidarians like jellyfish and others have an enteron, a central digestive cavity for food digestion.

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91. Annelids, such as earthworms, have a body that is metamerically segmented, meaning their body is divided into repeated segments.
92. Excretion in Planaria (a type of flatworm) takes place through protonephridia, which are specialized excretory structures that help in osmoregulation and waste removal.
93. Birds have a four-chambered heart with a right systemic arch, which is part of their circulatory system that efficiently separates oxygenated and deoxygenated blood.
94. Frogs are anamniotes, meaning they do not have an amniotic membrane around their embryos, unlike reptiles, birds, and mammals.
95. Organisms in Kingdom Animalia are multicellular and obtain nutrition by consuming other organisms (heterotrophic). They lack cell walls, which distinguishes them from plants and fungi. This kingdom includes diverse animals, ranging from insects to mammals.
96. In phylum Aschelminths (Nematoda), the nervous system consists of a nerve ring that encircles the pharynx and sends branches to different parts of the body.
97. Aquatic mammals like whales and dolphins belong to the order Cetacea, which is adapted for life in water. Unlike other orders such as Pholidota and Chiroptera, Cetacea is specifically designed for aquatic living.
98. Coral reefs are the characteristic feature of phylum Coelenterata (now called Cnidaria), which includes corals, jellyfish, and sea anemones. These organisms often form large, complex reef structures in marine environments.
99. Green glands in arthropods are excretory organs that help in the removal of waste products, specifically nitrogenous wastes, from their body.
100. The cells of the endoderm in coelenterates (Cnidarians) are specialized for digestion. These cells line the gastrovascular cavity where digestion of food occurs.
101. Malpighian tubules are the excretory structures in arthropods, responsible for the removal of nitrogenous wastes and osmoregulation.
102. Alternation of generation is a characteristic feature of phylum Coelenterata (Cnidaria), where organisms alternate between asexual and sexual reproductive phases, such as the polyp and medusa stages in jellyfish and corals.
103. All animals begin life as a single fertilized egg (zygote), which then undergoes development through various stages, including cleavage, blastula, and gastrula.
104. Parazoa, such as sponges, are simple multicellular animals that are believed to have evolved from protists, which are single-celled eukaryotes.
105. Trout fish belongs to the phylum Chordata, which includes animals with a notochord, dorsal nerve cord, and other defining features at some stage of development.
106. Malpighian tubules are excretory structures found in arthropods like grasshoppers, where they help in the removal of waste and osmoregulation.
107. Sharks belong to the class Chondrichthyes, which includes cartilaginous fish like sharks, rays, and skates. They have a cartilage-based skeleton rather than a bony one.
108. The canal system is a characteristic feature of Porifera (sponges), which helps in the circulation of water through their bodies for feeding, respiration, and excretion.
109. The mantle is a characteristic feature of Mussels (and other mollusks like clams, oysters, etc.). It is a soft tissue that secretes the shell and surrounds the body.
110. Taenia, a genus of tapeworms, is an acoelomate, meaning it lacks a true body cavity. It has a solid body structure without a coelom, unlike other organisms with a defined body cavity.
111. Frogs are anamniotes, meaning they do not have an amniotic membrane surrounding their embryos, unlike reptiles, birds, and mammals.

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TOPIC 7 ENZYMES

PRACTICE EXERCISE

Q.1 If enzymes stop their functions, then biochemical reactions would:
A. Stop
B. Be slowed down
C. Not affected
D. Carried out at faster rate

Q.2 All of the following are true for an enzyme except:
A. Is globular protein
B. Increase the energy of activation
C. Remain unchanged after reaction
D. Speed up the reaction

Q.3 Enzymes catalyze all of the followings except:
A. Digestion
B. Cellular respiration
C. Photosynthesis
D. Breathing

Q.4 The lower the activation energy, the _____ reaction will be.
A. Faster
B. Moderate
C. Slower
D. No effect on enzyme action

Q.5 Most of the enzymes are:
A. Attached with organelles
B. In cytoplasm
C. Free floating
D. In coagulated form

Q.6 Enzymes related to fatty acids oxidation are present in/at:
A. Plasma membrane
B. Chloroplast
C. Mitochondria
D. Nucleolus

Q.7 It is false about enzymes:
A. All enzymes require co-factors for proper functioning
B. Only small amount of enzymes is required
C. They work in *vitro* as well as in *vivo* conditions
D. They lower activation energy

Q.8 The reaction takes place in a small part of the enzyme called:
A. Allosteric site
B. Globular site
C. Reactive site
D. Active site

Q.9 The atoms, groups of atoms and molecules that join with enzymes altering their shape and making them functional:
A. Substrate
B. Prosthetic Group
C. Coenzymes
D. Co-factors

Q.10 If the co-factor is a non-protein like a metallic ion, it is referred to as a:
A. Apoenzyme
B. Coenzymes
C. Activator
D. Prosthetic group

Q.11 Non-protein part which is organic in nature and detachable is called:
A. Activator
B. Coenzyme
C. Co-factor
D. Prosthetic group

Q.12 Function of succinate dehydrogenase is aided by:
A. NAD^+
B. Metal ion
C. FAD^+
D. Vitamin

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Q.13 **Prosthetic groups are:**
A. Metallic ions
B. Inorganic molecules
C. Organic molecules
D. Radicals

Q.14 **An enzyme that is not protein in nature:**
A. Amylopsin
B. Bam HI
C. Arginase
D. Peptidyl transferase

Q.15 **ES complex is converted into product by:**
A. Co-factor
B. Coenzyme
C. Catalytic site
D. Binding site

Q.16 **_____ suggested that each enzyme had a particular shape into which the substrate fit exactly.**
A. D. Koshland
B. R. Whittaker
C. E. Fischer
D. F. Sanger

Q.17 **Allosteric enzymes have _____ major sites.**
A. 1
B. 3
C. 2
D. 4

Q.18 **Working of sucrase and maltase can be explained by:**
A. Induce fit model
B. Lock and key
C. Both models can explain its working
D. No model can explain its working

Q.19 **The effect of reversible competitive inhibitor can be neutralized by increasing the concentration of:**
A. Substrate
B. Activator
C. Enzyme
D. Inhibitor

Q.20 **If the concentration of substrate molecule is higher than the enzymes, then rate of reaction would be:**
A. Increasing
B. Decreasing
C. Remain constant
D. Variable

Q.21 **Optimum pH of enterokinase is:**
A. Slightly acidic
B. Highly acidic
C. Slightly basic
D. Highly basic

Q.22 **Which of the following properties of amino acids is affected by a change in pH?**
A. Oxidation of amino acids
B. Atomization of amino acids
C. Reduction of amino acids
D. Ionization of amino acids

Q.23 **Change in temperature from 30°C to 40°C in human body will cause:**
A. Increase in rate of reaction
B. Decrease in rate of reaction
C. First increase then decreases in rate of reaction
D. First increase then become constant

Q.24 **Which of the following factor does not affect the rate of enzyme action?**
A. Enzymes concentration
B. Substrate concentration
C. Light intensity
D. Temperature

Q.25 **Enzymes which require optimum temperature to be lower than 37° C for their proper functioning are present in:**
A. Liver
B. Testes
C. Kidney
D. Stomach

Q.26 **Which of the followings statement is correct?**
A. All enzymes in human body work at same temperature but different pH
B. All enzymes in human body work at different temperature but same pH
C. All enzymes in human body work at same temperature and same pH
D. All enzymes in human body work at different temperature and different pH

Q.27 **Bond sensitive to change in temperature and pH are respectively:**
A. Hydrogen, ionic
B. Hydrogen, covalent
C. Ionic, hydrogen
D. Covalent, ionic

Q.28 **Penicillin, an antibiotic inhibits bacterial growth. It is categorized as:**
A. Irreversible inhibitors
B. Competitive inhibitors
C. Non-competitive inhibitors
D. Reversible inhibitors

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Q.29 **Which of the followings is not an inhibitor of enzymes?**
A. Anti-metabolites
B. Sucrose
C. Antibiotics
D. ATP

Q.30 **Cytochrome oxidase are categorized in:**
A. Transferases
B. Lyases
C. Oxidoreductases
D. Hydrolases

Q.31 **Conversion of glucose 6-phosphate into fructose 6-phosphate is done by:**
A. Transferases
B. Isomerases
C. Oxidoreductases
D. Hydrolases

Q.32 **Prosthetic group is such a non-protein co-factor that is commonly attached to enzyme through:**
A. Hydrogen bond
B. Ionic bond
C. Covalent bond
D. Peptide bond

Q.33 **Vitamin that acts as precursor for formation of NAD^+ is:**
A. B1
B. B2
C. B3
D. B6

Q.34 **When apoenzyme is separated from its metal component, its activity is:**
A. Decreased
B. Lost
C. Increased
D. Remains unaffected

Q.35 **Which of the following act as activator for salivary amylase?**
A. Mg^{2+}
B. Cl^-
C. Zn^{2+}
D. Cu^{2+}

Q.36 **One molecule of an enzyme is needed to convert 2 substrate molecules into products in 5 minutes. 10 molecules of the enzyme and 25 molecules of the substrate are mixed in a test tube. After 5 minutes, the test tube will have:**
A. Products and 5 molecules of unreacted substrate
B. Products and enzymes
C. Products only
D. Products, enzymes and 5 molecules of unreacted substrate

Q.37 **Which one of the following enzyme shows the greatest substrate specificity?**
A. Lipase
B. Nuclease
C. Pepsin
D. Sucrase

Q.38 **This is the core of Induce Fit Model which distinguishes it from Lock and Key model:**
A. Catalytic nature of enzyme
B. Specificity of enzyme
C. Change in enzyme
D. Change in substrate

Q.39 **It helps the enzyme in the recognition and binding of a proper substrate to produce an ES complex:**
A. Catalytic site
B. Binding site
C. Active site
D. Allosteric site

Q.40 **Precursor activation is a mechanism of enzyme regulation and is initiated by:**
A. Initial substrate
B. Final product
C. Intermediate substance
D. Enzyme inhibitor

Q.41 **Optimum pH for working of sucrase is:**
A. 4.50
B. 6.80
C. 5.50
D. 9.0

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7 TOPIC ENZYMES PAST PAPER MCQ'S

Q.42 All enzymes are _____. (MDCAT-2017)
A. Fibrous proteins
B. Lipoproteins
C. Low molecular weight proteins
D. Globular proteins

Q.43 The reactants on which enzyme work are: (MDCAT-2017)
A. Products
B. Substrates
C. Metabolites
D. Catabolites

Q.44 What is true about enzymes? (MDCAT-2017)
A. Fibrous proteins
B. No effect on end product
C. Use in reaction
D. Non-specific

Q.45 Enzymes work by lowering the _____ of the reactions they catalyze. (PMC-2020)
A. Kinetic energy
B. Heat energy
C. Activation energy
D. Potential energy

Q.46 Enzymes are _____ in nature. (ETEA-2022)
A. Carbohydrates
B. Proteins
C. Lipids
D. Vitamins

Q.47 Zinc ion is attached to the active site of the enzyme carboxypeptidase. The zinc ion functions as: (UHS-2022)
A. A coenzyme molecule
B. An activator
C. An inhibitor molecule
D. Controller of allosteric site

Q.48 A co-factor tightly bound to the enzyme on the permanent basis is called: (MDCAT-2014)
A. Activator
B. Prosthetic group
C. Coenzyme
D. Apo-enzyme

Q.49 Which of the following comprises of inorganic ions? (MDCAT-2017)
A. Coenzymes
B. Prosthetic group
C. Activators
D. Apoenzyme

Q.50 A non-protein part essential for proper and essential functioning of enzyme is called: (MDCAT-2018)
A. Extra factor
B. Efficient co-factor
C. Additional factor
D. Co-factor

Q.51 According to _____ model, the active site of enzyme is modified as the substrate interacts with enzyme. (MDCAT-2019)
A. Induced fit
B. Emil Fischer
C. Lock and key
D. Fluid mosaic

Q.52 Modified form of Lock and Key model was proposed by: (MDCAT-2017)
A. Koshland
B. Watson
C. Fischer
D. Rosalind Franklin

Q.53 With the increase of enzyme concentration in a reaction, more _____ is/are available for the substrate. (AJK-2019)
A. Binding sites
B. Products
C. Active sites
D. Activation energy

Q.54 Lock and key model for enzyme action proposed by Emil Fischer suggests that: (PMC-2020)
A. Enzymes are unbiased for substrate
B. Enzymes can modify their active sites
C. Enzymes are restricted to one reaction type
D. Enzyme can catalyze variety of reactions

Q.55 The catalytic activity of an enzyme is restricted to its small portion: (SZABMU-2022)
A. Active site
B. Passive site
C. Allosteric site
D. Regulation site

Q.56 The catalytic site of enzyme is made up of how many amino acids? (BUMHS-2022)
A. 3-12
B. 30-50
C. 50-100
D. 100-1000

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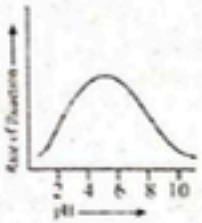
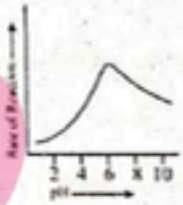
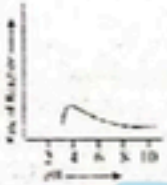
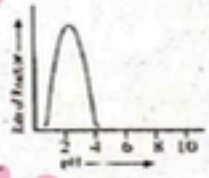
Q.57 **Enzymes lower the activation energy by stabilizing the transition state of a metabolic reaction due to:** (UHS-2022)
A. Changing conditions within the active site
B. Changing conditions within the protein framework
C. Rearranging the fatty acids in active site
D. Distorting the molecules in the allosteric site

Q.58 **Enzymes work by lowering the _____ of the reactions they catalyze.** (SZABMU-2022)
A. Kinetic energy
B. Activation energy
C. Heat energy
D. Potential energy

Q.59 **When substrate combines the active site of an enzyme it induces a conformational changes that enable enzyme to perform:** (DUHS-2022)
A. Analytic function
B. Metabolism
C. Meiosis
D. Catalytic function

Q.60 **Which one of the following is the optimum pH of pancreatic lipase enzyme?** (MDCAT-2014)
A. 7.60
B. 9.00
C. 8.00
D. 9.70

Q.61 **Which one of the following graphs shows how the rate of reaction of pepsin is affected by pH?** (MDCAT-2019)

A. 
B. 
C. 
D. 

Q.62 **The temperature that promotes the maximum activity of enzyme is referred as:** (MDCAT-2018)
A. Fixed temperature
B. Controlled temperature
C. Optimum temperature
D. Active temperature

Q.63 **Which type of bonds is mostly affected in an enzyme molecule when there are pH fluctuations?** (AJK-2019)
A. Ionic bonds
B. Disulphide bonds
C. Hydrogen bonds
D. Peptide bond

Q.64 **Considering enzyme action, 'minimum temperature' is the term used when:** (NUMS-2022)
A. Enzymes start denaturing
B. Enzyme become hyperactive
C. Enzyme work at their best
D. Inactive enzyme getting reactivated

Q.65 **Which enzyme works in alkaline pH?** (NUMS-2022)
A. Pepsin
B. Sucrase
C. Enterokinase
D. Pancreatic lipase

Q.66 **The maximum enzymatic activity of trypsin is shown at:** (SZABMU-2022)
A. pH 2
B. pH 4
C. pH 6
D. pH 8

Q.67 **In term of enzyme action maximum temperature refers to a temperature at which:** (SZABMU-2022)
A. Enzymes start to denature
B. Enzymes start to re-nature
C. Enzymes work best
D. Enzymes are reactivated

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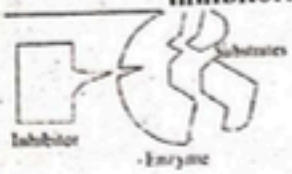
Q.68 Optimum pH for digestive enzymes of stomach is: (BUMHS-2022)
A. Highly acidic
B. Highly alkaline
C. Slightly acidic
D. Slightly alkaline

Q.69 Enzymes are generally inactivated rapidly by exposure to UV high and also α, β rays because it alters the: (DUHS-2022)
A. Quantity of enzyme
B. pH of enzyme
C. Shape of enzymes
D. Nature of enzyme

Q.70 The competitive inhibitors have structural similarity with: (MDCAT-2014)
A. Active site
B. Substrate
C. Binding site
D. Coenzyme

Q.71 This figure represents _____ inhibitor. (MDCAT-2019)



A. Non-competitive
B. Irreversible
C. Competitive
D. Isosteric

Q.72 Which of the following type of inhibitor can be neutralized by adding more substrate into reaction? (MDCAT -2017)
A. Irreversible inhibitor
B. Irreversible non-competitive
C. Reversible inhibitor
D. Irreversible competitive

Q.73 If molecule can bind to another site of the enzyme rather than the true active site, it is referred as _____. (MDCAT-2018)
A. Non-competitive inhibitors
B. Competitive inhibitors
C. Non-allosteric inhibition
D. Irreversible inhibition

Q.74 What is common in both competitive and non-competitive inhibition? (MDCAT-2019)
A. Irreversible inhibition
B. Reversible inhibition
C. Feedback inhibition
D. Non-Reversible inhibition

Q.75 A student of chemical engineering mistakenly engulfed the toxic compound 'A' which was a potent inhibitor of certain enzyme. He was immediately brought to hospital where the doctor injected intravenously substrate 'B' to minimize the toxic effect of compound 'A'. His life was saved from serious damages. The treatment method shows that compound 'A' was a _____ inhibitors. (MDCAT-2019)
A. Temperature sensitive
B. Irreversible
C. Competitive reversible
D. Non-competitive reversible

Q.76 Competitive inhibitors compete with: (UHS-2022)
A. Enzyme
B. Substrate
C. Product
D. Coenzyme

Q.77 Non-competitive inhibitor molecules have: (UHS-2022)
A. A similar structure to the normal substrate molecule
B. A quite different structure from the substrate molecule
C. A different conformation but fit into the active site
D. A similar conformation but does not fit into the active site

Q.78 _____ reduces the enzyme productivity by blocking the substrate from entering into the active site due to similar shapes. (SZABMU-2022)
A. Competitive inhibitors
B. Non-Competitive inhibitors
C. Co-enzymes
D. Activators

Q.79 Phosphatases belong to which group of the following? (ETEA-2019)
A. Lyases
B. Ligase
C. Hydrolases
D. None of the above

Q.80 NAD is an important? (UHS-2023)
A. Enzyme
B. Coenzyme
C. Hormone
D. Vitamin

Q.81 Non protein but inorganic detachable co-factor is called: (SZABMU-2023)
A. Activator
B. Prosthetic group
C. Co-enzyme
D. Apoenzyme

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Q.82 All of the following are related to enzymes except: (ETEA-2023)
A. Speed up reaction
B. Remain unchanged after reaction
C. Increase the activation energy
D. Possess the active site

Q.83 The coenzyme NAD is made up of: (ETEA-2023 Retake)
A. Vitamins
B. Amino acids
C. Nucleotides
D. Sugar

Q.84 What alters the shape of enzyme and makes them functional: (ETEA-2023 Retake)
A. Cofactor
B. Other enzymes
C. Proteins
D. Both A and C

Q.85 Enzymes are: (ETEA-2023 Retake)
A. Carbohydrates
B. Proteins
C. Lipids
D. Can be lipids or proteins

Q.86 What is 'flavin adenine dinucleotide'? (ETEA-2023 Retake)
A. Catalyst
B. Coenzyme
C. Cofactor
D. Enzyme

Q.87 The active sites of enzymes are composed of? (UHS-2023)
A. Few nucleotides
B. Few nucleosides
C. Few saccharides
D. Few amino acids

Q.88 Lock and Key Model for enzyme action proposed by Emil Fischer suggests that: (SZABMU-2023)
A. Enzymes are unbiased for the substrate
B. Enzymes can modify their active sites
C. Enzymes are restricted to one reaction type
D. An enzyme can catalyze variety of reactions

Q.89 Enzymes work by lowering the _____ of the reactions they catalyze: (SZABMU-2023)
A. Kinetic energy
B. Activation energy
C. Heat energy
D. Potential energy

Q.90 Select a regulatory enzyme: (SZABMU-2023)
A. Urease
B. Hexokinase
C. Maltase
D. Sucrase

Q.91 Which one of the following factors does not affect the rate of enzyme action? (ETEA-2023)
A. Temperature
B. Substrate concentration
C. Enzyme concentration
D. Water concentration

Q.92 Enzymes present in mammals work best at: (ETEA-2023)
A. 20°C
B. 30°C
C. 40°C
D. 50°C

Q.93 The optimal pH of lipase (pancreas) is: (ETEA-2023)
A. 4.0 - 5.0
B. 1.5 - 1.6
C. 8.0
D. 6.1 - 6.8

Q.94 Most enzymes work best at the following temperature: (NUMS-2023)
A. 30°C
B. 40°C
C. 50°C
D. 20°C

Q.95 In term of enzyme action, 'maximum temperature' refers to a temperature at which: (NUMS-2023)
A. Enzymes start to denature
B. Enzymes start to re-nature
C. Enzymes work best
D. Enzymes are reactivated

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Q.96 Adding substrates will not make a difference to the enzyme catalyzed reaction: (ETEA-2023 Retake)

A. When few enzyme molecules are left unsaturated
B. When the substrate cools down
C. When the substrate heats up
D. When many enzyme molecules remain unsaturated

Q.97 Competitive inhibitors are _____. (UHS-2023)

A. Homologous to substrate
B. Analogous to substrate
C. Smaller than substrate
D. Larger than substrate

Q.98 _____ reduce the enzyme productivity by blocking the substrate entering into the active site due to similar shapes. (NUMS-2023)

A. Competitive inhibitors
B. Non-competitive inhibitors
C. Co- enzymes
D. Activators

Q.99 Non- competitive inhibitors react with enzymes at: (NUMS-2023)

A. Allosteric site
B. Active site
C. Passive site
D. Regulatory site

Q.100 An example of competitive inhibitor molecule is: (ETEA-2023)

A. Insecticide
B. Sulphonamide
C. Cyanide
D. Metal ions

Q.101 The inhibition, in which the inhibitor does not combine directly with the enzyme but binds to the enzyme substrate complex is called: (ETEA-2023)

A. Reversible inhibition
B. Competitive inhibition
C. Non-competitive inhibition
D. Uncompetitive inhibition

Q.102 Which of the following is an example of hydrolase? (ETEA-2023 Retake)

A. Transmethylase
B. Oxygenase
C. Phosphatase
D. Peroxidase

Q.103 The enzymes enable the conversion of substrates into products by: (KMU-2024)

A. Changing equilibrium in the direction of the substrate
B. Increasing the activation energy
C. Increasing the substrate concentration.
D. Lowering the activation energy

Q.104 A covalently bonded inorganic ion to protein part of enzyme is termed as: (SZAMBU-2024)

A. Coenzyme
B. Holoenzyme
C. Apoenzyme
D. Prosthetic group

Q.105 Activation of all the following enzymes need a regulatory molecule except: (NUMS-2024)

A. Pepsinogen
B. Trypsinogen
C. Erypsin
D. Chymotrypsinogen

Q.106 Which property of enzyme is helpful to carry out metabolic activities at room temperature? (SZAMBU-2024-Reconduct)

A. Not sensitivity to pH
B. Does not change the speed of reaction
C. Highly specific
D. Required in large quantities

Q.107 Induced fit model of enzyme activity suggests that an enzyme: (UHS-2024)

A. Cannot modify its active sites
B. Can bind to a single substrate
C. Can catalyze related reaction
D. Usually belong to non-regulatory enzyme

Q.108 What happens to the enzyme after an enzyme-catalyzed reaction? (KMU-2024)

A. Reduced to inactive form
B. Becomes inert
C. Changes into substrate
D. Used for another reaction

Q.109 The Lock and Key Model (1894) was modified by: (SZAMBU-2024)

A. Emil Fischer
B. Koshland
C. Kuhne
D. Camillo Golgi

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Q.110 **An enzyme is capable of acting on a wide range of related substrates. Which of the following is a property of this enzyme?** (NUMS-2024)
A. Inflexible active size
B. Regulatory enzyme
C. Non-regulatory enzyme
D. Highly specific enzyme

Q.111 **All of the following are the postulates of lock and key model, except:** (SZAMBU-2024-Reconduct)
A. Active site has a rigid structure
B. Enzymes are non-regulatory
C. One specific key can only open specific lock
D. Substrate combines with an enzyme to induce change in enzyme structure

Q.112 **Which of the following statement is incorrect regarding rate of enzymatic action?** (UHS-2024)
A. Increase in enzyme concentration increases the rate
B. Increase in enzyme concentration reduces the rate
C. All enzymes work at their maximum rate at optimum
D. All enzymes work at their maximum rate at optimum pH temperature

Q.113 **Catalase can be activated at pH:** (KMU-2024)
A. 1
B. 3
C. 5
D. 7

Q.114 **Optimum pH for pancreatic lipase is:** (KMU-2024)
A. 2
B. 4
C. 6
D. 8

Q.115 **Enzymatic activity can be inhibited by:** (KMU-2024)
A. Heavy metal ions
B. Methane
C. Mutase
D. Noble gases

Q.116 **A competitive inhibitor:** (KMU-2024)
A. Accelerates the chemical reaction
B. Competes with the enzyme
C. Is irreversible
D. Is reversible

Q.117 **Cyanides attached to enzymes by forming a covalent bond. These come under category of:** (SZAMBU-2024)
A. Reversible inhibitors
B. Irreversible inhibitors
C. Non-competitive inhibitors
D. Competitive inhibitors

Q.118 **Which enzyme is secreted in the active form?** (KMU-2024)
A. Amylase
B. Trypsin
C. Pepsin
D. Chymotrypsin

Q.119 **Ions of heavy metal are harmful for living organisms because of their ability to:** (NUMS-2024)
A. Cleave nucleic acid
B. Interfere with fat metabolism
C. Break glycosidic bonds
D. Destabilize proteins

Q.120 **Enzyme catalase protects the plant cell from:** (NUMS-2024)
A. Dehydration
B. Photorespiration
C. Toxic effect of alcohol metabolism
D. Protein loss

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ANSWER KEY

PRACTICE EXERCISE

1	B	11	B	21	A	31	B	41	A
2	B	12	C	22	D	32	C		
3	D	13	C	23	C	33	C		
4	A	14	D	24	C	34	B		
5	A	15	C	25	B	35	B		
6	C	16	C	26	A	36	A		
7	A	17	C	27	A	37	D		
8	D	18	B	28	A	38	C		
9	D	19	A	29	B	39	B		
10	C	20	C	30	C	40	C		

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42	D	52	A	62	C	72	C	82	C	92	C	102	C	112	B
43	B	53	C	63	A	73	A	83	C	93	C	103	D	113	D
44	B	54	C	64	D	74	B	84	A	94	B	104	D	114	D
45	C	55	A	65	D	75	C	85	B	95	C	105	C	115	A
46	B	56	A	66	D	76	B	86	B	96	A	106	C	116	D
47	B	57	A	67	A	77	B	87	D	97	A	107	C	117	B
48	B	58	B	68	A	78	A	88	C	98	A	108	D	118	A
49	C	59	D	69	D	79	C	89	B	99	A	109	B	119	D
50	D	60	B	70	B	80	B	90	B	100	B	110	C	120	C
51	A	61	D	71	A	81	A	91	D	101	D	111	D		

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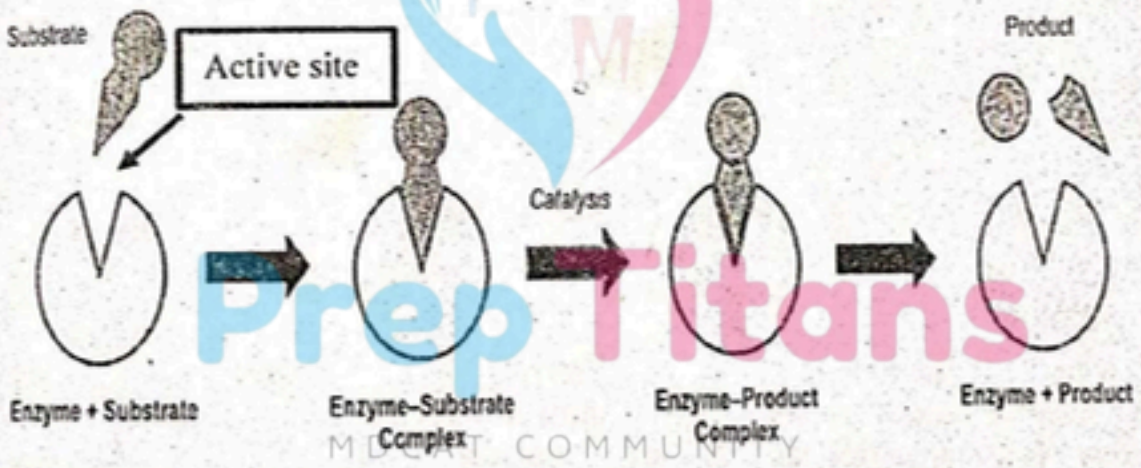
EXPLANATORY NOTES

PRACTICE EXERCISE

1. The biological processes that occur within all living organisms are chemical reactions, and enzymes regulate most. In the presence of enzymes, these chemical reactions carried out at faster rate, while in the absence they will slow down.
2. Enzymes are the biological catalysts, which speed up rate of chemical reaction by lowering energy of activation.
3. Breathing (or ventilation) is the process of moving air out and in the lungs to facilitate gas exchange with the internal environment, mostly to flush out carbon dioxide and bring in oxygen. There is no involvement of any enzyme to carry out breathing.
4. Enzymes are the biological catalyst, which speed up rate of chemical reaction by lowering energy of activation.
5. The membrane-bound organelles contain a variety of enzymes called hydrolases that can digest proteins, nucleic acids, lipids, and complex sugars. But many enzymes are present in cytoplasm of cell.
6. Fatty acid metabolism is the function of mitochondria, while synthesis of lipids is the function of SER.
7. Co-factors are non-protein parts that are required for proper functioning of enzyme but some enzymes such as pepsin do not require co-factors.
8.



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9. A co-factor is a non-protein chemical that assists with a biological chemical reaction. Co-factors may be metal ions, organic compounds, or other chemicals that have helpful properties. They are non-protein part of enzymes.
10.

Apoenzyme	An enzyme without its non-protein part.
Coenzyme	If non-protein part loosely attached to protein part of enzyme. It is organic in nature.
Activator	If non-protein part loosely attached to protein part of enzyme. It is inorganic in nature.
Prosthetic group	If non-protein part covalently attached to protein part of enzyme.

11.

Co-factor	Non-protein chemical that assists with a biological chemical reaction. It may be organic or inorganic.
Coenzyme	If non-protein part loosely attached to protein part of enzyme. It is organic in nature.
Activator	If non-protein part loosely attached to protein part of enzyme. It is inorganic in nature.
Prosthetic group	If non-protein part covalently attached to protein part of enzyme.

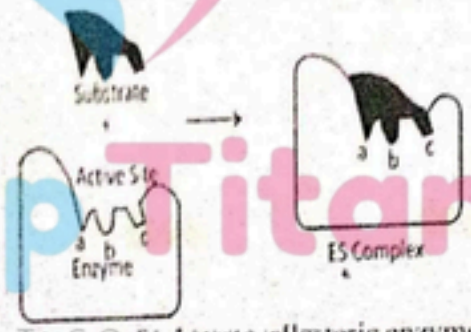
12. During the conversion of the succinic acid into fumaric acid, FAD' is reduced by gaining two hydrogen atoms from succinic acid, which are liberated by succinate dehydrogenase.

13. Inorganic co-factors are activators while organic co-factors may be coenzymes or prosthetic group.

14. **Peptidyl transferase** connects two amino acids by formation of peptide bond during translation process. It is a catalytic RNA.
- **Amylopsin**: is an enzyme of the pancreatic juice that converts starch into sugar.
- **Arginase**: catalyzes the fifth and final step in the urea cycle, a series of biochemical reactions in mammals during which the body disposes of harmful ammonia.
- **Bam H1**: is a type II restriction endonuclease, having the capacity for recognizing short sequences (6 bp) of DNA and specifically cleaving them at a target site.

15. Active site contains two sites binding site and catalytic site. Binding site is responsible for the formation of ES complex. After the formation of this complex catalytic site is activated and it converts ES complex into products.

16.

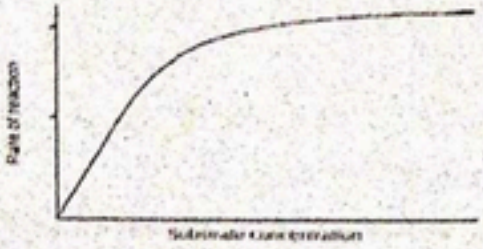


17. Along the active site for the attachment of substrate, allosteric enzymes also have another site where a molecule that is not a substrate may bind and regulate the enzyme action.

18. The working of non-regulatory enzymes such as sucrase and maltase is best explained by Lock and key model, due to their specificity of substrate and reaction.

19. Addition of more substrate molecules will replace inhibitors, and will bind with the active site of the enzyme and results in increase in rate of reaction.

20.



21. Optimum pH for the catalytic activity of enterokinase is 5.50, which is slightly acidic.

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22. Change in pH causes the imbalance of H^+/OH^- ions, which causes the ionization of amino acids at the active sites and substrate as well.
23. The optimum temperature for the enzymes in human body is 37°C. When the temperature is increased from 30°C, the rate of reaction is also increased. At 37°C, the rate of reaction is maximum. If the temperature further increases, the rate of reaction decreases due to denaturation of enzymes at high temperature.
24. Rate of reaction effects by substrate concentration, temperature, pH and enzyme concentration.
25. All body parts have optimum temperature around 37°C but spermatogenesis takes place at 35°C which means that the enzymes found in testes can work optimally at 35°C.
26. All enzymes in human body work at optimum temperature of 37°C with exception of testes. The pH for all enzymes is different such as pepsin works best at pH 2 while salivary amylase works best at pH 6.80.
27. Enzymes are protein in nature and different types of bonds (Hydrogen and Ionic) maintain their structure. Rise in temperature from optimum breaks hydrogen bonds while change in pH disturbs ionic bonds.
28. Penicillin inhibits formation of cell wall and bacteria are unable to undo effect of penicillin so it is categorized as irreversible inhibitor.
29. Sucrose is a carbohydrate. It is a substrate for enzyme but it does not act as inhibitor for any enzyme. ATP is non-competitive inhibitor for phosphofructokinase.
30. Oxidoreductases catalyze oxidation/reduction of their substrate and act by removing or adding electron or H^+ ions from or to substrate. Cytochrome oxidase oxidizes cytochromes.
31. Formation of fructose 6-phosphate from glucose 6-phosphate is a glycolytic pathway reaction and is catalyzed by phosphoglucoisomerase. Glucose and fructose are isomers to each other so an enzyme that catalyzes this reaction is classified as Isomerase.
32. Prosthetic group is permanent part of enzyme that is covalently bonded.
33. Vitamin B3 is nicotinamide/ niacin which forms NAD^+.
34. Holoenzyme (Activated Enzyme) – Co-Factor = Apoenzyme (Inactive Enzyme)
35. Chloride ions (Cl-) act as an activator for salivary amylase, enhancing its ability to break down starches into simpler sugars.
36. Each enzyme molecule converts 2 substrate molecules in 5 minutes. With 10 enzyme molecules and 25 substrates, 20 substrates will be converted, leaving 5 unreacted substrates, while enzymes remain unchanged.
37. • Lipase acts on different kinds of lipids.
    • Nuclease acts on nucleic acids whether DNA or RNA.
    • Pepsin acts on different kinds of proteins.
    • Sucrase acts only on sucrose.
38.

Lock & Key Model	Induce Fit Model
• Enzyme is rigid structure.	• Enzyme is flexible structure.
• Enzyme does not show change during reaction.	• Enzyme shows change during reaction.

39. The binding site is the region where the substrate binds to the enzyme, forming the enzyme-substrate (ES) complex before catalysis.
40. Precursor activation is a mechanism where an enzyme is activated by intermediate substances within a biochemical pathway.
41. Sucrase works optimally at a pH of around 4.50, which is near found in the small intestine.

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42. Enzymes are composed of hundreds of amino acids joined together and coiled upon themselves to form a globular structure.
43. A substrate is a molecule acted upon by an *enzyme*. When substrates bind to enzymes, they undergo an enzyme induced chemical change, and are converted to products.
44. Enzymes are globular proteins, which act as biocatalyst and speed up biochemical reactions and their presence does not affect the nature of properties of end product/s.

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45. The minimum amount of energy requires to start a chemical reaction is called activation energy. Enzymes speed up reaction by lowering its activation energy.

46. All enzymes are protein in nature. They have tertiary structure. Specific arrangement of amino acids is common in enzymes.

47. Metal ions are acted as activators. Zinc ion is a metallic ion, it acts as bridge between enzyme and substrate.

48. The detachable co-factor is known as an activator if it is an inorganic ion. If the non-protein part is covalently bonded, it is known as a prosthetic group. If it is loosely attached to the protein part, it is known as coenzyme. Enzyme with its co-factor is removed is called apoenzyme.

49. Some enzymes use metal ions as co-factors like Mg^{+2}, Fe^{+2}, Cu^{+2}, Zn^{+2} etc. The detachable co-factor is known as an activator if it is an inorganic ion.

50. Some enzymes have a non-protein part known as a co-factor, which is essential for the proper functioning of the enzymes. The co-factor usually acts as 'bridge' between the enzyme and its substrate.

51. According to induce fit model, when a substrate combines with an enzyme, it induces changes in the enzyme structure. The change in structure enables the enzyme to perform its catalytic activity more efficiently.

52. Modified form of lock and key model is called induced fit model, which was proposed by D. Koshland. According to this model, when a substrate combines with an enzyme, it induces changes in the enzyme structure.

53. When enzyme molecules increase there will be more active sites available for the binding of more substrates, due to which reaction rate will further increase.

54. According to lock and key model, every enzyme is specific due to its active site for its substrate. Therefore, every enzyme can convert only its specific substrate into product.

55. Enzymes have a small restricted portion that have catalytic activity. It is referred as active site. At this portion substrate is attached and converted into product.

56. Different amino acids are specifically arranged into active site. Their number varies from 3 to 12 amino acids. For example, aldolase consists of glycine, histidine and alanine amino acids at active site.

57. Enzymes lowers activation energy by changing conditions within the active site.

58. One of the unique features of enzymes is lowers the activation energy. In this way, chemical is become speed up.

59. Active site has two sites i.e. binding site and active site. First substrate attaches with binding site then it brings conformational changes in active site and induces enzyme to perform its catalytic activity.

60. Optimum pH values for the catalytic activity of catalase, chymotrypsin, pancreatic lipase and Arginase are 7.60, 7.00-8.00, 9.00 and 9.70, respectively.

61. Every enzyme work best at its optimum pH. Pepsin optimum pH is 2. In the pH above 2, pepsin will be denatured.

62. All enzymes can work at their maximum rate at a specific temperature called as optimum temperature. For enzymes of human body, 37°C is the optimum temperature.

63. Hydrogen bond will have affected due to increase in temperature than optimum value, while change in pH will affects ionic bond.

64. The least amount of temperature that is required to activate a temperature-inactivated enzyme is called as minimum temperature.

65. Pepsin, sucrase, and enterokinase work in acidic medium, while pancreatic lipase is secreted in small intestine. It works in alkaline medium (pH=9.00).

66.

Enzymes	pH
Pepsin	2
Sucrase	4.50
Salivary amylase	6.80

67. Maximum temperature is a special temperature for an enzyme at which hydrogen bindings are broken down.

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68. Stomach normally digests proteins. It has acidic medium. It secrets gastric juice which contains HCl. HCl lowers the stomach's pH and activates the inactive pepsinogen into pepsin.
69. Enzymes are consisted of amino acids. Radiation such as UV, alpha and beta rays denature the protein structure in enzymes.
70. Non-competitive reversible inhibitors block allosteric site of enzyme while competitive reversible inhibitors have structural similarity with substrate and they bind active site of enzyme.
71. Non-competitive inhibitor binds allosteric site of enzyme rather than active site.
72. Reversible inhibitors can form weak linkages with the enzyme. Their effect can be neutralized completely or partly by an increase in the concentration of the substrate.
73. Non-competitive reversible inhibitor blocks allosteric site of enzyme while competitive inhibitor has structural similarity with substrate and they bind active site of enzyme.
74. Both competitive and non-competitive inhibitors are types of reversible inhibitor and their effect can be neutralizing by adding small amount of substrate.
75. Reversible inhibitors form weak linkages with the enzyme. Their effect can be neutralized completely or partly by an increase in the concentration of the substrate. Since the student was recovered after injected substance 'B', it means that substance 'B' is the original substrate of that enzyme which has been competitively blocked by substance 'A'.
76. Competitive inhibitor has structural similarity with substrate. That's why it attaches with active site and blocks it for substrate.
77. Non-competitive inhibitor structurally differs from substrate. And it attaches to allosteric site of enzyme (other than active site).
78. Non-competitive inhibitors do not bind at active site. If co-factor attaches loosely with enzyme, referred as co-enzyme. Metal ions which act as co-factors are referred as activators.
79. Lyases and ligases are enzymes involved in catalyzing biochemical reactions. The main difference between lyases and ligases is that lyases break chemical bonds in order to form new compounds whereas ligases form chemical bonds in order to combine different compounds.
80. NAD (Nicotinamide Adenine Dinucleotide) acts as a coenzyme in redox reactions, assisting dehydrogenase enzymes in electron transfer.
81. Activators are inorganic ions that temporarily bind to an enzyme to enhance its activity, unlike prosthetic groups, which are permanently attached.
82. Enzymes are the biological catalysts which speed up the rate of reaction. They increase the rate of reaction by lowering the need of activation energy. So, all options are correct except increase the activation energy.
83. NAD consists of two nucleotides—one containing adenine and the other nicotinamide—linked through phosphate groups.
84. Cofactors (inorganic ions) and proteins (apoenzymes) are essential for an enzyme's proper conformation and functionality.
85. Most enzymes are globular proteins that act as biological catalysts, although some RNA molecules (ribozymes) also exhibit enzymatic activity.
86. FAD is a coenzyme involved in oxidation-reduction reactions, accepting and donating electrons in metabolic pathways like the Krebs cycle.
87. The active sites consists of specific amino acid residues that create a unique three-dimensional shape essential for substrate binding.
88. According to the Lock and Key model, enzymes have a specific active site that perfectly matches only one type of substrate.
89. Enzymes speed up reactions by lowering the activation energy, making it easier for reactants to convert into products.
90. Hexokinase is a regulatory enzyme that controls the first step of glycolysis by phosphorylating glucose.
91. While temperature, enzyme concentration, and substrate concentration affect enzyme activity, water concentration does not directly impact enzyme action.
92. Enzymes in mammals work best at around 37-40°C, which is close to normal body temperature.
93. Pancreatic lipase functions optimally at an alkaline pH of around 8.0, as it acts in the small intestine.

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94. Most enzymes in the human body exhibit peak activity at around 40°C before denaturing at higher temperatures.
95. The maximum temperature refers to the optimal temperature at which an enzyme exhibits the highest activity before denaturation starts.
96. When all enzyme molecules are bound to substrates, adding more substrate does not increase the reaction rate.
97. Competitive inhibitors resemble the substrate's shape, allowing them to compete for the active site of the enzyme.
98. Competitive inhibitors mimic the substrate and bind to the active site, blocking the enzyme's function.
99. Non-competitive inhibitors bind to an allosteric site, altering the enzyme's shape and reducing activity.
100. Sulphonamides act as competitive inhibitors by blocking bacterial folic acid synthesis.
101. In uncompetitive inhibition, the inhibitor binds only to the enzyme-substrate complex, preventing product formation.
102. Phosphatases are hydrolase enzymes that catalyze the removal of phosphate groups from molecules using water.
103. Enzymes speed up reactions by reducing the activation energy required for a reaction to proceed.
104. A prosthetic group is a tightly bound inorganic ion or molecule that is permanently attached to the enzyme.
105. Erypsin (a type of peptidase) does not require a regulatory molecule for activation, unlike the other options, which are zymogens.
106. Enzymes are highly specific to their substrates, which allows them to catalyze reactions efficiently at room temperature.
107. The induced fit model suggests that enzymes can slightly change their active site shape to accommodate substrates with similar structures.
108. Enzymes are not consumed in reactions and can be reused for multiple catalytic cycles.
109. Daniel Koshland proposed the induced fit model as a modification of the Lock and Key model.
110. Non-regulatory enzymes can act on a broader range of related substrates, unlike highly specific enzymes.
111. The Lock and Key model suggests a rigid active site, unlike the Induced Fit model, where the enzyme structure adapts to fit the substrate.
112. Increasing enzyme concentration generally increases the reaction rate, provided that substrate concentration is not limiting.
113. Catalase functions optimally at a neutral pH of around 7.
114. Pancreatic lipase operates best at an alkaline pH of 8, as it functions in the small intestine.
115. Heavy metal ions inhibit enzymatic activity by binding to the enzyme and disrupting its structure.
116. Competitive inhibition is reversible because the inhibitor competes with the substrate for the active site.
117. Competitive inhibition is reversible because the inhibitor competes with the substrate for the active site.
118. Amylase is secreted in its active form, unlike proteases, which are secreted as inactive zymogens.
119. Heavy metal ions disrupt enzyme and protein function by binding to sulfhydryl (-SH) groups, leading to protein denaturation.
120. Catalase breaks down hydrogen peroxide, a harmful byproduct of alcohol metabolism, into water and oxygen, protecting the cell.

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8 TOPIC EVOLUTION

PRACTICE EXERCISE

Q.1 **Series of changes in the genetic composition of a population over time is called:**
A. Revolution
B. Population genetics
C. Evolution
D. Succession

Q.2 **Product of evolution is:**
A. Ecosystem
B. Community
C. Biome
D. Species

Q.3 **Who developed a theory of natural selection essentially identical to Darwin's?**
A. Hardy-Weinberg
B. Malthus
C. Alfred Wallace
D. Lyell

Q.4 **All of the following are related to evolution except:**
A. Change over time
B. Muscle hypertrophy
C. Antibiotic resistance in bacteria
D. Origin of new species

Q.5 **Which one of the following statements is correct?**
A. There is no evidence of the existence of gills during embryogenesis of mammals
B. All plant and animal cells are totipotent
C. Ontogeny repeats phylogeny
D. Stem cells are specialized cells

Q.6 **He was not vocal for the idea of evolution:**
A. Aristotle
B. Lamarck
C. Linnaeus
D. Darwin

Q.7 **It is not true about evolution:**
A. It is a slow and continuous process
B. Evolution doesn't leave observable signs
C. Evolution transforms life on earth
D. Evolutionary relationships among organisms are reflected in their DNA

Q.8 **Life started about:**
A. 1.5 billion years ago
B. 2.5 billion years ago
C. 3.5 billion years ago
D. 4 billion years ago

Q.9 **Lamarck presented a mechanism to explain:**
A. How earth formed
B. How specific adaptations evolved
C. How life started
D. How life changed

Q.10 **Which statement is contradictory to Lamarckism?**
A. Acquired characteristics can be passed to offspring
B. Extensive usage causes hypertrophy
C. Disuse causes atrophy
D. Acquired characteristics can't be inherited

Q.11 **Which of the following is not an example of disuse of organs?**
A. Snake's feet
B. Shedding of teeth
C. Muscle atrophy
D. Movement of ear

Q.12 **Which is not related to the idea of use and disuse?**
A. Extensively used body parts become longer and strong
B. Disused body parts deteriorated
C. Bigger bicep of black smith
D. Different type of beaks present in finches

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Q.13 First ever theory which explained evolution as a process is:
A. Darwinism
B. Haeckelism
C. Wallaceism
D. Lamarckism

Q.14 Unique fauna was observed by Darwin in:
A. Ecuador
B. Bahamas
C. Galapagos
D. Maldives

Q.15 Darwin perceived origin of new species and _____.
A. Fixation
B. Stabilization
C. Adaptation
D. Maladaptation

Q.16 What is the perception of Darwin about unity of life?
A. All organisms descent from a common ancestor
B. All organisms are created specially by a divine force
C. All organisms share a common biological composition
D. All organisms arise from nonliving things

Q.17 Over production of individuals leads to the _____ amongst the members of a population.
A. Harmony
B. Variations
C. Competition
D. All A, B, C

Q.18 According to Darwin _____ become better adapted to local environment through natural selection.
A. Regional community
B. Ecosystem
C. Population
D. Flora

Q.19 Survival is only for the fittest is true for:
A. Artificial selection
B. Descent with modification
C. Natural selection
D. Revolution

Q.20 Survival in the struggle for existence depends upon:
A. Physical environment
B. Hereditary constitution
C. Chemical constituents
D. Environmental resources

Q.21 Which one is related to natural selection?
A. More people → more resources → no competition
B. More people → less resources → more competition
C. Less people → more resources → no competition
D. Less people → less resources → no competition

Q.22 Darwin's theory of evolution was mainly based on the evidences from:
A. Geographical distribution and fossil record
B. Fossil record and Embryology
C. Geographical distribution and comparative anatomy
D. Paleontology and Geology

Q.23 Over many years two population could become dissimilar enough to be designated as separate species that is applied upon:
A. Galapagos finches
B. Giant turtle
C. Black smith bicep
D. Giraffe neck

Q.24 Neo-Darwinism has integrated discoveries and ideas from all except:
A. Taxonomy
B. Genetics
C. Paleontology
D. Serology

Q.25 Neo-Darwinism is:
A. Darwinism + Lamarckism
B. Darwinism + Mendelism
C. Darwinism + Haeckelism
D. Lamarckism + Mendelism

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Q.26 **The finches of Galapagos Islands provide evidence in favour of:**
A. Evolution due to mutation
B. Evolution due to biogeography
C. Retrogressive evolution
D. Special creation

Q.27 **Modern biological sciences suggest that _____ are the ancestors of all life forms.**
A. Protists
B. Prokaryotes
C. Protozoans
D. Parazoans

Q.28 **_____ provides a visual record in a complex series showing the evolution of an organism.**
A. Comparative anatomy
B. Comparative embryology
C. Fossils record
D. Electron microscopy

Q.29 **The presence of gill slits, in the embryos of all vertebrates, supports the theory of:**
A. Metamorphosis
B. Recapitulation
C. Organic evolution
D. Biogenesis

Q.30 **Which is not a character of fossils?**
A. Actual remains of ancient organisms
B. Living
C. Traces of ancient organisms
D. May be embedded in sand, resin or ice

Q.31 **Functionally different but structurally alike organs are:**
A. Analogous
B. Homologous
C. Anomalous
D. Cosmopolitan

Q.32 **Analogous organs help organism to live in:**
A. Same habitat
B. Different biomes
C. Different habitats
D. Environment

Q.33 **Which one of the following statement cannot be used to describe a species?**
A. A group with similar autosomes
B. A group with analogous structures
C. A group capable of producing viable off springs
D. A group sharing same niche

Q.34 **When two species of different genealogy come to resemble each other as a result of adaptation, the phenomenon is termed as:**
A. Microevolution
B. Convergent evolution
C. Co-evolution
D. Divergent evolution

Q.35 **The actual remains or traces of organisms that lived in ancient geological times:**
A. Vestigial remains
B. Fuel
C. Fossils
D. Analogous organs

Q.36 **In humans gill pouches have modified into:**
A. Nose
B. Eustachian tubes
C. Ear
D. External ear

Q.37 **Forelimbs of man, horses and whales show:**
A. Analogous organs
B. Divergent evolution
C. Chemical evolution
D. Convergent evolution

Q.38 **'Evolution is a remodeling process'. This statement is supported by:**
A. Biogeography
B. Comparative physiology
C. Comparative anatomy
D. Molecular biology

Q.39 **The comparative embryology of all vertebrates shows presence of:**
A. Hairs
B. Gill pouches
C. Scales
D. Fins

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Q.40 **Fossils are most likely to be present in:**
A. Sedimentary rocks
B. Metamorphic rocks
C. Igneous rocks
D. Shower curtains

Q.41 **For evolution, the important requirement is:**
A. Heritable variations
B. Use & disuse of organs
C. Non-heritable variations
D. Developmental anatomy

Q.42 **Evolutionary relationships among species are reflected in their:**
A. Behaviors
B. Genes & gene products
C. Differences of DNA
D. Mutations

Q.43 **Basic idea of evolution is:**
A. Cosmic evolution
B. Spontaneous generation
C. Special creation
D. Descent with modification

Q.44 **Comparative anatomy supports that evolution is a _____ process in which ancestral structures that functioned in one capacity become modified as they take on new function.**
A. Continuous
B. Discontinuous
C. Remodeling
D. Complete

Q.45 **Doctrine of evolution is concerned with:**
A. Biogenesis
B. Abiogenesis
C. Gradual changes
D. Special creation theory

Q.46 **Which of the given statement is wrong as per the 'theory of Special Creation'?**
A. All living organism created as such
B. Earth is about 4000 years old
C. Diversity change as time changes
D. Human is novel creation

Q.47 **The finches of Galapagos islands provide an evidence in favor of:**
A. Evolution due to mutation
B. Retrogressive evolution
C. Biogeographical evolution
D. Special creation

Q.48 **Neo Darwinism describes the role of _____ in explaining how evolution works.**
A. Biochemistry
B. Cell biology
C. Paleontology
D. Genetics

Q.49 **Which of the following is the latest evolved group?**
A. Amphibians
B. Reptiles
C. Aves
D. Mammals

Q.50 **Which of the following is not vestigial structure?**
A. Ear of humans
B. Coccyx
C. 2nd molar of humans
D. Vermiform appendix

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Q.51 The term 'survival of the fittest' was used by: (ETEA-2022)
A. Lamarck
B. Darwin
C. Herbert Spencer
D. Mayr

Q.52 This theory says that mitochondria and chloroplasts are in fact ancient bacteria which now live inside the larger cells. (PMC 2020)
A. Darwin's theory of evolution
B. Neo Darwinism
C. Lamarckism
D. Endosymbiont theory

Q.53 Adaptations that an organism acquires by its own actions during its life span without modifying its genome are: (UHS-2022)
A. Heritable
B. Non-heritable
C. Can be made heritable through some modification
D. Sometimes heritable and other times non-heritable

Q.54 According to the theory of natural selection, organisms produce: (MDCAT 2017)
A. More offspring than supported
B. Less offspring than supported
C. Offspring according to the resources available
D. Offspring to create resources

Q.55 _____ occurs because natural selection gives some alleles a better chance of survival than others. (PMC 2020)
A. Fitness
B. Crossing over
C. Evolution
D. Artificial selection

Q.56 The animal species on Galapagos resemble species living on the: (UHS-2022)
A. Northern Europe
B. Great Britain
C. North American mainland
D. South American mainland

Q.57 He presented the theory of 'origin of species by means of natural selection: (NUMS-2022)
A. Lamarck
B. Linnaeus
C. Hardy-Weinberg
D. Darwin

Q.58 The raw material that is used by natural selection for better survival is/are: (ETEA-2022)
A. Variation only
B. Mutation only
C. Similarity only
D. Variation and mutation

Q.59 A small biological unit that can evolve over time is_____. (BUMHS-2022)
A. A specie
B. A population
C. An organism
D. Cell

Q.60 Who held to the concept of unity of life? (DUHS-2022)
A. Aristotle
B. Lamarck
C. Darwin
D. Alfred

Q.61 Evolution is transformation of the form and mode of existence of an organism in such manner that the descendants differ from their ancestor, according to:
A. Weismann
B. Lamarck
C. Mendel
D. Darwin

Q.62 Vestiges of vestigial organs are those organs which have ceased to be of any use in their possessor but they persist to reduce from generation after generation. In man, they are: (KMDC 2014)
A. Vermiform appendix
B. Coccyx
C. Nictitating
D. All A, B, C

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Q.63 The organs which are similar in function but different in structure, are called: (PMC 2020)
A. Analogous organs
B. Convergent evolution
C. Homologous organs
D. Divergent evolution

Q.64 For evolutionary process to occur, which of the following is not a geographical barrier? (UHS-2022)
A. Ocean
B. River
C. Mountains
D. Atmosphere

Q.65 Among the oldest known fossils comes the: (SZABMU-2022)
A. Prokaryotes
B. Amphibians
C. Reptiles
D. Fishes

Q.66 The Archaeopteryx is a fossil bird which possesses the characters of both: (ETEA-2022)
A. Fishes and amphibians
B. Amphibians and reptiles
C. Reptiles and birds
D. Birds and mammals

Q.67 Presence of remnant of pelvic girdle in whale and snake although they never have legs show evidence from: (DUHS-2022)
A. Biochemical evidence
B. Paleontology
C. Vestigial organs
D. Embryology

Q.68 Artificial selection in breeding provides evidence for evolution is known as: (DUHS-2022)
A. Domestication
B. Deme
C. Gene pool
D. Desired trait

Q.69 The organs perform same functions in different groups of organisms but are different in this internal structure called as: (DUHS-2022)
A. Homologous organs
B. Analogous organs
C. Radial symmetry
D. Asymmetry

Q.70 A general formula is derived by one of the following scientist for calculating the frequencies of alleles and genotypes in population at equilibrium: (SZABMU-2023)
A. Linnaeus
B. Lamarck
C. Darwin
D. Hardy Weinberg

Q.71 According to evolutionary studies, prokaryotes may have arisen around: (UHS-2023)
A. 2.5 billion years ago
B. 3.5 billion years ago
C. 4.5 billion years ago
D. 5.5 billion years ago

Q.72 When humans purposefully apply selection pressure to populations, the process is known as: (SZABMU-2023)
A. Natural selection
B. Artificial selection
C. Evolution
D. Genetic drift

Q.73 Which of the following is not an example of disuse of organs? (UHS-2023)
A. Snake's legs
B. Shedding of milk teeth
C. Muscle atrophy
D. Movement of ear

Q.74 Who proposed the concept that an organism can pass on acquired modifications to its offspring? (ETEA-2023 Retake)
A. Lamarck
B. Darwin
C. Malthus
D. Aristotle

Q.75 Which of the following is the main point of Darwinism? (UHS-2023)
A. Over production
B. Variation
C. Disuse of organ
D. Perceived unity of life

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Q.76 **Which statement is not correct for the Darwin's theory of natural selection?** (SZABMU-2023)
A. Survival in the struggle for existence is random
B. The fit individuals leave more off springs into their environment
C. The unequal ability of individuals to survive and reproduce will lead to a gradual
D. Accumulation over the generations thus leading to the evolution of a new species

Q.77 **According to Neo-Darwinism, which of the following is a cause of evolution?** (ETEA-2023 Retake)
A. Reproductive isolation
B. Infinite large population
C. Environmental stability
D. Both A and B

Q.78 **Darwin's 'Origin of species by natural selection' is mainly concerned with:** (ETEA-2023 Retake)
A. Origin of life
B. Adaptation
C. Extinction
D. Speciation

Q.79 **Which of the following type of organs are supposed to be functional in ancestral species rather than in present day species:** (UHS-2023)
A. Vestigial organs
B. Homologous organs
C. Analogous organs
D. Embryonic organs

Q.80 **All of the following paired organs/structures have homology except:** (ETEA-2023)
A. Human hand: Bat's wing
B. Bat's wing: Wings of butterfly
C. Horse front leg: Front flappers of whale
D. Wings of bird: wings of flying lizards

Q.81 **Identify fossil bird among the following:** (ETEA-2023)
A. Equus
B. Python
C. Archaeopteryx
D. Dawn horse

Q.82 **This theory states that 'mitochondria and chloroplasts are, in effect, ancient bacteria which now live inside the larger cells':** (NUMS-2023)
A. Darwin's theory of evolution
B. Lamarckism
C. Neo- Darwinism
D. Endosymbiont hypothesis

Q.83 **The organs which are similar in functions but differ in structure are called:** (NUMS-2023)
A. Analogous organs
B. Homologous organs
C. Convergent organs
D. Divergent organs

Q.84 **Who formulated the principle that "ontogeny recapitulates phylogeny"?** (ETEA-2023)
A. Von Bear
B. Haekel
C. Herbert Spencer
D. Darwin

Q.85 **According to endosymbiosis theory, flagella may have derived by the ingestion of prokaryotes similar to:** (UHS-2024)
A. Amoeboid prokaryote
B. Aerobic bacterium
C. Spirochete
D. Spirillum

Q.86 **The idea of inheritance of acquired characteristics was presented by:** (UHS-2024)
A. Jean Baptist Lamarck
B. Charles Darwin
C. Thomas Malthus
D. Alfred Wallace

Q.87 **According to Lamarckism, the basis of evolution is:** (KMU-2024)
A. Inheritance of acquired characteristics
B. Mutation
C. Natural selection
D. Survival of the fittest

Q.88 **Children of a mason do not inherit strong muscles developed by father due to hard labour. This is an example of:** (NUMS-2024)
A. Survival of the fittest
B. Over production of offspring
C. Not inheriting acquired characters
D. Use and disuse of organs

Q.89 **Which of the following statements about natural selection is not true?** (UHS-2024)
A. It affects variations that are heritable
B. It is selected by a breeder
C. It can improve the adaptation of species
D. It is regional in nature

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Q.90 **Which of the following is the main point of Darwinism?** (SZAMBU-2024)

A. Descent with modification
B. Use and disuse of organ
C. Inheritance of acquired characters
D. Artificial Selection

Q.91 **The Darwin's observation on discovery and investigation on fossils is called _____.** (SZAMBU-2024)

A. Biogeography
B. Chronology
C. Homology
D. Paleontology

Q.92 **Identify the correct pair of vestigial organs:** (UHS-2024)

A. Ear Muscles & Vermiform appendix
B. Heart & Liver
C. Ear Muscles & Liver
D. Vermiform appendix & Heart

Q.93 **What best describes the hind leg bones seen in the whale?** (KMU-2024)

A. Analogous to the fin of living fish
B. Fossil structure from an extinct ancestor
C. Homologous structure of the wings of a bat
D. Vestigial structures that had a function in an ancestor

Q.94 **Wings of birds and that of flying lizards provide evidence of:** (KMU-2024)

A. Convergent evolution
B. Divergent evolution
C. No evolution
D. Same origin

Q.95 **The embryological stages of anatomical features. show similarity in:** (KMU-2024)

A. All living things
B. All non-vertebrates
C. All vertebrates
D. Human, jelly fish and mouse

Q.96 **The reduction of population size with some specific allele and genotype due to natural disaster is called:** (SZAMBU-2024-Reconduct)

A. Mutation
B. Bottle neck effect
C. Founder effect
D. Speciation

Q.97 **When humans purposefully apply selection pressure to populations, the process is known as:** (SZAMBU-2024-Reconduct)

A. Natural selection
B. Artificial selection
C. Evolution
D. Genetic drift

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ANSWER KEY

PRACTICE EXERCISE

1	C	11	B	21	B	31	B	41	A
2	D	12	D	22	A	32	A	42	B
3	C	13	D	23	A	33	B	43	D
4	B	14	C	24	D	34	B	44	C
5	C	15	C	25	B	35	C	45	C
6	C	16	A	26	B	36	B	46	C
7	B	17	C	27	B	37	B	47	C
8	C	18	C	28	C	38	C	48	D
9	B	19	C	29	B	39	B	49	C
10	D	20	B	30	B	40	A	50	C

PAST PAPER MCQ'S

51	C	61	D	71	B	81	C	91	D
52	D	62	D	72	B	82	D	92	A
53	B	63	A	73	B	83	A	93	D
54	A	64	D	74	A	84	B	94	A
55	C	65	A	75	B	85	C	95	C
56	D	66	C	76	A	86	A	96	B
57	D	67	C	77	A	87	A	97	B
58	D	68	D	78	B	88	C		
59	A	69	B	79	A	89	B		
60	C	70	D	80	B	90	A		

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EXPLANATORY NOTES

PRACTICE MCQ'S

1. Evolution is heritable change in characteristics of biological populations over successive generations. Evolutionary processes give rise to biodiversity at every level of biological organization.
2. Final product of evolution is always a new species and it is smallest unit of classification.
3. The research of British naturalist Alfred Russell Wallace played a pivotal role in developing the theory of natural selection as it had the same theme to that of Darwin. But he attributes his work to Charles Darwin.
4. Muscle hypertrophy involves an increase in size of skeletal muscle through an increase in size of its component cells, i.e. increased storage of glycogen etc.
5. E. Haeckel proposed that developing animal embryo passes through stages resembling adult forms of its ancestors. E. Haeckel formulated biogenetic law or recapitulation theory which states that ontogeny (developmental history of an individual) repeats phylogeny (development history of races), all other are incorrect.
6. C. Linnaeus introduced binomial nomenclature. He assigned scientific names to living organisms but he was not vocal for idea of evolution.
7. Evolution is a long-term process and it takes place by changes in the existing organisms so it leaves observable signs.
8. Biologists believe that life began about 3.5 billion years ago. These organisms were prokaryotes.
9. Lamarckism is the hypothesis that an organism can pass on characteristics that it has acquired during its lifetime to its offspring as well as how specific adaptations evolve.
10. 

The inheritance of acquired characteristics is a hypothesis that physiological changes *acquired* over the life of an organism may be transmitted to offspring and option D is contradictory to hypothesis.

11. Shedding of deciduous teeth is a term given to describe the physiological process that ultimately leads to replacement of the deciduous teeth by their corresponding permanent teeth and it is not an example of disuse of organs.

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12. Darwin's finches are a classical example of an adaptive radiation. Their common ancestor arrived on the Galapagos about two million years ago. During the time that has passed Darwin's finches have evolved into 14 recognized species differing in body size, beak shape, song and feeding behavior.
13. Firstly, the theory of evolution was explained by Lamarck. He said that acquired characters are inheritable and also explain used and disuse of organs.
14. Darwin visited the Galapagos Islands and observed unique fauna of this land.
15. After returning to Britain, Darwin perceived the origin of new species and adaptations as closely related processes for evolution.
16. The phrase descent with modification summarized Darwin's perception of the unity of life. The phrase refers to the view that all organisms are related through descent from an ancestor that lived in the remote past. In the Darwinian view, the history of life is like a tree with branches representing life's diversity.
17. When number of individuals are more than available resources, a competition would start between members for the resources.
18. Natural selection is the differential survival and reproduction of individuals (population) due to differences in phenotype. It is a key mechanism of evolution, the change in the heritable traits characteristic of a population over generations.
19. During artificial selection only fittest organisms are selected, while during natural selection survival restricts for the fittest organisms as they have such inherited characteristics which make them fit for their environment and leave more offspring than the less fit individuals.
20. Survival in struggle for existence depends upon hereditary constitutions and good variations.
21. Logically when there are more people and fewer resources, there shall be high competition for struggle of existence and people with better inherited characteristics will be selected naturally.
22. Darwin's theory of evolution was mainly based on the evidences from biogeography and fossil record as he observed and collected these evidences from expedition.
23. Allopatric speciation is speciation that happens when two populations of the same species become isolated from each other due to geographic changes. Speciation is a gradual process by which populations evolve into different species and Galapagos finches are example of allopatric speciation.
24. The theory of evolution as expounded by later students of Charles Darwin, especially Weismann, holding that natural selection accounts for evolution and denying the inheritance of acquired characters and includes most of the advance sciences like Taxonomy, Paleontology and Genetics, but not serology (study of blood).
25. At time of birth of Darwinism knowledge of genetics had not surfaced. When Mendelism got attention, it became clear that process of Darwinism cannot be explained without population genetics so theory of modern synthesis (Neo-Darwinism) was introduced.
26. Biogeographical evolution is a process in which gene pool of a population gradually changes in response to environmental pressures, natural selection and genetic mutations.
27. The oldest known fossil belongs to prokaryotes which suggest that they are the ancestors of all life forms. Protists are first descendant of prokaryotes.
28. A fossil is any preserved remains, impression, or trace of any once-living thing from a past geological age. The totality of fossils is known as the fossil record.
29. The theory of recapitulation, also called the biogenetic law or embryological parallelism, often expressed using E. Haeckel's phrase "ontogeny recapitulates phylogeny", is a historical hypothesis that the development of the embryo of an animal, from fertilization to gestation or hatching (ontogeny), goes through similar stages and presence of gill slits in all vertebrate embryos is one of the best example of this theory.

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30. A fossil is any preserved remains, impression, or trace of any once-living thing from a past geological age.
31. Organs such as bat's wing, wings of birds, seal's flipper, forelimb of a horse, and human arm have a common underlying anatomy that was present in their last common ancestors; therefore, these forelimbs are homologous organs.
32. Analogous organs are the opposite of homologous organs, which have similar functions but different origins. An example of an analogous trait would be the wings of insects, bats and birds that evolved independently in each lineage separately but survive in same kind of habitat performing similar function.
33. Analogous organs which have similar functions but different origins. An example of an analogous trait would be the wings of insects, bats and birds that evolved independently in each lineage separately but survive in same kind of habitat performing similar function and are not used to define species.
34. Convergent evolution is the process whereby organisms not closely related in origin, independently evolve similar traits as a result of having to adapt to similar environment or ecological niches. On a molecular level, this can happen due to random mutation unrelated to an adaptive change.
35. A fossil is any preserved remains, impression, or trace of any once-living thing from a past geological age. Examples include bones, shells, exoskeletons, stone imprints of animals or microbes, hair, petrified wood, oil, coal, and other remnants.
36. Ancestral characters are often, but not always, preserved in an organism's development. For example, both chick and human embryos go through a stage where they have slits and arches in their necks like the gill slits and gill arches of fish but in humans one of these gill pouches develop into Eustachian tubes.
37. Forelimbs of mammals are homologous organs (Same structure and different functions) and these organs show divergent evolution.
38. Comparison of anatomical structures of organisms of same species of different eras show marked differences. Older organisms were simple and present-day organisms are more advanced. This remodeling takes place due to evolution.
39. All vertebrates have structures common in their embryonic stages; gill pouches are one of them. In fish gill pouches are converted in to gills and in land vertebrates' pouches are converted are into Eustachian tube.
40. It has been observed while conducting studies of paleontology that fossils are recovered from sedimentary rocks mostly.
41. For natural selection to work, there must be heritable variations in a population that can be passed down to offspring.
42. Similarities in genes and proteins reflect evolutionary relationships among species, providing evidence for common ancestry.
43. The central idea of evolution is that species change over time, with traits being passed down and modified across generations.
44. Remodeling refers to the process by which ancestral structures evolve and take on new functions.
45. Evolution involves gradual changes over time.
46. The theory of special creation does not support the idea of change over time in species.
47. The finches on the Galapagos Islands provided evidence of evolution due to their geographic isolation and adaptation to different environmental conditions.
48. Neo-Darwinism emphasizes the role of genetics in the process of evolution, particularly how genetic variation leads to natural selection.
49. Among the listed groups, mammals are the latest evolved group, having evolved after amphibians, reptiles, and birds.
50. The ear is not vestigial in humans; it serves a critical function in hearing.

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PAST PAPER MCQ'S

51. Herbert Spencer is famous for his doctrine of social Darwinism, which asserted that the principles of evolution, including natural selection, apply to human societies, social classes, and individuals as well as to biological species developing over geologic time.

52. According to the endosymbiotic theory, mitochondria of eukaryotes derive from eubacteria. The host may be more closely related to the Archaea. Following endosymbiosis gave rise to the chloroplasts of algae and plants.

53. Lamarck was a great scientist of his time. He understood process of evolution and presented a theory to explain how evolution takes place. He could not present visual evidences to support his theory that adaptation are heritable.

54. According to theory of natural selection, those organisms whose inherited characteristics fit them best to their environment are likely to leave more offsprings than the less fit individuals

55. Evolution occurs because natural selection gives some alleles a better chance of survival than others.

56. Most of species on the Galapagos live nowhere else in the world, although they resemble species living on the South America mainland. It was as though the islands were colonized by animals and plants that strayed from South American mainland and then diversified on the different islands.

57. Darwin suggested that populations of individual's species become better adapted to their local environments through natural selection.

- Linnaeus gave binomial nomenclature system.
- Lamarck published his theory of evolution.
- Hardy Weinberg gave 'Hardy Weinberg Theorem'.

58. Mutation ultimate source of all changes. Natural selection is based on variation and mutation.

59. Species is a smallest biological unit. It is product of evolution. It evolves with passage of time.

60. Darwin believed in perceived unity in life, with all organisms related through descent from some common ancestor that lived in the remote past.

61. Lamarck gave theory of evolution by inheritance of acquired characteristics.

- Weismann proved wrong inheritance of acquired characteristics with its experiments.
- Mendel gave 'laws of inheritance'.

62. The appendix or vermiform appendix is a muscular structure attached to the large intestine in the human body.

- A small triangular bone at the base of the spinal column in humans and some apes, formed of fused vestigial vertebrae.
- A transparent or translucent third eyelid present in some animals that can be drawn across the eye for protection and to moisten it while maintaining visibility. In humans it has lost its functions and located in the corner of eye called pilica semilunaris.
- Ear muscle are not functional for sound intensity regulation.

63. Analogous organs which have similar functions but different origins. They are involved in convergent evolution.

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64. A geographical barrier is something that blocks the pathway to something, this can be any natural feature such as mountains that prevents easy movement from one place to another and atmosphere is not a geographical barrier.

65. Fossil records show that prokaryotes are oldest from all other organisms. They were evolved 3.4 billion years ago. All other groups are descendants of prokaryotes.

66. Birds were evolved from reptiles. It is proved by fossil of archeopteryx. Archaeopteryx had teeth and a long bony tail, just like other dinos in the theropod family

67. Biochemical evidences: there are some similarities between eukaryotes and prokaryotes on the basis of biological molecules e.g., protein and nucleic acid

- Paleontology: study of fossils.
- Vestigial organs are historical remnants of structure that had important functions in ancestors but are no longer essential presently.
- Embryology: study of changes from zygote formation to adult organism.

68. Darwin found evidences in artificial selection, the breeding of domesticated plants and animals. Humans have modified other species over many generations by selecting individuals by selecting individuals with the desire traits as breeding stock.

69. Homologous organs are functionally different but structurally alike e.g., fore limbs of man, bats, horse, whale etc. are example divergent evolution. Analogous organs are function alike but structurally different e.g., wings of bat, birds and insects etc., are examples of convergent evolution.

70. The formula for calculating allele and genotype frequencies at equilibrium was derived by Hardy-Weinberg. It helps predict genetic variation in a population under ideal conditions.

71. Prokaryotes may have arisen around 3.5 billion years ago. This is based on fossil evidence and molecular data indicating the early emergence of simple life forms.

72. When humans purposefully apply selection pressure to populations, the process is known as artificial selection. This involves humans selecting for desirable traits in plants or animals.

73. Shedding of teeth's is not an example of disuse of organs. It is a physiological process, while the other options involve the reduction or loss of organ function due to disuse.

74. Lamarck proposed the concept that an organism can pass on acquired modifications to its offspring. He suggests that traits acquired during an organism's lifetime can be inherited.

75. The main point of Darwinism is variation. Darwin emphasized that natural selection operates on the variations within a population, leading to evolution over time.

76. The statement "Survival in the struggle for existence is random" is incorrect. Darwin's theory suggests survival is influenced by traits that improve an organism's chances of survival and reproduction.

77. According to Neo-Darwinism, reproductive isolation is a cause of evolution. It leads to the formation of new species by preventing gene flow between populations.

78. Darwin's 'Origin of Species by Natural Selection' is mainly concerned with adapation. It explains how new species arise through the process of natural selection.

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79. Vestigial organs were functional in ancestral species but are reduced or non-functional in present-day species. Examples include the human appendix and tailbone.

80. Bat's wing: Wings of butterfly do not have homology. They are analogous structures, meaning they have a similar function but different evolutionary origins.

81. Archaeopteryx is the fossil bird. It is considered one of the earliest known birds, showing both reptilian and avian features.

82. The Endosymbiont hypothesis states that mitochondria and chloroplasts are ancient bacteria that live inside larger cells in a symbiotic relationship.

83. Analogous organs are similar in function but differ in structure. They arise from different evolutionary origins but serve similar roles, like wings of birds and insects.

84. Hackel formulated the principle that "ontogeny recapitulates phylogeny," suggesting that an organism's development (ontogeny) mirrors its evolutionary history (phylogeny).

85. According to the endosymbiosis theory, flagella may have derived from the ingestion of an spirochete bacterium.

86. The idea of inheritance of acquired characteristics was presented by Jean Baptist Lamarck, who suggested that traits acquired during an organism's lifetime could be passed on to offspring.

87. According to Lamarckism, the basis of evolution is the inheritance of acquired characteristics, where traits acquired during an organism's lifetime are passed to its offspring.

88. This is an example of not inheriting acquired characters. Acquired traits, like muscle strength, are not passed to offspring.

89. The statement "It is selected by a breeder" is not true. Natural selection occurs naturally, not through human intervention like breeding.

90. The main point of Darwinism is descent with modification, which suggests that species evolve over time, passing down traits from their ancestors with changes.

91. Darwin's observation on discovery and investigation of fossils is called paleontology, the study of ancient life through fossils.

92. The correct pair of vestigial organs is Ear Muscles & Vermiform appendix. These organs are reduced in function and serve minimal or no purpose in humans today.

93. The hind leg bones in whales are vestigial structures that had a function in an ancestor. They are remnants of functional legs from earlier land-dwelling ancestors.

94. The wings of birds and flying lizards provide evidence of convergent evolution. They have similar functions but evolved independently in different species.

95. The embryological stages of anatomical features show similarity in all vertebrates, indicating a common evolutionary origin.

96. The reduction of population size with specific alleles and genotypes due to a natural disaster is called the bottleneck effect. It causes genetic drift and reduces genetic variation in the population.

97. When humans purposefully apply selection pressure to populations, the process is known as artificial selection. This involves selecting for traits that are beneficial or desirable.

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PRACTICE EXERCISE

Q.1 All the insectivorous plants are:

A. Heterotrophic
B. Autotrophic
C. Decomposers
D. Parasites

Q.2 End of leaf is modified to form a hood in:

A. *Sarracenia purpurea*
B. *Drosera intermedia*
C. *Dionaea muscipula*
D. All A, B, C

Q.3 Pick out the different:

A. Dodder
B. Sundew
C. Venous fly trap
D. Pitcher plant

Q.4 In which of the following types of animals would you expect the digestive tract to be more complex:

A. Those with single opening
B. Those with multiple openings
C. Those with two opening
D. Those without any opening

Q.5 How many sites of digestion are present in the digestive system of man?

A. 3
B. 4
C. 5
D. 6

Q.6 Cooking of the food and _____ in the mouth significantly improve the digestibility of food stuff by the enzymes.

A. Mastication
B. Peristalsis
C. Churning
D. Acidity

Q.7 The digestion of carbohydrates occurs briefly in _____ and largely in the _____ respectively.

A. Mouth, intestine
B. Stomach, intestine
C. Esophagus, mouth
D. Mouth, stomach

Q.8 On taking a spoonful of boiled rice and after partial digestion, which of the following biomolecule cannot be the part of bolus?

A. Protein
B. Vitamins
C. Amylose
D. Monosaccharide

Q.9 Oral cavity is aided in selection of food by all of the following senses except:

A. Smell
B. Sight
C. Sound
D. Taste

Q.10 Align the following events performed by oral cavity:

1) Digestion
2) Mastication
3) Lubrication
4) Selection

A. 1,3,4,2
B. 4,2,1,3
C. 4,3,2,1
D. 4,2,3,1

Q.11 Main function of $NaHCO_3$ and other salts in buccal cavity is to:

A. Perform chemical digestion
B. Stabilize the pH
C. Cleansing teeth
D. Act as promoter of Ptyalin

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Q.12 All of the following are influenced by the movement of tongue except:
A. Nasal opening B. Teeth cleansing
C. Epiglottis D. Peristalsis

Q.13 Which of the following region in alimentary canal produces no enzyme?
A. Esophagus B. Duodenum
C. Stomach D. Jejunum

Q.14 Cardiac sphincter is present at the junction of stomach and:
A. Esophagus B. Duodenum
C. Caecum D. Heart

Q.15 Which one is different from others?
A. Amylase B. Glucagon
C. Gastrin D. Insulin

Q.16 More gastric juice is produced by gastric glands on the stimulation of a hormone:
A. Pepsinogen B. Secretin
C. Gastrin D. Insulin

Q.17 The digestive enzyme which is absent in adults:
A. Rennin B. Renin
C. Amylase D. Enterokinase

Q.18 Which of the following layer regulates the peristaltic movement along the digestive tract?
A. Middle B. Innermost
C. Outermost D. Connective tissue layer

Q.19 Pepsin hydrolyzes protein to yield:
A. Acylglycerols B. Amino acids
C. Peptones and polypeptide D. Dipeptides

Q.20 Which combination of the following food components in humans reaches the stomach undigested?
A. Starch, Proteins and Fats B. Vitamins, Carbohydrates and Polypeptides
C. Proteins, Cellulose and Fats D. Proteins, Starch and Cellulose

Q.21 In the wall of stomach, the sequence from outer to inner layer is:
A. Serosa, longitudinal muscle, mucosa, sub-mucosa
B. Mucosa, serosa, muscles, epithelium
C. Serosa, longitudinal muscles, circular muscles, sub-mucosa, mucosa
D. Serosa, longitudinal muscles, sub-mucosa, mucosa

Q.22 Lactase breaks the lactose into:
A. Fatty acids + glycerols B. Amino acid + peptones
C. Glucose monomers D. Glucose + galactose

Q.23 Final digestion of food stuff and absorption of digested products occur at:
A. Small intestine B. Large intestine
C. Mouth D. Stomach

Q.24 The hepatic portal vein is located between the:
A. Hepatic vein – vena cava B. Mouth – stomach
C. Pancreas – small intestine D. Small intestine – liver

Q.25 Which of the following carries lipoproteins from digestive tract?
A. Hepatic portal vein B. Mesenteric vein
C. Lymphatic vessels D. Hepatic vein

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Q.26 Which of the following is produced from both intestinal lining and pancreas?
A. Maltase
B. Lipase
C. Enterokinase
D. Erypsin

Q.27 Fats changes to lipoproteins in:
A. Goblet cells
B. Blood vessel
C. Lacteals
D. Crypts

Q.28 These are the part of lymphatic system:
A. Lacteals
B. Duodenum
C. Villi
D. Liver

Q.29 Which of the following do not pass from the small intestine to the large intestine?
A. Water and sloughed off mucosal cells
B. Cellulose and inactive enzymes
C. Organic and inorganic salts
D. Gastrin and secretin

Q.30 Small intestine is termed small because of its small:
A. Surface area
B. Volume
C. Diameter
D. Length

Q.31 Which of the following is not a component of intestinal juice?
A. Ptyalin
B. Lipase
C. Erypsin
D. Lactase

Q.32 Fats pass into blood via:
A. Right lymphatic duct
B. Subclavian vein
C. Thoracic lymphatic duct
D. Jugular vein

Q.33 Starch is digested in:
A. Oral cavity and stomach
B. Duodenum and ileum
C. Buccal cavity and duodenum
D. Esophagus and proximal part of small intestine only

Q.34 Which of the following is incorrect regarding to trypsin and pepsin?
A. Both released as pro-enzymes
B. Both are endo-peptidase
C. Both act upon same substrate
D. Both act at same site and pH

Q.35 Which one of the following is endocrine pair present in digestive canal?
A. Esophagus and stomach
B. Pancreas and ileum
C. Stomach and duodenum
D. Stomach and liver

Q.36 Secretion which lacks enzymes is:
A. Saliva
B. Pancreatic juice
C. Bile
D. Gastric juice

Q.37 Release of $NaHCO_3$ and many enzymes required for intestinal digestion is related with:
A. Pancreas
B. Mouth
C. Gallbladder
D. Liver

Q.38 The acidic dietary contents of the stomach, on reaching small intestine are neutralized by _____, produced by _____.
A. Bicarbonate, liver
B. Hydrogen, duodenum
C. Bicarbonate, duodenum
D. Bicarbonate, pancreas

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Q.39 **Hepatic and pancreatic secretions are also stimulated by a hormone called:**
A. Gastrin B. Secretin
C. HCl D. Enterokinase

Q.40 **Which of the following is not a component of pancreatic juice?**
A. $NaHCO_3$ B. Amino peptidase
C. Chymotrypsinogen D. Amylopsin

Q.41 **All principal components of food can be digested by:**
A. Gastric juice B. Pancreatic juice
C. Bile D. Oral secretions

Q.42 **Which of the following statement regarding liver is incorrect?**
A. It produces no digestive enzyme B. Detoxify chemicals and drugs
C. Filters blood D. Produces albumin and prothrombin

Q.43 **Chemical gall stones are:**
A. Calcium oxalate molecules B. Calcium phosphate molecules
C. Cholesterol molecules D. Uric acid molecules

Q.44 **The longest part of large intestine is:**
A. Caecum B. Rectum
C. Colon D. Anus

Q.45 **The large intestine in human:**
A. Digests all type of food B. Is the longest part of GIT
C. Absorbs H_2O + electrolytes D. Is connected to stomach

Q.46 **Movement of materials across ileum to large intestine is guarded by:**
A. Pyloric sphincter B. Ileocolic sphincter
C. Cardiac sphincter D. Anal sphincter

Q.47 **Oral rehydration salts are given as a treatment in case of:**
A. Dyspepsia B. Food poisoning
C. Obesity D. Piles

Q.48 **When a person has an abnormal amount of fat on the body it is called:**
A. Dyspepsia B. Anorexia nervosa
C. Obesity D. Piles

Q.49 **All of the following are lined with mucous membrane of ciliated epithelium except:**
A. Nasal cavity B. Trachea
C. Bronchi D. Bronchioles

Q.50 **Which of the following function is not associated with nasal cavity?**
A. Filtration B. pH adjustment
C. Moistening D. Temperature adjustment

Q.51 **A complex cartilaginous structure surrounding the upper end of the trachea:**
A. Larynx B. Esophagus
C. Pharynx D. Epiglottis

Q.52 **A muscularly controlled cartilage, hinge-like action and serves as a lid which automatically covers the opening of the larynx is called:**
A. Epiglottis B. Esophageal sphincter
C. Uvula D. Respiratory valve

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Q.53 A cavity bounded by ribs and diaphragm is called:
A. Abdominal cavity
B. Thoracic cavity
C. Pelvic cavity
D. Pleural cavity

Q.54 Diameter of bronchioles is:
A. 1mm
B. 0.1mm
C. 1μm
D. 1nm

Q.55 Bronchioles are made up of mainly:
A. Connective tissues
B. Goblet cells
C. Circular smooth muscles
D. Endothelial cells

Q.56 Functional units of lungs are:
A. Alveoli
B. Bronchioles
C. Air sacs
D. Epithelial cells

Q.57 Each air sac consists of several microscopic alveoli which are:
A. Double layered structures
B. Single layered structures
C. Triple layered structures
D. Multi layered structures

Q.58 A sheet of skeletal muscles forming the floor of chest cavity is called:
A. Pleura
B. Peritoneum
C. Diaphragm
D. Serosa

Q.59 The function of nasal cavity is:
A. Protection
B. Moisten
C. Temperature regulation
D. All A, B, C

Q.60 The epithelium of alveoli is:
A. Ciliated epithelium
B. Squamous epithelium
C. Cuboidal epithelium
D. Columnar epithelium

Q.61 How many functional pairs of vocal cords are present in humans?
A. 1
B. 3
C. 2
D. 4

Q.62 _____ are folds of tissue within the larynx, creates sounds when vibrate.
A. Vocal cords
B. Epiglottis
C. Glottis
D. Trachea

Q.63 Human pharynx is conventionally divided into _____ sections.
A. 1
B. 2
C. 3
D. 4

Q.64 The respiratory bronchioles terminate in elongated airways called:
A. Alveolar sacs
B. Bronchi
C. Alveolar duct
D. Alveoli

Q.65 Cartilage rings present in trachea which prevent it from collapsing and keep the air passage way open, are:
A. 'O' shaped
B. 'C' shaped
C. 'D' shaped
D. 'G' shaped

Q.66 Vocal cords are stretched across:
A. Larynx
B. Glottis
C. Pharynx
D. Bronchi

Q.67 The chemical nature of surfactant is:
A. Glycolipids
B. Nucleoproteins
C. Glycoproteins
D. Lipoproteins

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Q.68 **Inspiratory center is _____ portion of medulla:**
A. Ventral
B. Lateral
C. Dorsal
D. Both B & C

Q.69 **Surfactant is present in:**
A. Bronchi
B. Alveoli
C. Bronchioles
D. Trachea

Q.70 **Which of the following is not a function of surfactants?**
A. Filtration of blood
B. Increase gases exchange
C. Reduce surface tension
D. Act as antiseptic

Q.71 **During exercise, the breathing rate may rise to:**
A. 15 times per minute
B. 20 times per minute
C. 30 times per minute
D. 25 times per minute

Q.72 **Which energy is consumed in breathing?**
A. Chemical
B. Physical
C. Potential
D. Mechanical

Q.73 **Find out the incorrect statement:**
A. Inspired air contains more O_2 than exhaled air
C. Amount of N_2 is equal in both inhaled and exhaled air
B. Expired air has 100 times greater CO_2 as inspired air
D. Exhaled air is comparatively drier than inhaled air

Q.74 **Partial pressure of oxygen is maximum in:**
A. Inspired air
B. Alveolar air
C. Expired air
D. Oxygenated blood

Q.75 **Which of the following play passive role during breathing?**
A. Lungs
B. Intercostal muscles
C. Diaphragm
D. Pleura

Q.76 **Which of the following factors does not alter the rate of breathing by influencing the chemoreceptors in medulla oblongata, aorta and carotid artery?**
A. CO_2 partial pressures in the blood
B. H^+ concentration in the blood
C. O_2 partial pressures in the blood
D. Blood glucose level

Q.77 **If you hold your breath for a long time, CO_2 levels are likely to _____, and the pH of body fluids is likely to _____.**
A. Increase, decrease
B. Increase, increase
C. Decrease, Increase
D. Decrease, decrease

Q.78 **During expiration, the diaphragm becomes:**
A. Less dome-shaped
B. Oblique
C. Flattened
D. More dome-shaped

Q.79 **Diffusion of respiratory gases is inversely proportional to:**
A. Surface area
B. Thickness of the membrane
C. Difference in concentration
D. Presence of moisture

Q.80 **At normal alveolar ventilation, the respiratory center is stimulated by:**
A. O_2 concentration in venous blood
B. CO_2 concentration in venous blood
C. CO_2 concentration in arterial blood
D. O_2 concentration in arterial blood

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Q.81 **Which one of these shows the path of blood after it leaves the lungs?**
A. Pulmonary Vein – Left Atrium – Left Ventricle – Aorta
C. Pulmonary Artery – Left Atrium – Left Ventricle – Aorta
B. Pulmonary Vein – Right Atrium – Right Ventricle – Aorta
D. Pulmonary Artery – Right Atrium – Right Ventricle – Aorta

Q.82 **Which of the following correctly describes the binding affinities of gases with haemoglobin?**
A. $CO>CO_2>O_2$
B. $CO_2>O_2>CO$
C. $O_2>CO_2>CO$
D. $O_2>CO_2>CO$

Q.83 **All of the following occur due to presence of carbon dioxide in blood except:**
A. Increases rate of breathing
B. Increases respiratory volume
C. Makes blood more acidic
D. Oxygen carrying capacity of Hb decreases

Q.84 **The amount of CO_2 in pulmonary artery is:**
A. 54ml/100ml of blood
B. 50ml/100ml of blood
C. 60ml/100ml of blood
D. 4ml/100ml of blood

Q.85 **Which of the following incorrectly explains the binding of inorganic component in structures found in erythrocytes?**
A. CO with organic portion of haem
B. CO_2 with NH_2 group of haemoglobin
C. O_2 with Fe^{++} of haem
D. H^+ with COOH group of haemoglobin

Q.86 **Which of the following shows maximum solubility in blood plasma?**
A. Oxygen
B. Carbon dioxide
C. Nitrogen
D. Carbon monoxide

Q.87 **Amount of oxygen absorbed by haemoglobin at 115 mmHg per 100 ml of blood is:**
A. 20 ml
B. 16 ml
C. 13.4 ml
D. 19.6 ml

Q.88 **All of the following can bind to haemoglobin except:**
A. HCO_3^-
B. O_2
C. H^+
D. CO_2

Q.89 **O_2 pressure in cells or tissues is:**
A. 158 mmHg
B. Less than 100 mmHg
C. 115 mmHg
D. Less than 60 mmHg

Q.90 **All of the following facilitates the release of O_2 from haemoglobin except:**
A. High CO_2 concentration
B. High pH
C. High temperature
D. High Acidity

Q.91 **In reduced form, hemoglobin carries:**
A. CO_2
B. O_2
C. Hydrogen ion
D. CO

Q.92 **Which of the following has maximum oxygen carrying capacity?**
A. Haemoglobin in erythrocytes
B. Globulin in blood plasma
C. Myoglobin in sarcoplasm
D. Bicarbonate ions in RBCs

Q.93 **The residual volume is:**
A. 5 liter
B. 1.5 liter
C. 500 ml
D. 3500 ml

Q.94 **Inspiratory reserve volume is:**
A. 3000 ml
B. 6000 ml
C. 5000 ml
D. 3500 ml

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Q.95 **Which of the following is false regarding to haemoglobin?**
A. It is a globular protein
C. Abundantly found in RBCs
B. It contains organic haem group and inorganic Fe^{++}
D. Each haem in haemoglobin can bind to four O_2 molecules

Q.96 **Hemoglobin in man increases oxygen carrying capacity by:**
A. 80 times
B. 75 times
C. 90 times
D. 100 times

Q.97 **The characteristics red color of hemoglobin is due to:**
A. Haem
B. β–globin chains
C. α–globin chains
D. Central iron atom

Q.98 **What is true about haemoglobin?**
A. It is dipeptide and present in RBC.
C. It is present in dissolved state in blood plasma
B. It is dipeptide in mammals and localized in RBC
D. It is having haem group

Q.99 **All are respiratory disorders except:**
A. Pulmonary tuberculosis
B. Emphysema
C. Rickets
D. Lungs Cancer

Q.100 **In heavy smokers, the alveoli become enlarged and damaged which reduces the surface area for the exchange of respiratory gases. This condition is called:**
A. Lung cancer
B. Emphysema
C. Asthma
D. Bronchitis

Q.101 **Active transport is selective and is dependent upon:**
A. Photosynthesis
B. Respiration
C. Transportation
D. Permeability

Q.102 **The site/s where most of the uptake of water and minerals take place is/are:**
A. Root hairs
B. Root cells
C. Underground stem
D. Leaves

Q.103 **Transport of minerals from soil to epidermal cells of roots via carrier protein molecules along their concentration gradient is called:**
A. Diffusion
B. Facilitated diffusion
C. Passive transport
D. Active transport

Q.104 **To attain maximum turgidity of a cell, it must be placed in:**
A. Normal saline
B. Distilled water
C. Glucose solution
D. Away from sunlight

Q.105 **In a _____ solution, solute and pressure potentials are equal to water potential.**
A Hyperplasmonic
B. Isotonic
C. Hypertonic
D. Hypotonic

Q.106 **The membrane of vacuoles is known as:**
A. Cisternae
B. Tonoplast
C. Cristae
D. Protoplast

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Q.107 Hydrogen bonding between water molecules produces:
A. Cohesion
B. Adhesion
C. Tension
D. Attraction

Q.108 Translocation of sucrose is between:
A. Sink to source
B. Sink to sink
C. Source to sink
D. Source to source

Q.109 Widely accepted theory that explains transport of organic solutes in plants is supported by
A. Pressure flow theory
B. Diffusion
C. Imbibition
D. Ascent of sap

Q.110 Loading of sucrose from companion cells to sieve tube cell is:
A. Diffusion
B. Active transport
C. Passive transport
D. Facilitated diffusion

Q.111 Chordae tendineae are extension of:
A. Heart
B. Ventricles
C. Auricles
D. Sinus venosus

Q.112 Which one has the thickest walls than the others?
A. Right atria
B. Left atria
C. Right ventricle
D. Left ventricle

Q.113 The nature of valves in the heart is:
A. Membranous
B. Muscular
C. Tendinous
D. Ligamentous

Q.114 Oxygenated blood is supplied to all body parts from:
A. Right atrium
B. Left atrium
C. Right ventricle
D. Left ventricle

Q.115 Mitral valve prevents the flow of blood from:
A. Right atrium to right ventricles
B. Left atrium to left ventricles
C. Right atrium to left atrium
D. Left ventricles to left atrium

Q.116 First artery that arises from the base of aorta:
A. Pulmonary artery
B. Coronary artery
C. Renal artery
D. Iliac arteries

Q.117 At start of ventricular contraction:
A. Bi and tricuspid valves are opened
B. Semilunar valves are closed
C. Bi and tricuspid valves are opened and semilunar valves are closed
D. Bi and tricuspid valves are closed and semilunar valves are opened

Q.118 Which valve allows blood to pass from heart to pulmonary artery?
A. Right Semi lunar valve
B. Left AV valve
C. Left Semi lunar valve
D. Right AV valve

Q.119 Myocardium of heart shows _____ characters.
A. Smooth and involuntary
B. Smooth and voluntary
C. Striated and involuntary
D. Striated and voluntary

Q.120 In humans, only _____ systemic arch is present.
A. Left
B. Superior
C. Right
D. Inferior

Q.121 The heart muscle is nourished by:
A. Chambers of the heart
B. Right atrium
C. Coronary artery
D. Left atrium

Q.122 **Which one is continuation of iliac artery?**
A. Renal Artery B. Femoral Artery
C. Hepatic Artery D. Intercostal Arteries

Q.123 **Which vein has oxygenated blood?**
A. Renal vein B. Pulmonary vein
C. Subclavian vein D. Jugular vein

Q.124 **In man, blood from alimentary canal to liver is transported by:**
A. Hepatic portal vein B. Hepatic vein
C. Pulmonary vein D. Renal vein

Q.125 **The most appropriate statement for atrial systole is:**
A. A.V valves close B. A.V valves open
C. A.V valves open and semilunar valves close D. A.V valves close and semilunar valves open

Q.126 **At the end of ventricle contraction:**
A. A.V valves open B. Semilunar valves open
C. A.V valves open and semilunar valves close D. Both A.V and semilunar valves close

Q.127 **Lubb sound is produced when:**
A. A.V valves open B. Semilunar valve close
C. A.V valves close D. Semilunar valve open

Q.128 **The portion of heart which is always ready to be the pacemaker if SA node stops working:**
A. Bundle branch B. AV node
C. Ventricle Muscles D. Atrial Muscles

Q.129 **Atrial depolarization is represented by:**
A. P-wave B. QRS complex
C. T-wave D. PQRS complex

Q.130 **Arteriosclerosis is:**
A. A metabolic disorder B. A degenerative disorder
C. An infectious disorder D. A genetic disorder

Q.131 **All are functions of lymphatic system except:**
A. Transport fat B. Provide immunity
C. Blood filtration D. Filtration of urea

Q.132 **Lymph is not present in:**
A. Lacteal B. Lymph node
C. Left thoracic lymphatic duct D. Left subclavian vein

Q.133 **Which one is more closely related to lymph?**
A. CSF B. Interstitial fluid
C. Blood D. Urine

Q.134 **Lymph nodes are drained by:**
A. Single afferent vessel B. Single efferent vessel
C. Many afferent vessels D. Many efferent vessels

Q.135 **Largest lymphoid mass is:**
A. Thymus B. Spleen
C. Adenoid D. Tonsils

Q.136 **Flow of lymph is maintained by:**
A. Skeletal muscles B. Visceral movements
C. Breathing movements D. All A, B, C

Q.137 **Just as blood is filtered by spleen, the lymph is filtered by:**
A. Spleen B. Lymph nodes
C. Tonsils D. Liver

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Q.138 Lymph just before entering into subclavian vein always passes through:
A. Heart
B. Abdominal vessels
C. Groin lymph nodes
D. Thoracic lymphatic duct

Q.139 Return of lymph from lower leg is assisted by:
A. Lymph nodes
B. Venous valves
C. Calf muscles
D. Cytokines

Q.140 After taking too much fat, the lymph consists of how many fat globules?
A. 10%
B. 1%
C. 20%
D. 8%

Q.141 The lymphatic vessels of the body empty the lymph into blood stream at the:
A. Abdominal vein
B. Jugular vein
C. Sub-clavian vein
D. Bile duct

Q.142 Common feature of cell humoral response and cell mediated response are:
A. Recognition of antigen
B. Tissue rejection
C. Production of antibodies
D. Plasma clone formation

Q.143 Vaccination against specific disease like tetanus is an example of:
A. Artificial active immunity
B. Natural active immunity
C. Artificial passive immunity
D. Natural passive immunity

Q.144 Antibodies are injected in:
A. Artificial active immunity
B. Natural active immunity
C. Artificial passive immunity
D. Natural passive immunity

Q.145 Antibodies consist of:
A. One Heavy chain only
B. Two heavy chains only
C. Two heavy and two light chains only
D. Two light chains only

Q.146 Antibodies are an example of _____ proteins.
A. Fibrous
B. Globular
C. Catalytic
D. Regulatory

Q.147 Antigen binding sites are present on:
A. Constant region of heavy chain only
B. Constant region of light chain only
C. Variable region of both heavy and light chains
D. Constant region of both heavy and light chains

Q.148 Any foreign body that may activate immune system:
A. Antigen
B. Immunoglobulin
C. Antibodies
D. Plasmogen

Q.149 Immunity is the capacity of body to do all except:
A. Recognize antigen
B. Mobilize lymphocytes
C. Increase antibodies production
D. Mobilize hemoglobin

Q.150 Immunity is generally destroyed in:
A. All infections
B. HIV infection
C. All inflammations
D. All diseases

Q.151 Specific immunity is the result of:
A. 1st line of defense
B. 3rd line of defense
C. 2nd line of defense
D. 4th line of defense

Q.152 Phagocytosis usually involves:
A. 1st line of defense
B. 3rd line of defense
C. 2nd line of defense
D. 4th line of defense

Q.153 All are examples of 1st line of defense except:
A. Skin
B. Mucous
C. Stomach HCl
D. Antibodies

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Q.154 Cyclosporine is used to inhibit which type of response?
A. Cell mediated
B. Cell humoral
C. Cell signaling
D. Cell to cell

Q.155 Type of immunity that is present by birth is called:
A. Innate immunity
B. Adaptive immunity
C. Acquired immunity
D. Secondary immunity

Q.156 All are true about passive immunization except:
A. Antibodies are injected
B. Antisera are injected
C. Antitoxin are injected
D. Antibodies are produced

Q.157 Disulfide bridge is present between all except:
A. Heavy –Heavy chains
B. Light and heavy chain
C. Heavy- light chain
D. Light and light chain

Q.158 Vaccination is not available for which of the following disease:
A. Bacterial
B. Fungal
C. Viral
D. Microbial

Q.159 Stronger and specific immunity is found in:
A. All animals
B. Humans only
C. Invertebrates only
D. All vertebrates

Q.160 An antigen is:
A. Residue of antibody
B. Result of antibody
C. Stimulus for antibody formation
D. Opposite to an antibody

Q.161 Vaccine is prepared by using a microorganism that shows association to disease. Antigen Humoral immune response is generated by:
A. B lymphocytes
B. Basophils
C. T lymphocytes
D. Neutrophils

Q.162 B-lymphocytes originate in human from:
A. Blood cells
B. Bursa of Fabricius
C. Bone marrow
D. Thymus

Q.163 Function of respiratory passage, cilia is to keep the airways clear from:
A. CO_2
B. O_2
C. Dust
D. CO

Q.164 Gut epithelium is involved in:
A. Secretion of enzymes
B. Absorption of food
C. Secretion of hormones
D. All A, B, C

Q.165 Which one of the following is not the function of stomach?
A. Storage of food
B. Digestion of dipeptides
C. Mechanical digestion
D. Production of HCl

Q.166 Bile is secreted by:
A. Acinar cells
B. Gall bladder
C. Hepatic cells
D. Kupffer cells

Q.167 It is a complex cartilaginous structure surrounding upper end of trachea:
A. Pharynx
B. Larynx
C. Glottis
D. Epiglottis

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Q.168 Bicarbonate ions during transport of CO_2 can be generated in:

A. RBCs
B. Basophils
C. Neutrophils
D. Lymphocytes

Q.169 In human beings, the main respiratory pigment is:

A. Cytochrome
B. Hemoglobin
C. Hemocyanin
D. Myoglobin

Q.170 If a plant cell is placed in a hypertonic solution, it will:

A. Deplasmolyzed
B. Plasmolyzed
C. Turgid
D. Shrink

Q.171 The mineral elements in chlorophyll and haemoglobin are respectively:

A. Ca^{+2} and Mg^{+2}
B. Na^{+1} and Fe^{+2}
C. Mg^{+2} and Fe^{+2}
D. K^{+1} and Fe^{+2}

Q.172 Which of the following is correct regarding condition of heart valves during different stages of cardiac cycle?

	Diastole	Atrial systole	Ventricular systole
A.	AV closed, SL open	AV closed, SL open	AV & SL closed
B.	AV open, SL closed	AV open, SL closed	SL open, AV closed
C.	AV & SL open	AV & SL closed	AV open, SL closed
D.	AV open, SL closed	AV closed, SL open	AV & SL closed

Q.173 Amino acid sequence in constant region of antibody is same in:

A. All antibodies of all classes
B. All antibodies of one class
C. Some antibodies of one class
D. All antibodies against one antigen only

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Q.174 Which one of the following is not a carnivorous plant? (ETEA-2022)
A. Pitcher plant
B. Sundew
C. Butterworts
D. Money plant

Q.175 Digestion of _____ starts in oral cavity due to the action of enzyme present in saliva. (MDCAT-2016)
A. Starch
B. Fatty Acids
C. Cellulose
D. Polypeptides

Q.176 Food is diverted in the esophagus by: (MDCAT-2017)
A. Glottis
B. Cheeks
C. Tongue
D. Epiglottis

Q.177 Salivary amylase begins to digest starch to shorter polysaccharides and then to: (MDCAT-2017)
A. Sucrose
B. Maltose
C. Glucose
D. Lactose

Q.178 Type of salivary glands found in human oral cavity: (MDCAT-2017)
A. 3
B. 6
C. 4
D. 2

Q.179 Lingual lipase is secreted by which gland? (BUMHS-2022)
A. Parotid
B. Submandibular
C. Ebner's gland
D. Sub-maxillary gland

Q.180 Bolus enters the esophagus not the trachea due to presence of: (DUHS-2022)
A. Roof palate
B. Mouth
C. Epiglottis
D. Buccal cavity

Q.181 Gastric glands are composed of _____ types of cells. (MDCAT-2014)
A. Two
B. Four
C. Three
D. Five

Q.182 HCl in gastric juice is secreted by which one of the following cells? (MDCAT-2014, 2015, 2016, 2017)
A. Chief cells
B. Mucous cells
C. Oxyntic cells
D. Kupffer cells

Q.183 Protein components of food are digested by the enzymatic secretion of: (MDCAT-2016)
A. Goblet Cells
B. Zymogen Cells
C. Parietal Cells
D. Oxyntic Cells

Q.184 Digestive system consists of different layers, the innermost is known as: (MDCAT-2016)
A. Submucosa
B. Muscularis
C. Mucosa
D. Serosa

Q.185 Enzyme pepsin acts on: (MDCAT-2017)

Option	Substrate	Product
A.	Proteins	Polypeptides
C.	Polypeptide	Dipeptides
B.	Fats	Fatty acids / glycerol
D.	Proteins	Amino acids

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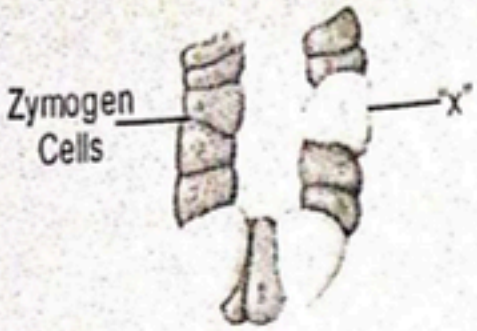
Q.186 Following is the structure of gastric glands in stomach wall where 'x' is: (MDCAT-2017)



A. Mucosa
B. Visceral fat cells
C. Mucus cells
D. Oxyntic cells

Q.187 Enzymatic portion of gastric juice is secreted by which mucosal cell? (NUMS-2022)

A. Oxyntic cells
B. Chief cells
C. Mucus cells
D. Endocrine cells

Q.188 The first chemical digestion of proteins takes place in the: (SZABMU-2022)

A. Mouth
B. Esophagus
C. Stomach
D. Intestine

Q.189 Select the hormone which increases the activity of parietal and chief cells: (SZABMU-2022)

A. Cholecystokinin
B. Secretin
C. Gastrin
D. Acetylcholine

Q.190 The hormone which increases the secretion of pancreatic juice is: (MDCAT-2015)

A. Secretin
B. Thyroxine
C. Gastrin
D. Parathormone

Q.191 Trypsinogen is activated to trypsin by: (MDCAT-2015)

A. HCl
B. Mucus
C. Enterokinase
D. Gastrin

Q.192 All kinds of absorption take place in: (MDCAT-2017)

A. Duodenum
B. Ileum
C. Jejunum
D. Colon

Q.193 Digested food from intestine is carried to the liver by: (UHS-2022)

A. Hepatic artery
B. Hepatic vein
C. Hepatic portal vein
D. Hepatic portal artery

Q.194 Emulsification of large fat globules is facilitated by: (SZABMU-2022)

A. Lipase
B. Bile salts
C. Trypsin
D. Chymotrypsin

Q.195 The emulsification of fats is the role of: (MDCAT-2015)

A. Saliva
B. Gastrin
C. Pancreatic juice
D. Bile

Q.196 Which of the following is not a component of bile? (SZABMU-2022)

A. Digestive enzymes
B. Salts
C. Mucus
D. Lecithin

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Q.197 In human, *Escherichia coli* is involved in the formation of: (MDCAT-2014)
A. Calcium
B. Vitamin A
C. Vitamin D
D. Vitamin K

Q.198 Appendix is finger like process arise from: (MDCAT-2017)
A. Colon
B. Caecum
C. Rectum
D. Small intestine

Q.199 The first part of the large intestine is: (MDCAT-2018)
A. Caecum
B. Colon
C. Rectum
D. Appendix

Q.200 Which one is not a function of large intestine? (NUMS-2022)
A. Absorption of electrolytes
B. Absorption of water
C. Production of vitamin
D. Absorption of amino acids

Q.201 Mucus secreting goblet cells are present in: (KMDC-2014)
A. Larynx
B. Glottis
C. Epiglottis
D. Trachea

Q.202 Site of gaseous exchange in humans is: (MDCAT-2017)
A. Trachea
B. Bronchus
C. Alveoli
D. Nose

Q.203 During breathing air from pharynx enters to: (MDCAT-2018)
A. Alveoli
B. Bronchi
C. Bronchioles
D. Trachea

Q.204 Respiratory tubules are termed as bronchioles when they attain the diameter of _____ or lesser. (MDCAT-2017)
A. 1.2cm
B. 1mm
C. 1cm
D. 1.2mm

Q.205 Label the part 'Y' in the following diagram: (MDCAT-2017)



A. Pleura
B. Chest cavity
C. Diaphragm
D. Inter-coastal muscle

Q.206 In the passageways of the respiratory system, mucus secreting cells are called: (NTS-2019)
A. Tracheal cells
B. Goblet cells
C. Surfactant cells
D. Pleural cells

Q.207 The respiratory surfaces exhibit following characteristic: (UHS-2022)
A. It must be permeable
B. It must be thick for low diffusion
C. It should be non-vascularized
D. It should have low ventilation mechanism

Q.208 The following part is common in both digestive system and respiratory system of human beings: (NUMS-2022)
A. Trachea
B. Pharynx
C. Larynx
D. Esophagus

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Q.209 The area between the two lungs is called: (SZABMU-2022)
A. Periosteum
B. Infundibulum
C. Mediastinum
D. Hilum

Q.210 Which of the following part of human respiratory system forms the gas exchange surface? (ETEA-2022)
A. Trachea
B. Larynx
C. Bronchi
D. Alveoli

Q.211 Where does the trachea lie in relation to the esophagus? (BUMHS-2022)
A. Dorsal
B. Ventral
C. Medial
D. Lateral

Q.212 Breathing consists of: (MDCAT-2016)
A. Four phases
B. One phase
C. Three phases
D. Two phases

Q.213 The low levels of surfactant produced by alveolar epithelium causes: (MDCAT-2018)
A. Emphysema
B. Respiratory distress syndrome
C. Bronchitis
D. Asthma

Q.214 During inspiration, the space inside the chest cavity is increased due to: (MDCAT-2019)
A. Increased pressure
C. The relaxation of the muscle of the diaphragm
B. Relaxation of the external intercostal muscle
D. The contraction of the muscles of the diaphragm

Q.215 Carboxyhemoglobin (10-20%) is formed when CO_2 combines with: (MDCAT-2016)
A. Amino group of haemoglobin
B. Haem portion of haemoglobin
C. Iron part of haemoglobin
D. Plasma proteins

Q.216 Low partial pressure of oxygen in tissues favors _____ of oxyhaemoglobin. (MDCAT-2017)
A. Dissociation
B. Stability
C. Formation
D. Transformation

Q.217 Gaseous exchange in animals takes place with the help of process called as: (MDCAT-2017)
A. Active transport
B. Cyclosis
C. Phagocytosis
D. Diffusion

Q.218 The percentage of carbon dioxide carried as carboxyhaemoglobin is: (ETEA-2022)
A. 70%
B. 23%
C. 15%
D. 7%

Q.219 The average adult human has a lung capacity of approximately: (ETEA-2022)
A. 2 liters
B. 5 liters
C. 9 liters
D. 12 liters

Q.220 The tidal Volume of lungs at rest or during normal breath is: (DUHS-2022)
A. 4 liters
B. 6 liters
C. 0.5 liters
D. 3 liters

Q.221 Which of the following statement is correct about the respiratory pigments? (MDCAT-2018)
A. Albumin, globulin and globular proteins are present in respiratory pigments
B. Myoglobin and haemoglobin has higher affinity for nitrogen
C. Myoglobin has more affinity for oxygen as compared to haemoglobin
D. Cyanide and haemoglobin has low affinity for oxygen

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Q.222 Which of the following is a respiratory disorder related to malnutrition? (MDCAT-2017)
A. Cancer B. Emphysema
C. Asthma D. Tuberculosis

Q.223 Breakdown of thin wall of alveoli occurs in: (MDCAT-2017, 2018, 2019)
A. Emphysema B. T.B
C. Cancer D. Asthma

Q.224 The maximum water potential of pure water is _____. (BUMHS-2022)
A. -100 B. 0
C. 1 D. 100

Q.225 The pathway of water transport in which water moves through plasmodesmata is: (SZABMU-2022)
A. Apoplast B. Symplast
C. Vacuolar D. Ascent of sap

Q.226 Four plants are present in different environmental conditions. Plant A is present in warm climate with continuous rainfall, plant B is present in a cool forest, plant C is present in warm climate with little breeze while plant D is present in warm climate high wind speed. Which one of the above plants will have highest rate of transpiration? (MDCAT-2019)
A. Plant B B. Plant C
C. Plant D D. Plant A

Q.227 _____ is the attractive force between a water molecule and container. (ETEA-2022)
A. Cohesion B. Adhesion
C. Tension D. Transpiration

Q.228 The cells which play very important role in developing immunity are: (PMC-2020)
A. Monocytes B. Lymphocytes
C. Neutrophils D. Thrombocytes

Q.229 Antibodies are manufactured in: (PMC-2020)
A. T lymphocytes B. Platelets
C. Red blood cells D. B lymphocytes

Q.230 The oxygenated blood from lungs to heart is transported by the: (MDCAT-2014)
A. Pulmonary artery B. Pulmonary vein
C. Coronary artery D. Hepatic artery

Q.231 Right atrium is separated from right ventricle by: (MDCAT-2015)
A. Bicuspid Valve B. Tricuspid Valve
C. Semilunar Valve D. Interatrial Septum

Q.232 The flaps of tricuspid valves are attached to muscular extensions of right ventricle known as: (MDCAT-2015)
A. Smooth Muscles B. Intercostal Muscles
C. Papillary Muscles D. Skeletal Muscles

Q.233 In human the closed sac which surrounds the heart is: (MDCAT-2016)
A. Endocardium B. Pericardium
C. Myocardium D. Epicardium

Q.234 Chordae tendineae are the fibrous cords attached with: (MDCAT-2016)
A. Cardiac end of stomach valve B. Pyloric sphincter of stomach
C. Tricuspid valve of heart D. Eyelid

Q.235 Bicuspid valve controls the flow of blood from: (MDCAT-2016)
A. Right atrium to right ventricle B. Left ventricle to aorta
C. Right atrium to left atrium D. Left atrium to left ventricle

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Q.236 Regarding structure of human heart chordae tendineae are present in: (PMC-2020)
A. Atria
B. Renal
C. Pulmonary valve
D. Ventricle

Q.237 In human heart the left atrium receives: (PMC-2020)
A. The superior vena cava
B. The coronary sinus
C. The inferior vena cava
D. The four pulmonary veins

Q.238 Which statement is correct about atrial systole? (MDCAT-2018)
A. Atria relax and ventricles contract
B. Atria contract and ventricle also contract
C. Atria and ventricles are relaxed
D. Ventricles remain relax while atria contract

Q.239 Select the duration of cardiac cycle: (SZABMU-2022)
A. 0.6 sec
B. 0.4 sec
C. 0.7 sec
D. 0.8 sec

Q.240 In human heart, the left atrium receives: (SZABMU-2022)
A. The superior vena cava
B. The inferior vena cava
C. The coronary sinus
D. The four pulmonary veins

Q.241 The heart beat cycle starts when electric impulses are generated from: (MDCAT-2015)
A. AV node
B. SA node
C. SV node
D. PQ node

Q.242 Which one of the following act as a pacemaker in heart? (MDCAT-2018)
A. Atria ventricular node
B. Sino-atrial node
C. Atria ventricular bundles of fibers
D. Bundle of His

Q.243 In ECG, QRS complex represent: (MDCAT-2017, ETEA-2018)
A. Atrial systole
B. Arial diastole
C. Ventricle systole
D. Ventricle diastole

Q.244 Heart beat is normally regulated by: (NUMS-2022)
A. Purkinje fibres
B. AV-bundle
C. SA-node
D. Bundle of His

Q.245 The only vein in the human body carrying oxygenated blood is: (PMC-2020)
A. Femoral
B. Renal
C. Pulmonary
D. Iliac

Q.246 Which of the following blood vessels contain semilunar valves? (MDCAT-2019)
A. Arteries
B. Arterioles
C. Veins
D. Capillaries

Q.247 Flow of blood in the capillaries is adjusted by: (UHS-2022)
A. Heart directly
B. Pre-capillary sphincters
C. Meta-arteriole
D. Valves

Q.248 Histamine causes blood vessels to: (BUMHS-2022)
A. Dilate
B. Constrict
C. Block
D. Rupture

Q.249 Which of the following blood vessels have the highest pressure of blood? (PMC-2020)
A. Aorta
B. Pulmonary veins
C. Pulmonary arteries
D. Vena cava

Q.250 The lymph vessel of villi is called: (MDCAT-2015)
A. Epithelium
B. Adrenals
C. Afferent lymph vessel
D. Lacteal

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Q.251 Thoracic lymph duct of the lymphatic system opens into _____ (MDCAT-2017)
A. Superior vena cava B. Inferior vena cava
C. Sub-clavian vein D. Renal vein

Q.252 The lymphatic vessels of the body empty the lymph into blood stream at: (UHS-2022)
A. Abdominal vein B. Jugular vein
C. Sub-clavian vein D. Bile duct

Q.253 Lymphatic system contains all of the following organs/structures except: (SZABMU-2022)
A. Lymphoid vessels B. Lymph vessels
C. Spleen D. Lungs

Q.254 Which of the following act as lymphatic organ? (BUMHS-2022)
A. Stomach B. Kidney
C. Spleen D. Liver

Q.255 Which part of antibody recognizes the antigen during immune response? (MDCAT-2014)
A. Heavy part B. Constant part
C. Light part D. Variable part

Q.256 Which one of the following glands is involved in the production of lymphocytes? (MDCAT-2014)
A. Pineal B. Thymus
C. Pituitary D. Adrenal

Q.257 Antibodies are proteins and made up of how many polypeptide chains? (MDCAT-2014, 2017)
A. One B. Three
C. Two D. Four

Q.258 T-lymphocytes recognize antigen and attack microorganisms or transplanted organ and tissues. This effect is called: (MDCAT-2014)
A. Cell-mediated response B. Active immunity
C. Humoral immune response D. Passive immunity

Q.259 What type of immunity is achieved by injecting antibodies, antiserum, anti-venom serum? (MDCAT-2014, 2017)
A. Active immunity B. Artificially induced immunity
C. Passive immunity D. Naturally induced immunity

Q.260 In _____ response, B-cells produce plasma cells that synthesize antibodies and release in blood plasma and tissue fluid. (MDCAT-2015, 2016, NTS-2017)
A. Cell-Mediated B. Humoral
C. Hormonal D. Phototactic

Q.261 Response of body against the transplanted organ is: (MDCAT-2015)
A. Homeostatic Response B. Primary Response
C. Behavioral Response D. Cell-mediated Response

Q.262 The type of immunity in which antibodies are passed from one individual to another is called: (MDCAT-2016)
A. Passive Immunity B. Natural Active Immunity
C. Artificial Active Immunity D. Humoral Immunity

Q.263 _____ cells survive for a few days and secrete a huge number of antibodies in blood, tissue fluids or lymph. (MDCAT-2017)
A. Memory B. T-lymphocytes
C. B-lymphocytes D. Plasma clone

Q.264 Vaccination is: (MDCAT-2017)
A. Natural active immunity B. Artificial active immunity
C. Natural passive immunity D. Artificial passive immunity

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Q.265 Cell mediated immune response is given by: (MDCAT-2018)
A. Neutrophils
B. Macrophages
C. T lymphocytes
D. B lymphocytes

Q.266 Anti-venom given after a snake bite venom is an example of: (MDCAT-2018)
A. Artificial active immunity
B. Artificial passive immunity
C. Natural active immunity
D. Natural passive immunity

Q.267 Now a day, every new born gets regular shots of vaccine for polio. It contains _____ for polio to make a child immune against this disease. (MDCAT-2019)
A. Antisera
B. Antibiotics
C. Antibodies
D. Antigens

Q.268 A person got an infection, he became ill but then he survived. What do you think which type of immunity he would have developed? (MDCAT-2019)
A. Naturally induced active immunity
B. Active immunity
C. Artificially induced active immunity
D. Passive immunity

Q.269 The prevention of disease by artificial activation of immune response is possible by: (AJK-2019)
A. Gene therapy
B. Drugs
C. Vaccines
D. Antibodies

Q.270 Is a foreign substance, which stimulates the formation of antibodies? (AJK-2019)
A. Antibiotic
B. Antigen
C. Archaea
D. Transposon

Q.271 Autoimmune diseases act at the principle of: (PMC-2020)
A. Self against antigens
B. Self against self
C. Antigen against self
D. Antigen self-destroyed

Q.272 _____ proteins are produced by WBCs in response to _____ and provide immunity. (UHS-2022)
A. Antibiotics, antigen
B. Antibodies, RBC
C. Globulin, histamine
D. Antibodies, antigen

Q.273 Which of the following helps in developing immunity against germs? (SZABMU-2022)
A. Radiotherapy
B. Chemotherapy
C. Vaccination
D. Antibiotics

Q.274 Feeding by living in or on the other organism (host) belonging to different species is called: (UHS-2023)
A. Mineral nutrition
B. Parasitic nutrition
C. Saprophytic nutrition
D. Symbiotic nutrition

Q.275 The _____ describes how water and dissolved chemicals are carried through the cell wall and intercellular gaps of plants. (UHS-2023)
A. Apoplast theory
B. Symplast theory
C. Vacuolar theory
D. Cytoplasmic theory

Q.276 The pathways of water transport in which water moves through plasmodesmata is: (SZABMU-2023)
A. Apoplast
B. Symplast
C. Vacuolar
D. Ascent of sap

Q.277 The movement of water to lower solute concentration area through a semipermeable membrane is? (UHS-2023)
A. Osmotic potential
B. Pressure potential
C. Soil potential
D. Solute potential

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Q.278 Descending aorta is bifurcated into two vessels which on further division from (form) femoral artery that supply blood to high (Thigh) muscles of legs: (UHS-2023)
A. Iliac vein
B. Iliac artery
C. Temporal artery
D. Sciatic artery

Q.279 In human heart, the left atrium receives: (SZABMU-2023)
A. The Superior Vena Cava
B. The Inferior Vena Cava
C. The Coronary Sinus
D. The four Pulmonary Veins

Q.280 The heart chamber from where Aorta originates: (NUMS-2023)
A. Left ventricle
B. Right ventricle
C. Left atrium
D. Right atrium

Q.281 Choose the correct pathway for the flow of blood: (SZABMU-2023)
A. Arterioles --- metarterioles thoroughfare channel capillaries
B. Capillaries through fare channel metarterioles arterioles
C. Throughfare channel metarterioles capillaries arterioles
D. Metarterioles arterioles throughfare channels capillaries

Q.282 Mesenteric veins drains the blood from: (NUMS-2023)
A. Liver
B. Large intestine
C. Stomach
D. Gall bladder

Q.283 Regarding structure of the human heart, Chordae tendinae are present in: (SZABMU-2023)
A. Atria
B. Pulmonary valve
C. Ventricles
D. Aortic valve

Q.284 In human heart right atrium communicates with right ventricle through: (ETEA-2023)
A. Inter-articular septum
B. Ventricular Septum
C. Tricuspid valve
D. Bicuspid valve

Q.285 The Purkinje fibers are the specialized fibers found in: (ETEA-2023)
A. Human heart
B. Human lungs
C. Human Stomach
D. Human brain

Q.286 Which of the following is known as the vessels of the vessels? (ETEA-2023 Retake)
A. Vasa vasorum
B. Tunica media
C. Tunica externa
D. Tunica interna

Q.287 The sinoatrial node is located in the ____ wall of the right atrium. (ETEA-2023 Retake)
A. Lower dorsal
B. Upper dorsal
C. On the interatrial septum
D. Near the coronary sinus

Q.288 Smooth muscles are found in all mentioned below except: (UHS-2023)
A. Trachea
B. Bronchi
C. Bronchioles
D. Alveoli

Q.289 The method of bringing oxygenated air into contact with a gas exchange surface is called: (UHS-2023)
A. Photorespiration
B. Ventilation
C. Gas transport
D. Respiration

Q.290 Which of the following statements is not correct about alveoli: (ETEA-2023)
A. Alveoli form the gas exchange surface
B. The wall of each alveolus is 0.1 cm thick
C. Alveoli has a dense network of capillaries
D. Collagen and elastin present in alveoli allow it to expand and recoil easily during

Q.291 Where does the Trachea lie in relation to the esophagus? (ETEA-2023 Retake)
A. Dorsal
B. Ventral
C. Medial
D. Lateral

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Q.292 The enzyme which can work on pH 7 of the medium is? (UHS-2023)
A. Pepsin
B. Sucrase
C. Chymotrypsin
D. Pancreatic lipase

Q.293 Trypsinogen can be activated by the action of: (ETEA-2023)
A. Amylase
B. HCl
C. Glucokinase
D. Enterokinase

Q.294 Which enzyme is different from others? (UHS-2023)
A. Pepsin
B. Trypsin
C. Chymotrypsin
D. Lactase

Q.295 Which Proteolytic enzyme is NOT secreted in inactive form? (SZABMU-2023)
A. Chymotrypsin
B. Pepsin
C. Trypsin
D Erypsin

Q.296 The first segment of the small intestine is: (ETEA-2023)
A. Duodenum
B. Jejunum
C. Ileum
D. Colon

Q.297 Mastication causes exocrine glands under the tongue and in the back of mouth to secrete a watery liquid called: (ETEA-2023)
A. Bolus
B. Bile
C. Pancreatic Juice
D. Saliva

Q.298 Pepsinogen is converted into its active form pepsin by: (NUMS-2023)
A. Proteolytic enzyme action
B. Dissolving in mucus
C. Hormonal action
D. Hydrochloric acid

Q.299 Intrinsic factor is secreted by: (NUMS-2023)
A. Pancreas
B. Liver
C. Stomach
D. Duodenum

Q.300 Digestion of which food component starts in oral cavity? (NUMS-2023)
A. Proteins
B. Fats
C. Carbohydrates
D. Vitamins

Q.301 Which may NOT be a possible action of interferons? (SZABMU-2023)
A. Belongs to cytokines
B. Activate natural killer cells
C. Activate immune cells
D. Secrete interleukin

Q.302 The immune cells that clean up pus as a part of the healing process is: (ETEA-2023)
A. Natural killer cell
B. Macrophages
C. Antibodies
D. Neutrophils

Q.303 Which may not be a mode of action of an antibody: (NUMS-2023)
A. Neutralizing an antigen
B. Precipitating an antigen
C. Secretion of cytokines
D. Enhancing phagocytosis

Q.304 The cells which play very important role in developing immunity are? (NUMS-2023)
A. Monocytes
B. Neutrophils
C. Lymphocytes
D. Thrombocytes

Q.305 Vaccination is an example of: (NUMS-2023)
A. Natural passive immunity
B. Natural active immunity
C. Acquired/artificial active immunity
D. Acquired/artificial passive immunity

Q.306 Thymus gland is involved in maturation of which of the following? (ETEA-2023 Retake)
A. Platelets
B. Eosinophils
C. B- lymphocytes
D. T-lymphocytes

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Q.307 Cytotoxic T-cells _____. (ETEA-2023 Retake)
A. Directly kill invaders
B. Aid B-cells in their job
C. Both A and B
D. Suppress T-cells activity

Q.308 All of these following are true about neutrophils except: (ETEA-2023 Retake)
A. Most abundant form of WBCs
B. Have a short life span
C. Made by the thymus gland
D. Released by the bone marrow

Q.309 Which of the following can be effective in preventing viral infection in humans? (ETEA-2023 Retake)
A. Taking antihistamines
B. Getting vaccinated
C. Applying antiseptics
D. Taking antibiotics

Q.310 The final destination of lymph is: (UHS-2023)
A. Lymph node
B. Lymphoid organs
C. Lymph capillaries
D. Subclavian vein

Q.311 The largest body of lymphoid tissue in the human body is: (ETEA-2023)
A. Tonsils
B. Pancreas
C. Spleen
D. Thymus

Q.312 Which of the following is true about bradykinin? (ETEA-2023 Retake)
A. It is produced at the site of tissue injury
B. It has no role in the leakage of fluids into the tissues in inflammation
C. It destroys phagocytes
D. It produces interferon gamma

Q.313 Carnivorous plants have evolved mechanisms for trapping and digesting small animals. The product of this digestion is used to supplement the plant's supply of: (KMU-2024)
A. Carbohydrates
B. Lipids
C. Nitrites
D. Water

Q.314 The leaf is bilobed with midrib and a row of long stiff bristles along the margins of leaf is present in: (SZAMBU-2024)
A. *Drosera intermedia*
B. *Dionaea muscipula*
C. *Sarracenia purpurea*
D. *Nepenthes purpurea*

Q.315 In the roots apoplast pathway becomes discontinuous in the endodermis due to the presence of: (SZAMBU-2024)
A. Casparian strips
B. Pericycle
C. Stele
D. Pith

Q.316 What will happen with the addition of salt to water? (KMU-2024)
A. Water potential will increase
B. Water potential will remain same
C. Osmotic potential will increase
D. Osmotic potential will remain same

Q.317 Plants growing in saline soil face the problem of dehydration due to: (NUMS-2024)
A. Ψw of soil > Ψw of root
B. Ψw of soil < Ψw of root
C. Ψw of root > Ψw of soil
D. Ψw of root = Ψw of soil

Q.318 The total delay in the conductance of action potential from SA node to AV node is: (SZAMBU-2024)
A. 0.10 second
B. 0.15 second
C. 0.08 second
D. 0.20 second

Q.319 Which of the following vessels have larger bore, thin wall with non-pulsatile nature? (SZAMBU-2024)
A. Aorta
B. Arteries
C. Capillaries
D. Veins

Q.320 Weakened papillary muscles of right ventricle would result in constant back flow of blood into: (NUMS-2024)
A. Right atrium
B. Left ventricle
C. Right ventricle
D. Left atrium

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Q.321 Which of the following set of characteristics are related to veins? (NUMS-2024)

	Valves	Wall Thickness	Diameter
A.	Present	Thick	7-9μm
B.	Absent	Thick	40-50 μm
C.	Present	Thinner	40-50 μm
D.	Absent	Thinner	40-50 μm

Q.322 The presence of which molecules distinguish blood from interstitial fluid? (NUMS-2024)

A. Large proteins and electrolytes
B. Glucose and RBCs
C. Antibodies and electrolytes
D. RBCs and large proteins

Q.323 All of the following are the characteristics of veins, except: (SZAMBU-2024-Reconduct)

A. They have broad lumen
B. Direction of blood flow towards heart
C. Thin layer elastic fibers are present
D. Valves are present in the upper part of body

Q.324 Identify the labelled part A & B: (SZAMBU-2024-Reconduct)



A. Aorta and subclavian artery
B. Carotid artery and inferior vena cava
C. Superior vena cava and inferior vena cava
D. Left pulmonary artery and papillary muscles

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Q.325 About 70% of the carbon dioxide is carried in blood as: (UHS-2024)

A. Carbonate
B. Bicarbonate
C. Tricarbonate
D. Carbonic anhydrase

Q.326 Range of normal total lung capacity in humans is: (UHS-2024)

A. 5–6-liter
B. 8-9 liter
C. 10–11-liter
D. 12-13 liter

Q.327 When the diaphragm muscle lowers and the ribs move outward and forward the volume of _____ increases, and the pressure on _____ decreases respectively. (SZAMBU-2024)

A. Abdominal cavity, lungs
B. Lungs, Chest cavity
C. Chest Cavity, Lungs
D. Lungs, Abdominal cavity

Q.328 Lungs are enclosed in the double membranous sac called: (SZAMBU-2024)

A. Pericardium
B. Peritoneum
C. Connective tissue
D. Pleura

Q.329 Which type of the conjugated molecule is absent in respiratory distress syndrome? (SZAMBU-2024)
A. Glycoprotein
B. Lipopolysaccharides
C. Lipoprotein
D. Glycolipids

Q.330 Most of the carbon dioxide in blood is transported as by bicarbonate ions. Choose the event not taking place during gaseous exchange at tissue level. (NUMS-2024)
A. Formation of HHb
B. Formation of sodium bicarbonate
C. Formation of oxyhaemoglobin
D. Chloride shift

Q.331 Which of the following proteins are involved in the expansion and recoiling of alveoli during breathing? (SZAMBU-2024-Reconduct)
A. Collagen and keratin
B. Elastin and heratin
C. Collagen and elastin
D. Collagens and squamous cells

Q.332 The area between the two lungs is called: (SZAMBU-2024-Reconduct)
A. Ischium
B. Mediastinum
C. Acetebuium
D. Hilum

Q.333 Which is true about the cells found in gastric glands lining the stomach wall? (KMU-2024)
A. Chief cells secrete gastrin
B. Hormone cells secrete intrinsic factor
C. Mucus cells secrete mucin
D. Parietal cells secrete pepsinogen

Q.334 Which hormone stimulates the secretion of gastric juice? (KMU-2024)
A. Cholecystokinin
B. Gastrin
C. Insulin
D. Secretin

Q.335 Which of the following salivary gland is present behind the jaws? (SZAMBU-2024)
A. Sublingual
B. Sub-maxillary
C. Maxillary
D. Parotid

Q.336 Gall stones are caused by the precipitation of: (SZAMBU-2024)
A. Calcium phosphate
B. Calcium
C. Cholesterol
D. Proteins

Q.337 At the end of ileum, there is _____ sphincter which opens and closes time to time to allow small amount of residue from ileum to enter the large intestine. (SZAMBU-2024)
A. Pyloric
B. Cardiac
C. Ileocolic
D. Rectal

Q.338 A person with a removed gall bladder experience difficulty in fat digestion due to: (NUMS-2024)
A. Absence of bile
B. Uncontrolled release of bile
C. Reduce alkalinity of bile
D. Absence of bile pigments

Q.339 The pH of pancreatic juice is: (SZAMBU-2024-Reconduct)
A. 0.8
B. 8.0
C. 0.7
D. 0.07

Q.340 Select the mismatched pair: (SZAMBU-2024-Reconduct)

Stomach cell	Function
A. Chief cell	Pepsinogen
B. Endocrine cell	Hormone
C. Parietal cell	Pepsin
D. Mucus cell	Mucus

Q.341 What directly triggers the activation of natural killer cells? (KMU-2024)
A. Free radicals
B. Hydrogen peroxide
C. Oxygen
D. Interferons

Q.342 In an inflammatory response, bradykinin causes: (KMU-2024)
A. Activation of natural killer cells
B. Blockage in blood vessels
C. Constriction of blood vessels
D. Leakage of fluid from blood vessels

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Q.343 Which of the following is an example of passive immunity: (KMU-2024)

A. Antibodies from mother's milk
B. Previous chickenpox infection
C. Inactivated polio vaccine
D. Live polio vaccine

Q.344 If a person becomes ill with HIV and survives, then the type of immunity developed is: (SZAMBU-2024)

A. Artificial passive immunity
B. Natural passive immunity
C. Artificial active immunity
D. Natural active immunity

Q.345 Which of the following chemicals is responsible for causing inflammation in upper respiratory tract? (SZAMBU-2024)

A. Acetyl amine
B. Ampicillin
C. Histamine
D. Nicotine

Q.346 During COVID-19 epidemic the plasma of recovered patients was injected in COVID patients. This proved quite effective, which component of plasma do you think was responsible for this? (NUMS-2024)

A. Plasminogen
B. Interferon
C. Antibodies
D. Interleukin-I

Q.347 Choose the one which is an example of artificial active immunity: (NUMS-2024)

A. Foetus receiving antibodies of mother through placenta
B. Mother receiving antibodies
C. Babies receiving MMR shorts
D. Prevention of disease due to previous infection

Q.348 Which of the following type of T-cells are required for the activation of B-cells? (NUMS-2024)

A. Helper T-cells
B. Cytotoxic T-cells
C. Suppressor T-cells
D. Memory T-cells

Q.349 Immunity provided to baby through colostrum is an example of: (SZAMBU-2024-Reconduct)

A. Natural active immunity
B. Artificial active immunity
C. Natural passive immunity
D. Artificial passive immunity

Q.350 Antibodies are manufactured in: (SZAMBU-2024-Reconduct)

A. T lymphocytes
B. Red blood cells
C. Platelets
D. B lymphocytes

Q.351 Which of the following would not be compromised in the absence of lymphatic system? (NUMS-2024)

A. Blood pressure
B. Oxygen carrying capacity of blood
C. Blood composition
D. Defense mechanism

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ANSWER KEY

PRACTICE EXERCISE

1	B	16	C	31	A	46	B	61	A	76	D	91	B	106	B	121	C	136	D	151	B	166	C
2	A	17	A	32	C	47	B	62	A	77	A	92	A	107	A	122	B	137	B	152	C	167	B
3	A	18	A	33	C	48	C	63	C	78	D	93	B	108	C	123	B	138	D	153	D	168	A
4	C	19	C	34	A	49	D	64	C	79	B	94	D	109	A	124	A	139	B	154	B	169	B
5	A	20	C	35	C	50	B	65	B	80	B	95	D	110	B	125	B	140	B	155	A	170	B
6	A	21	D	36	C	51	A	66	B	81	A	96	B	111	B	126	C	141	C	156	D	171	C
7	A	22	D	37	A	52	A	67	D	82	A	97	D	112	D	127	C	142	A	157	C	172	B
8	D	23	A	38	C	53	B	68	A	83	D	98	D	113	B	128	B	143	C	158	B	173	B
9	C	24	D	39	B	54	B	69	B	84	B	99	C	114	D	129	A	144	C	159	D		
10	C	25	C	40	B	55	C	70	A	85	A	100	B	115	B	130	B	145	C	160	C		
11	B	26	B	41	B	56	A	71	C	86	B	101	D	116	B	131	D	146	B	161	A		
12	D	27	C	42	A	57	B	72	D	87	D	102	B	117	D	132	D	147	C	162	C		
13	A	28	A	43	C	58	C	73	D	88	A	103	B	118	A	133	B	148	A	163	C		
14	A	29	D	44	C	59	D	74	B	89	D	104	B	119	D	134	B	149	D	164	D		
15	A	30	C	45	C	60	B	75	A	90	B	105	B	120	A	135	B	150	B	165	B		

PAST PAPER MCQ'S

174	D	194	B	214	D	234	C	254	C	274	B	294	D	314	B	334	B			
175	A	195	D	215	A	235	D	255	D	275	A	295	D	315	A	335	B			
176	D	196	A	216	A	236	D	256	B	276	B	296	A	316	C	336	C			
177	B	197	D	217	D	237	D	257	D	277	A	297	D	317	C	337	C			
178	A	198	B	218	B	238	D	258	A	278	B	298	D	318	B	338	B			
179	C	199	A	219	B	239	D	259	C	279	D	299	C	319	D	339	B			
180	C	200	D	220	C	240	D	260	B	280	A	300	C	320	A	340	C			
181	B	201	D	221	C	241	B	261	D	281	A	301	D	321	C	341	D			
182	C	202	C	222	D	242	B	262	A	282	B	302	B	322	D	342	D			
183	B	203	B	223	A	243	C	263	D	283	C	303	C	323	D	343	A			
184	C	204	B	224	B	244	C	264	B	284	C	304	C	324	B	344	D			
185	A	205	C	225	B	245	C	265	C	285	A	305	C	325	B	345	C			
186	D	206	B	226	D	246	C	266	B	286	A	306	D	326	A	346	C			
187	B	207	A	227	B	247	B	267	D	287	B	307	C	327	C	347	C			
188	C	208	B	228	B	248	A	268	A	288	D	308	C	328	D	348	A			
189	C	209	C	229	D	249	A	269	C	289	B	309	B	329	C	349	C			
190	A	210	D	230	B	250	D	270	B	290	B	310	D	330	C	350	D			
191	C	211	B	231	B	251	C	271	B	291	B	311	C	331	C	351	B			
192	C	212	D	232	C	252	C	272	D	292	C	312	A	332	B	-				
193	C	213	B	233	B	253	D	273	C	293	D	313	C	333	C					

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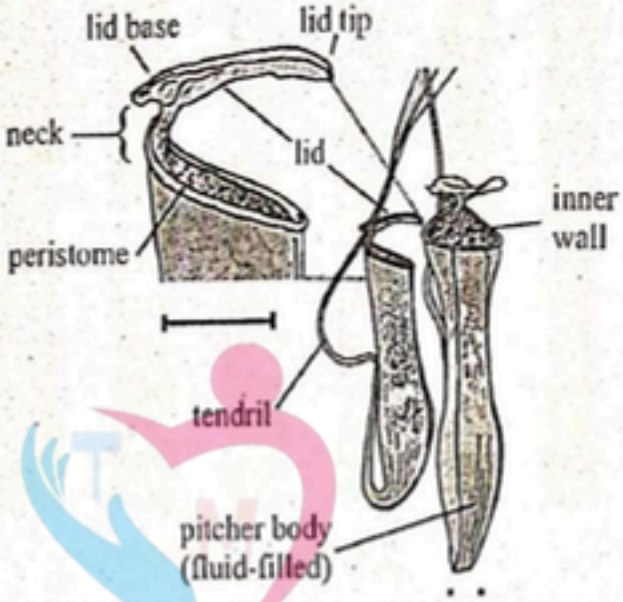
EXPLANATORY NOTES

PRACTICE EXERCISE

1. Insectivorous plants are both autotrophs and heterotrophs as they can photosynthesize but the soil in which they grow is nitrogen deficient so they capture insects for obtaining nitrogen.
2. *Sarracenia purpurea*, commonly known as the purple pitcher plant and a hood formed from its leaf can be seen in diagram.



3. Dodder is an annual seed-bearing parasitic vine while all others are insectivorous plants. Insectivore plants fulfill their nitrogen deficiency by consuming insects or small organism.
4. Those animals which have tubular type digestive system are more complex as compared to sac like digestive system. Tube has two openings.
5. Oral cavity, stomach and small intestine are the main sites of digestion. Each site is specific for digestion of different biochemicals.
6. Mastication increases the surface area of food particles which provides site of action for enzymes and significantly improves the digestibility.
7. Oral cavity has amylase enzyme and intestine has amylopsin, lactase and maltase for complete digestion of carbohydrates.
8. Explanation: Monosaccharides are already in their simplest form and cannot be part of the bolus after the partial digestion of rice, as the starch (amylose) in rice would be broken down into smaller sugars before absorption.
9. Smell, taste and sight help for selection of food. Sound is not related to food selection.
10. 1-Selection of food, 2-Mastication, 3-Lubrication, 4-Enzymetic digestion of food (starch) will occur in oral cavity.
11. $NaHCO_3$ is bicarbonate which neutralizes the pH in acidic environment. It increases the pH.
12. Teeth cleansing is not affected by tongue movement. Nasal opening, epiglottis, and peristalsis are influenced by tongue movement.
13. Esophagus is a muscular tubular part which starts peristalsis in alimentary canal and secretes no enzyme.

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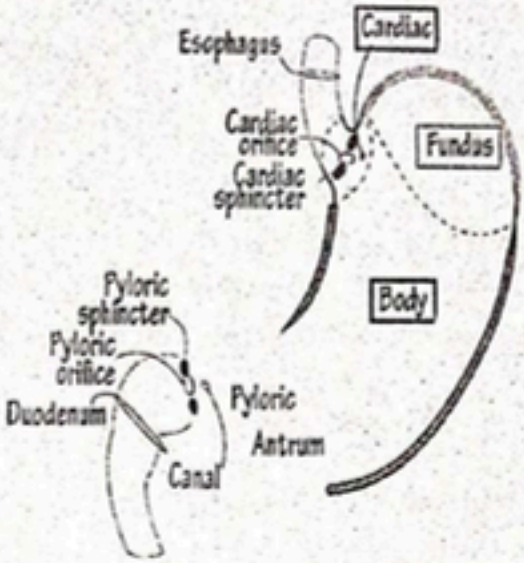
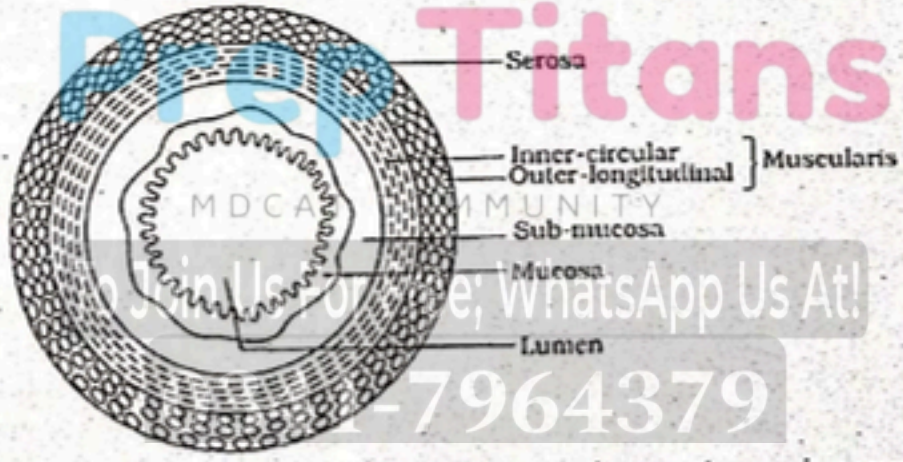
14.



15. Amylase is an enzyme which hydrolyzes the starch into maltose. While other chemicals are hormones.
16. High protein in food stimulates the release of gastrin which acts on epithelial cells to increase the secretion of stomach.
17. Rennin is an enzyme in new born for colostrum digestion. Rennin is an enzyme released from stomach.
18. As the middle layer is made up of smooth muscles which contract and relax and generate peristalsis which is responsible for contraction and relaxation.
19. Pepsin is an active enzyme which converts proteins into polypeptides and peptones in stomach.
20. Proteins and fats begin digestion in the stomach, but cellulose (a fiber) remains undigested because humans lack the enzymes to break it down.
21.



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22. Lactose is a disaccharide and composed of glucose and galactose; lactase is enzyme that breaks lactose.
23. Small intestine is divided into duodenum, jejunum and ileum for complete digestion and absorption due to their secretions and large surface area.
24. The vein that pours blood from liver to circulatory system is hepatic vein whereas hepatic portal vein pours blood from digestive system to liver.
25. Lymphatic vessels carry lipoproteins, in the form of chylomicrons, from the digestive tract to the bloodstream.

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26. Lipase is an enzyme for lipid digestion which is secreted from pancreas and intestinal lining of small intestine.
27. Protein present in lymph combines with fats absorbed from digestive system through lacteals.
28. Lacteals are present in villi to absorb and transport fats to the blood in the form of lipoprotein.
29. Gastrin and secretin are the hormones which are secreted into the blood and do not pass to large intestine as fecal material.
30. Small intestine has smaller diameter as compared to large intestine.
31. Ptyalin is present in oral cavity for starch digestion.
32. Thoracic lymphatic duct is the main duct which transfers lipoproteins into blood.
33. Amylase and amylopsin are present in buccal cavity and duodenum respectively for starch digestion.
34. Pepsin is present in stomach and works in acidic pH while trypsin is present in intestine and works in alkaline pH.
35. Stomach and duodenum secrete hormones and act as endocrine glands.
36. All secretions have enzymes except bile. It is involved in mechanical digestion of fats which is called emulsification.
37. Pancreas provides a set of enzymes and $NaHCO_3$ for digestion of carbohydrates, proteins and fats. Liver has no enzymatic secretion.
38. The pancreas produces bicarbonate, which neutralizes the acidic contents from the stomach as they enter the small intestine, specifically the duodenum.
39. When acidic chyme touches the lining of duodenum wall it stimulates the secretion of hormone secretin. It in turn stimulates hepatic and pancreatic secretions and inhibit gastric secretion.
40. Small intestine secretes aminopeptidase enzyme. Others chemicals are secreted by pancreas.
41. Pancreas has complete set of enzymes for digestion of all principal components (carbohydrates, proteins and lipids) of food.
42. Liver is a metabolic station and has a lot of enzymes for metabolism.
43. Gall stones are formed in gall bladder. Function of gall bladder is to concentrate bile. One of the components of bile is cholesterol that starts to accumulate in gall bladder. It can lead to gall stones.
44. Large intestine has colon in the form of ascending, transverse, descending and sigmoid colon.
45. Large intestine provides site for absorption of water and electrolytes.
46. Ileocolic sphincter allows materials to pass from ileum to large intestine.
47. Food poisoning includes diarrhea, abdominal pain and vomiting. As a result, there can be severe loss of salts and water in body. To compensate that loss ORS is given.
48. Fat in controlled amount is not hazardous for health but when its level increases in body it can lead to a condition known as obesity.
49. Ciliated epithelium containing goblet cells are present in all structure but absent in bronchioles.
50. Air while passing through the nasal cavity becomes warm, moist and filtered of smaller foreign particles by mucous membrane.
51. Larynx is also known as voice box and has vocal cords for sound production. It is made up of complex cartilaginous structure surrounding the upper end of the trachea.
52. During swallowing backward movement of tongue pushes the soft palate up and closes the nasal opening at the back.
53. Chamber of the body of vertebrates that is protected by the rib cage is called thoracic cavity.
54. When the diameter of bronchi becomes 1mm or less and it is devoid of cartilage is named as bronchioles.

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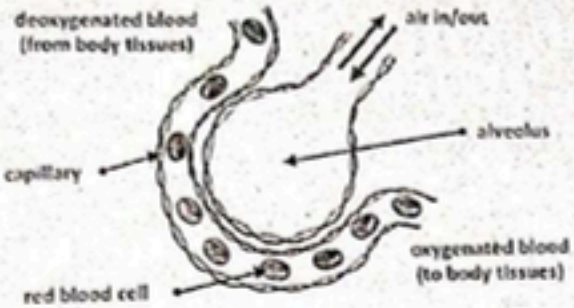
55. Bronchioles have circular smooth muscles. Cartilage and ciliated epithelium are absent in bronchioles.

56. Air sac is the functional unit of the lungs. Air sac consists of several microscopic single layered structures called alveoli.

57.



58. The diaphragm is a thin skeletal muscle that sits at the base of the chest and separates the abdomen from the chest. It contracts and flattens when you inhale. This creates a vacuum effect that pulls air into the lungs.

59. Air while passing through the nasal cavity becomes warm, moist and filtered of smaller foreign particles by mucous membrane.

60. Epithelium of alveoli is squamous or flattened epithelial cells, very thin and irregular in outline, occur as the covering epithelium of the alveoli of the lung.

61. In the glottis, the mucous membrane is stretched across into two thin edged fibrous bands (1 pair) called vocal cords, which help in sound production.

62. In the glottis, the mucous membrane is stretched across into two thin edged fibrous bands called vocal cords, which help in sound production.

63. Pharynx has three sections: (i) Nasopharynx, (ii) Oropharynx and (iii) Laryngopharynx

64.



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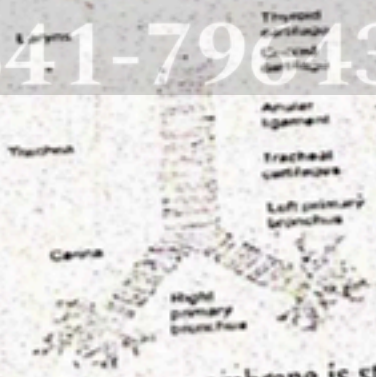
65.



66. In the glottis (upper end of larynx) the mucous membrane is stretched across into two thin edged fibrous bands called vocal cords, which help in sound production.

67. Surfactants are compounds that lower the surface tension (or interfacial tension) between two liquids, between a gas and a liquid, or between a liquid and a solid.

68. Medulla controls breathing in humans. Breathing has two phases. Inspiration is controlled by ventral portion of medulla and expiration is controlled by lateral and dorsal portion of medulla.

69. Surfactant (the mixture of lipoproteins) is produced by the secretory cells of the alveolar epithelium.

70. Surfactants is a lipoprotein layer inside alveoli, which reduce surface tension between water molecules to increase gases exchange.

71. At rest, we inhale and exhale 15-20 times per minute. During exercise, the breathing rate may rise to 30 times per minute.

72. Over all process of breathing is active and consumes energy during inspiration in the form of ATP.

73. Exhaled air has saturated water contents as compared to inhaled air which has variable water contents.

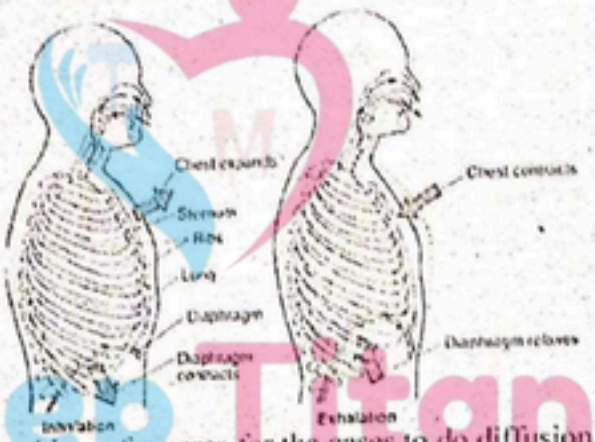
74. O_2 is diffused from atmospheric air (inspired) having partial pressure 159mmHg to the alveoli where pO2 is less, i.e., 116mmHg.

75. Lungs neither pull air in nor can they push it out. During inspiration passive expansion of elastic lungs occurs and expiration is due to passive contraction of lungs.

76. CO_2, O_2, pH and temperature are the factors that affect the capacity of haemoglobin to combine with oxygen

77. If we hold our breath for long time, then due to increased metabolic activity CO_2 level will increase and pH will decrease.

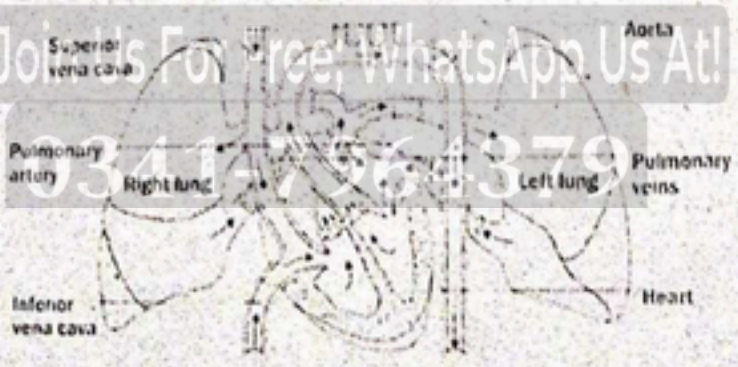
78.



79. Gaseous exchange requires thin surface area for the gases to do diffusion. It is one the property of respiratory surface.

80. Carbon dioxide is much more important than oxygen as a regulator of normal alveolar ventilation.

81.



82. The affinity of CO with haemoglobin is more than that of CO_2, similarly, the affinity of CO_2 with haemoglobin is more than O_2.

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83. Level of carbon dioxide in the blood is stimulus for breathing. More carbon dioxide in the blood will lead to the carbonic acid formation and so more will be the H^+ ions concentration. This leads to decrease in oxygen carrying capacity of haemoglobin.

84. Venus blood contains 4% more CO_2 per 100ml (54ml/100ml) of blood as compared to arterial blood (50ml/100ml). However, the case is reverse for pulmonary circulation.

85. Binding site of CO and O_2 with haemoglobin is Fe^{++} of haem.

86. Carbon dioxide is more soluble in blood than oxygen; about 5 to 7 percent of all carbon dioxide is dissolved in the plasma.

87. When oxygen tension is 115mmHg, haemoglobin is 98% saturated and, therefore, contains 19.6ml of oxygen per 100ml of blood.

88. 70% of carbon dioxide is transported in the form of $NaHCO_3$. CO_2 combines with amine group of haemoglobin.

89. During cellular respiration, oxygen is used and carbon dioxide is produced, due to the consumption of oxygen there is least partial pressure of oxygen at tissue level.

90. More CO_2, less O_2, high temperature and less pH facilitate oxygen dissociation from oxyhaemoglobin.

91. Addition of H^+ ions or electrons is known as reduction. Reduced form of haemoglobin contains H^+.

92. 90% of cytoplasm of erythrocytes is occupied by haemoglobin. Each molecule of haemoglobin carries four oxygen molecules.

93. Residual volume is the volume of air remaining in the lungs after maximum forceful expiration. Its value is between 1400 and 1600 ml.

94. The amount of extra air inhaled (above tidal volume) during a deep breath is inspiratory reserve volume. 6000 ml is the total lung capacity.

95. Haemoglobin has four polypeptide chains; each chain has one haem group which can bind with single oxygen molecule.

96. Without hemoglobin transport of oxygen in blood would be greatly reduced as one molecule of haemoglobin can bind four molecules of oxygen at a time.

97. The actual colour of RBCs is red and it is due to the presence of iron in the haem group of haemoglobin.

98. Haemoglobin has four polypeptide chains and each one contains a haem group.

99. Rickets is the softening and weakening of bones in children, usually because of an extreme and prolonged vitamin D deficiency.

100. Emphysema is a lung condition that causes shortness of breath. In people with emphysema, the air sacs in the lungs (alveoli) are damaged. Over time, the inner walls of the air sacs are weakened and ruptured creating larger air spaces instead of many small ones.

101. A root hair or the rhizoid of a vascular are extensions of epidermal cells of root. As they are lateral extensions of a single cell and only rarely branched, they are visible to the naked eye and developed in maturation region of roots.

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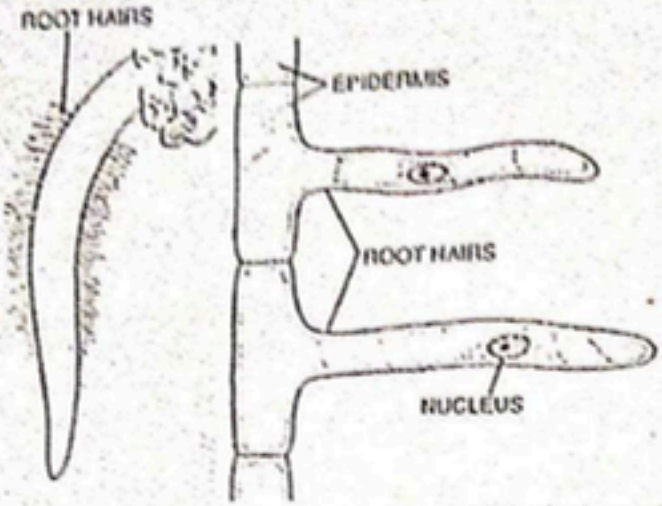
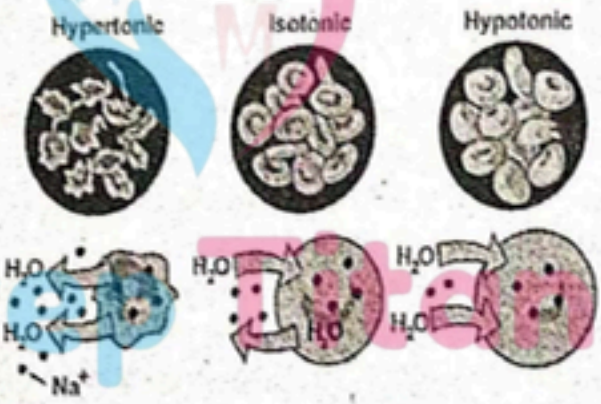
102.



103. Facilitated diffusion is the transport of substances across a biological membrane from an area of higher concentration to an area of lower concentration with the help of a transport protein.

104. When a cell is placed in distilled water, it starts to gain turgidity as water enters the cell wans swells it.

105.



106. A vacuole is a membrane-bound organelle (tonoplast). They are a kind of vesicle. Vacuoles are closed sacs, made of membranes with inorganic or organic molecules inside, such as enzymes. Protoplast is cell without cell wall. Cisternae are the structure present in endoplasmic reticulum, while cristae are the inholdings of inner mitochondrial membrane.

107. Hydrogen bonding between water molecules is a vital force and this helps in transportation of material in plants. This is strongly supported by a theory known as ascent of sap.

108. Sucrose is transported by phloem. In plants material movement is between source (Leaves) to sink (Area of metabolism or storage such as growing tips etc.)

109. Well accepted theory that explains transport of organic solutes in plants is pressure flow theory while force of diffusion cannot elaborate it. Imbibition and ascent of sap explain transport of water in xylem.

110. When sucrose is loaded from companion cells to sieve tube cell, this is accompanied by usage of ATP. Use of ATP to perform a process in living cell is known as active transport.

111. These flaps are attached with fibrous cords called chordae tendinae, to the papillary muscles which are extensions of the wall of the ventricles.

112. The wall of left ventricle is thicker (3 times) than that of right ventricle.

113. The nature of valves present in the heart is muscular and muscles ensure the unidirectional flow of blood in circulation.

114. The right ventricle pumps deoxygenated blood into the pulmonary circulation for oxygenation and the left ventricle pumps oxygenated blood into the systemic circulation through aorta.

115. Mitral valve is another name used for bicuspid valve and prevents the entry of blood from left ventricle to left atrium.

116. At the base of aorta, first pair of arteries, the coronary arteries arise and supply blood to heart.

117. When ventricle contraction starts, atrio-ventricular valve close to prevent back flow of blood and semilunar valve open to move blood out form heart.

118. On ventricular contraction blood from right ventricle is pumped into pulmonary trunk and from left ventricle blood is pumped into aorta. To prevent backflow of blood into ventricles there are semilunar valves at the base of aorta and pulmonary trunk.

119. Myocardium of heart has striations which show similarity with skeletal muscles but cardiac muscles are involuntary in action.

120. In humans, only left systemic arch is present while in birds only right systemic arch is present.

121. First artery that arises from base of aorta is coronary artery which supplies oxygenated blood to the heart.

122. Descending aorta is bifurcated into two iliac arteries which on further division form femoral artery that supplies blood to thigh muscles of legs.

123. The pulmonary vein carries oxygenated blood from the lungs to the left atrium.

124. The hepatic portal vein is a vessel that moves blood from the spleen and gastrointestinal tract to the liver. It is approximately three to four inches in length and is usually formed by the merging of the superior mesenteric and splenic veins behind the upper edge of the head of the pancreas.

125. At the end of ventricular systole, atrio-ventricular and semilunar valves close.

126. In healthy adults, there are two normal heart sounds, often described as a lubb and a dubb, that occur in sequence with each heartbeat. These are the first heart sound (S1) and second heart sound (S2), produced by the closing of the atrio-ventricular valves and semilunar valves, respectively.

127. During ventricle contraction two heart sounds produce, 1st sound is "Lubb" produced when AV-valves close while the 2nd heart sound is "Dubb" which is produced when semilunar valves close.

128. The atrioventricular node or AV node is a part of the electrical conduction system of the heart that coordinates the top of the heart. It electrically connects the atria and ventricles.

129.

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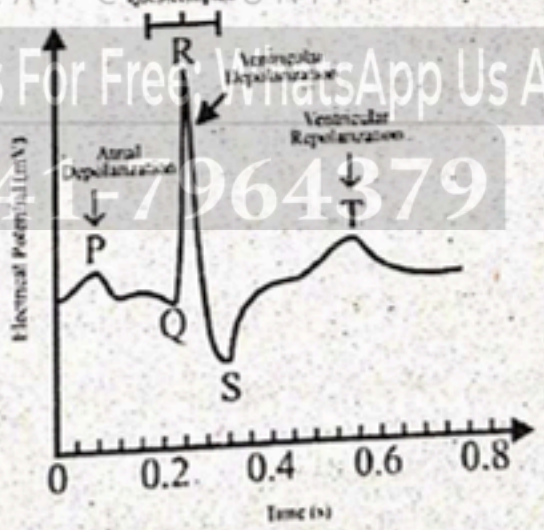


130. Arteriosclerosis is a degenerative disorder which is the result of continuous process based on degenerative cellular changes affecting tissues or organs, and will increasingly deteriorate over time.

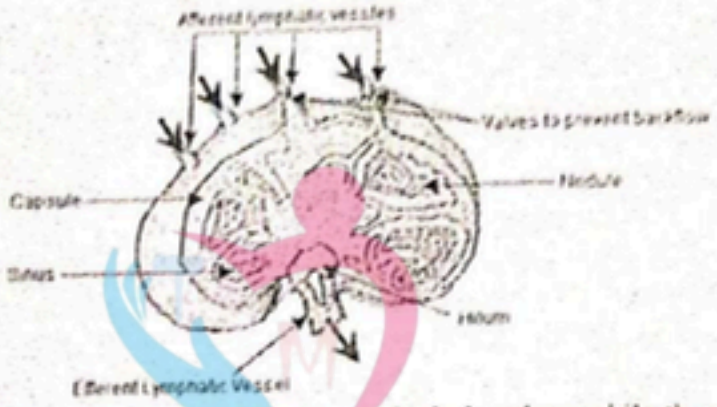
131. Transportation of absorbed lipids from small intestine, filtration of blood by spleen and immunity is related to the lymphatic system while filtration of urea is the function of kidneys.

132. Lymph is extra cellular fluid present in lymph vessels. Subclavian vein is a part of blood circulatory system.

133. The lymph is formed when the interstitial fluid (the fluid which lies in the interstices of all body tissues) is collected through lymph capillaries.

134.

Lymph Node Structure



135. The largest lymphoid structure present in the human body is spleen while thymus, adenoid and tonsils are relatively small structures.

136. Lymph flow from body parts is assisted by the movement of viscera, breathing movement and skeletal muscles.

137. Lymph nodes are important for the proper functioning of the immune system, acting as filters for foreign particles and cancer cells. Lymph nodes do not have a detoxification function, which is primarily dealt by liver.

138. The thoracic duct is the largest lymphatic vessel within the human body. Lymph before entering into the blood passes through lymphatic duct.

139. Lymph movement is controlled by the contraction of skeletal muscles; the calf muscles are skeletal muscles in lower limbs that will assist the movement of lymph.

140. After some fatty meal fat globules forms 1% of lymph that returns to blood.

141. The thoracic duct is the largest lymphatic vessel within the human body. Lymph enters into left subclavian vein through thoracic duct.

142. Recognition of antigen is important in both types of responses. However, tissue rejection is a cell mediated response, on the other hand production of antibodies and plasma clone formation is achieved by cell humoral response.

143. Tetanus vaccine, also known as tetanus toxoid, is an inactive vaccine used to prevent tetanus. It is considered as artificial active immunity.

144. Passive immunity can occur naturally, when maternal antibodies are transferred to the fetus through the placenta and it can also be induced artificially, when high levels of antibodies specific to a pathogen or toxin (obtained from humans, horses, or other animals) are injected to affected person.

145. Two light and two heavy chains are visible in given diagram.

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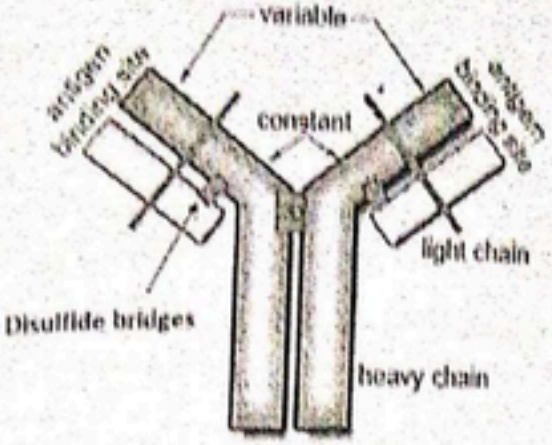


146. An antibody, also known as an immunoglobulin, is a large, Y-shaped globular protein produced mainly by plasma cells that is used by the immune system to phagocytose the antigens or neutralize their toxins.

147. As we can see antigen binding sites are present on variable region of both heavy and light chains

148. Antigen is a toxin or other foreign substance which induces an immune response in the body, especially the production of antibodies.

149. Hemoglobin mobilization is the function of blood and heart that comes under circulatory system.

150. HIV is dangerous because the virus destroys the cells of immune system. HIV replicates within helper T lymphocytes and destroys them.

151. Specific immunity is the result of 3rd line of defense which includes lymphocytes.

152. Phagocytes are type of cells within the body capable of engulfing and absorbing bacteria and other small cells or particles. These are neutrophils and monocytes that form 2nd line of defense.

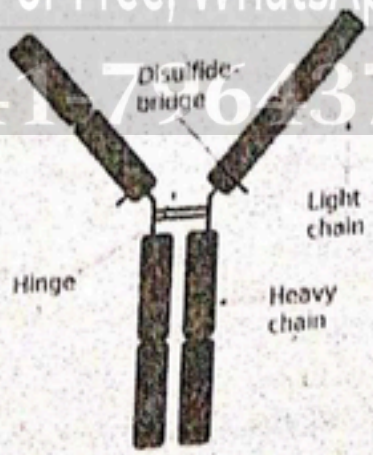
153. Skin, HCl and mucous are examples of barriers which constitute 1st line of defense while antibodies produced by lymphocytes which belong to 3rd line of defense.

154. Cyclosporine is used to prevent organ rejection (cell mediated) in people who have received a liver, kidney, or heart transplant. It is usually taken along with other medications to allow your new organ to function normally. Cyclosporine belongs to a class of drugs known as immuno-suppressants.

155. The innate immunity, also known as the non-specific immunity or in-born immunity, is an important subsystem of the overall immune system that comprises the cells and mechanisms that defend the host from infection by other organisms.

156. In passive immunization, we inject antibodies in the body; body does not make its own antibodies.

157.



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158. Vaccines have been prepared against different types of bacterial and viral infections, but there is no vaccine against fungus yet.
159. For immunity purpose antibodies or immunoglobulin are produced by all vertebrates which protect them against pathogens.
160. Any foreign substance which induces an immune response in the body of organism especially by producing antibodies is called antigen.
161. In humoral immune response B-lymphocytes proliferate and form plasma clone cell and memory cells. Plasma clone cells produce antibodies which phagocytose an antigen or neutralize toxins produced by pathogens.
162. B-lymphocytes are cells of immune system that produced from bone marrow in human but in case of birds they are originated from Bursa of Fabricius which is a lymphoid mass.
163. Tiny hairs called cilia protect the nasal passageways and other parts of the respiratory tract, filtering out dust and other particles that enter the nose through the inhaled air.
164. The epithelium in the gut secretes enzymes, absorbs nutrients, and can also secrete hormones.
165. The stomach does not directly digest dipeptides. This process occurs mainly in the small intestine after protein digestion is completed in the stomach.
166.
- Bile is secreted by hepatic cells of liver.
- Acinar cells of pancreas produce pancreatic juice.
- Gall bladder stores bile.
- Kupffer cells are macrophages of liver.

167. Glottis is the opening of windpipe. Epiglottis is a cartilaginous flap that covers the glottis during swallowing. Larynx or voice box is around the opening of windpipe.
168. Bicarbonate ions are formed from splitting of carbonic acid which is formed by the activity of carbonic anhydrase.
169. Oxygen and carbon dioxide in human blood are transported by hemoglobin. In muscles oxygen is stored and transferred by myoglobin.
170. In a hypertonic solution, water leaves the cell due to exosmosis, causing plasmolysis (shrinking of the cytoplasm).
171. Chlorophyll contains magnesium (Mg), while hemoglobin contains iron (Fe), both critical for their respective functions in plants and animals.
172. During diastole and atrial systole, AV valves are open and SL valves are closed. During ventricular systole, AV valves close and SL valves open.
173. The constant region is the same for all antibodies of the same class, ensuring the same type of immune response.

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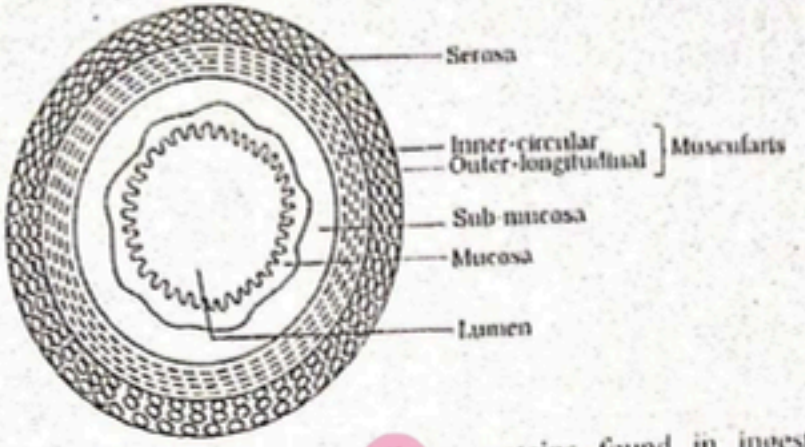
174. Money plant is not insectivore. It can remove air born pollutants from indoor air. Remaining plants are example of insectivore plants.
175. The main function of amylases is to hydrolyze the glycosidic bonds in starch molecules with in oral cavity, converting complex carbohydrates to simple sugars.
176. The epiglottis is a leaf-shaped flap in the throat that prevents food from entering the windpipe and the lungs.
177. Salivary amylase begins to digest starch to shorter polysaccharides and then to maltose.
178. Human oral cavity have three types of salivary glands;
i. Parotid gland ii. Submaxillary or submandibular gland iii. Sublingual gland
179. Ebner's gland secretes lipase enzyme while other glands contribute in saliva formation.
180. The epiglottis is a leaf-shaped flap in the throat that prevents food from entering the windpipe and the lungs. Remaining structures do not participate in this process.

181. These glands are composed of three major cell types: zymogens, parietal, and mucous cells.

182. Oxyntic cells or Parietal cells within the stomach lining secrete hydrochloric acid that lowers the pH of the stomach.

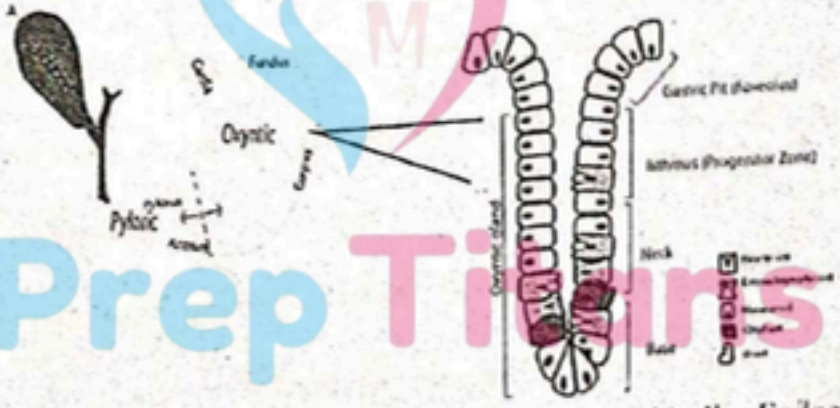
183. Zymogenic (chief) cells, which are thought to produce the enzymes pepsin and rennin. (Pepsin digests proteins, and rennin curdles milk).

184.



185. Pepsin is a stomach enzyme that serves to digest proteins found in ingested food. Other biochemicals are not digested by stomach.

186.



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187. Pepsinogen is secreted by chief cell, zymogen cells or principal cells. Endocrine cells secret hormones, mucus cells secrete mucus and oxyntic cells secrete HCl.

188. In oral cavity, only starch is digested, then bolus moves towards esophagus where no enzyme is added. Then bolus enters into stomach where its protein part is digested. After that chyme moves towards small intestine. Where it's all components are broken down.

189. Cholecystokinin and secretin are secreted in small intestine. Acetylcholine is released from presynaptic part of neuron.

190. Secretin is a hormone released into the bloodstream by the duodenum (especially in response to acidity) to control secretion by the liver and pancreas.

191. Enterokinase is an enzyme produced by cells of the duodenum and is involved in digestion in humans and other animal. It converts trypsinogen into its active form trypsin, resulting in the subsequent activation of pancreatic digestive enzymes.

192. Ileum is the 3rd part of small intestine and all types of food components such as monosaccharides, amino acids, fatty acids take place in this section.

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193. Only hepatic portal vein carries blood from intestine to liver. Other structures are not not involved in this circulation.

194. Bile salts help emulsify large fat globules, breaking them into smaller droplets, which increases the surface area for lipase action during digestion.

195. When bile enters the small intestine, it mixes with the fat globules and cause them to break down into smaller units called emulsion droplets. This process is called emulsification. Emulsification greatly increases the surface area of the fat on which the lipase can actually act on.

196. Bile is produced by the liver and it does not contain any enzyme. It is consisted of following major parts:
- Bile salts
- Bile pigments
- $NaHCO_3$
- H_2O

197. In large intestine vitamin K is formed by the activity of a symbiotic bacterium; *E coli*.

198. The appendix (vermiform appendix) is a finger-like, blind-ended tube connected to the cecum

199. Large intestine has 3 parts. i. Caecum, (appendix is attached to ceacum) ii. Colon and iii. Rectum.

200. Amino acids have already absorbed in small intestine. Large intestine cannot absorb them. It also produces vitamin K.

201. Goblet cells in the trachea secrete mucus that helps trap dust, microbes, and other particles, aiding in respiratory protection.

202. Air sac is the functional unit of the lungs. Air sac consists of several microscopic single layered structures called alveoli. Gaseous exchange occurs at alveoli.

203. During breathing, air from the pharynx passes into the trachea, which then directs it to the bronchi and further into the lungs.

204. When the diameter of bronchi becomes 1 mm or less and it is devoid of cartilage is named as bronchioles.

205. The diaphragm is a thin skeletal muscle that sits at the base of the chest and separates the abdomen from the chest.

206. Goblet cells are unicellular structures which present in respiratory system and secrete mucus.

207. Respiratory surface must be permeable, thin for high diffusion, highly vascularize and efficient ventilation mechanism.

208. Pharynx (throat) is common for digestion and respiration. It is muscular structure. It has three regions.

209. The mediastinum is the central area between the two lungs that contains the heart, trachea, esophagus, and other structures.

210. Trachea, larynx, bronchi and alveoli are part of lower respiratory tract but gas exchange is only possible through alveoli.

211. Ventral is the underside of an organism or an organ. Trachea is referred as wind pipe. It is divided into bronchi.

212. Breathing is mechanical process consisting of two phases i.e., inspiration and expiration.

213. Respiratory distress syndrome is common, and it occurs because enough surfactant is not produced by secretory cells of the alveolar epithelium.

214. During inspiration muscles of ribs and diaphragm contract due to which ribs are elevated and diaphragm becomes less dome shaped. The space in chest cavity is increased.

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215. About 70% CO_2 is transported in the form of bicarbonate ions and about 20% is transported as carboxyhaemoglobin. Carboxyhaemoglobin is formed when carbon dioxide combines with amine group of haemoglobin.

216. More CO_2, less O_2, high temperature and less pH facilitate oxygen dissociation from oxyhaemoglobin.

217. Gaseous exchange is always a passive process in which gases move from higher concentration to lower concentration.

218. Haemoglobin carries 23% carbon dioxide.
- Plasma proteins carry 7% carbon dioxide.
- In the form of bicarbonate ions is about 70%.

219. Total lungs capacity of an average adult human is 5-6 liters.

220. Tidal volume is the amount of air that moves in or out of the lungs with each respiratory cycle. It measures around 500 mL in an average healthy adult.

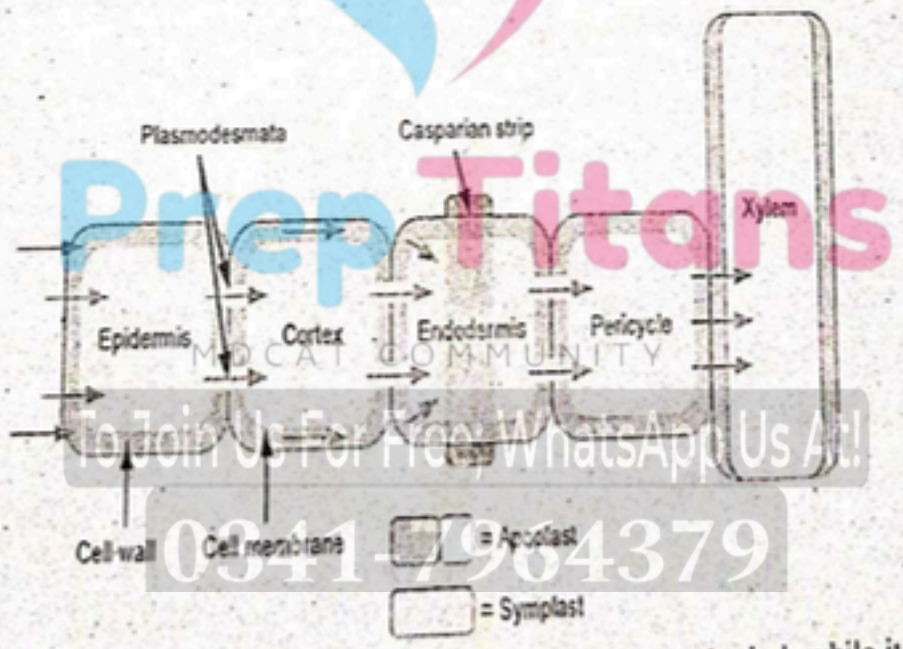
221. Myoglobin stores oxygen in muscles. It is also known as muscle haemoglobin. It has more affinity for oxygen as compared to haemoglobin, so for this reason it is not a good oxygen carrier.

222. Breathing consists of two phases: inhalation (inspiration) and exhalation (expiration).

223. Emphysema is a lung condition that causes shortness of breath. In people with emphysema, the air sacs in the lungs (alveoli) are damaged. Over time, the inner walls of the air sacs are weakened and ruptured creating larger air spaces instead of many small ones.

224. Water potential of pure water is maximum and its value is zero. Water potential is equal to solute potential and pressure potential.

225.



226. Rate of transpiration is directly proportional to light, temperature and wind, while it is inversely proportional to humidity in air.

227. **Cohesion:** force of attraction between water molecules.
- **Adhesion:** force between xylem wall and water molecules.
- **Tension:** Hydrogen bonding between water molecules produce.
- **Transpiration:** loss of water from aerial parts of plants.

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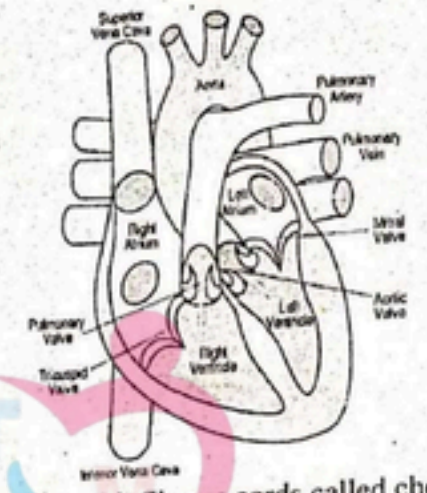
228. Lymphocytes are white blood cells that are also one of the body's main types of immune cells. They are made in the bone marrow and found in the blood and lymph tissue. The immune system is a complex network of cells known as immune cells that include lymphocytes.

229. B-cells differentiate into plasma cells that produce antibody molecules closely modeled after the receptors of the precursor B-cell. Once released into the blood and lymph, these antibody molecules bind to the target antigen and initiate its neutralization or destruction.

230. The pulmonary vein carries oxygenated blood from the lungs to the left atrium.

231.

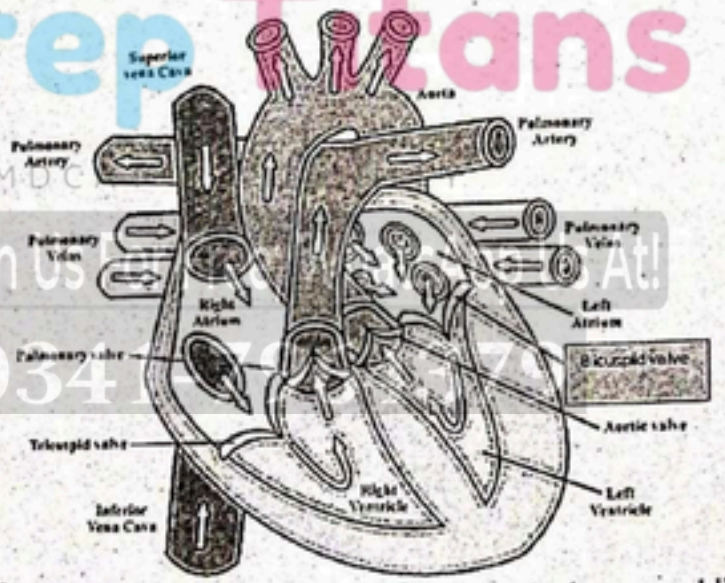


232. The flaps of heart valves are attached with fibrous cords called chordae tendineae, to the papillary muscles which are extensions of the wall of the ventricles.

233. The heart is enclosed in a double membranous sac – the pericardial cavity, which contains the pericardial fluid.

234. The flaps of heart valves are attached with fibrous cords called chordae tendineae, to the papillary muscles which are extensions of the wall of the ventricles.

235.



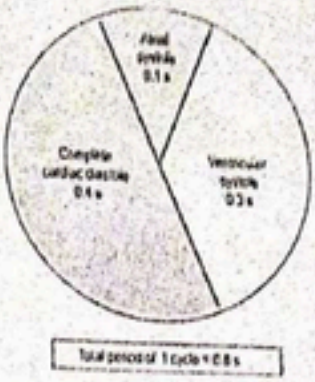
236. The chordae tendineae, also known as the heart strings, are tendon-resembling fibrous cords of connective tissue that connect the papillary muscles to the tricuspid valve and the mitral valve in the heart.

237. During atrial systole, the atrio-ventricular valves remain open while semi-lunar valves remain close because the pressure gradient between the atrium and ventricle is preserved during late ventricular diastole.

238. During atrial systole following events occur:
- AV valves open
- SL valves close
- Muscles of atria contract and pump blood to ventricles

Ventricles are relaxed and receive blood from atria.

239.



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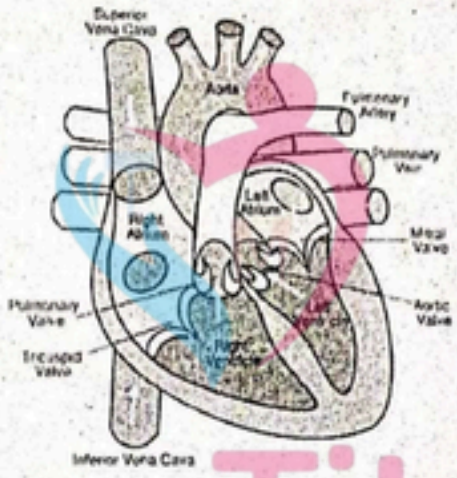

241. The SA node is the heart's natural pacemaker. The SA node consists of a cluster of cells that are situated in the upper part of the wall of the right atrium.

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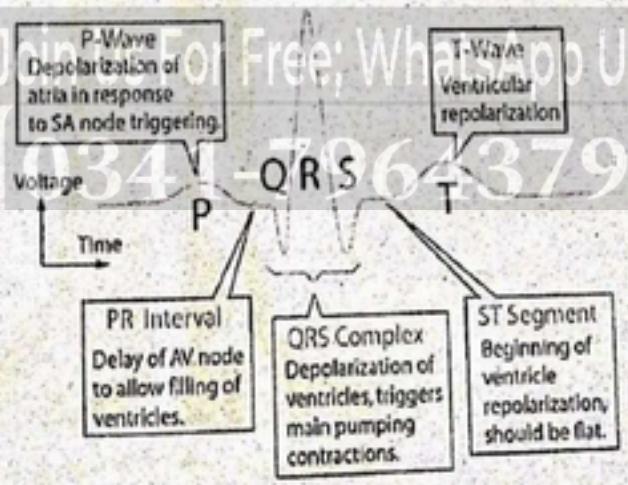
243.



244. The SA node is the heart's natural pacemaker. The SA node consists of a cluster of cells that are situated in the upper part of the wall of the right atrium.

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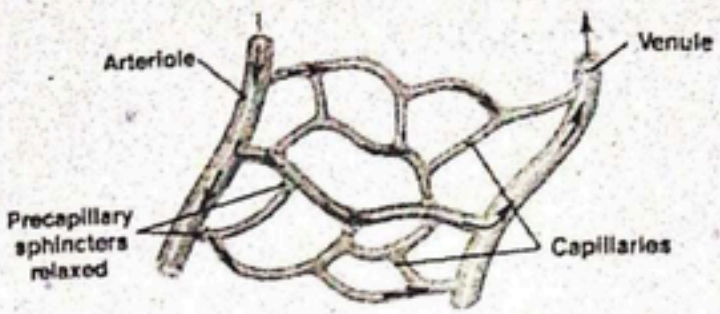
245. Pulmonary vein carries oxygenated blood from lungs to left atrium of heart.

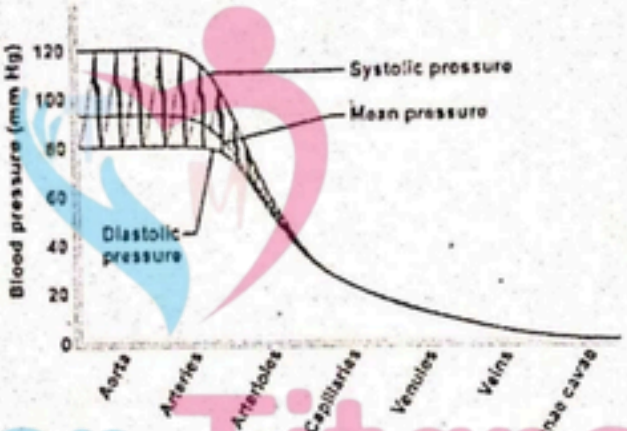
246. Semilunar valves are present in veins to prevent back flow of blood.

247.



248. Histamine, a chemical found in some of the body's cells, causes many of the symptoms of allergies, such as a runny nose or sneezing. It also causes vasodilation.

249.



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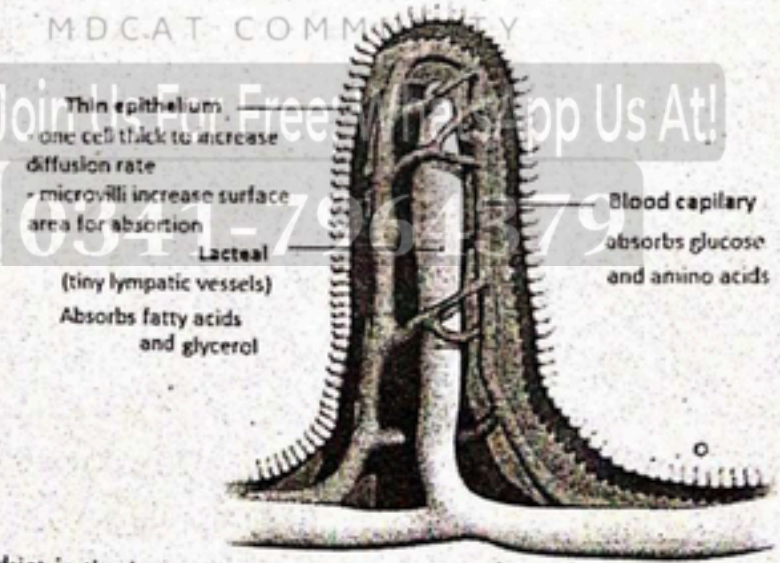
250.

Longitudinal section through a villus



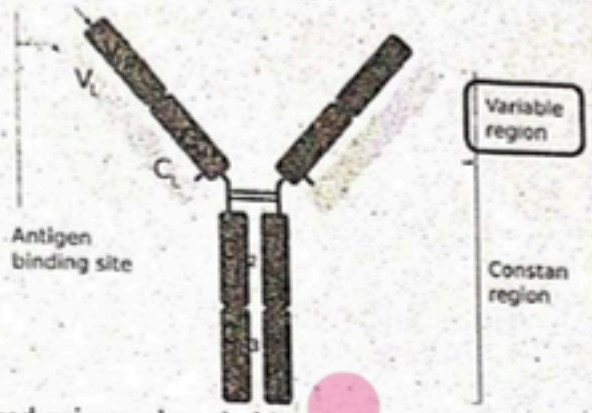
251. The thoracic duct is the largest lymphatic vessel within the human body. Lymph enters into left sub-clavian vein through thoracic duct.

252. The thoracic duct is the largest lymphatic vessel within the human body. Lymph enters into left sub-clavian vein through thoracic duct.

253. Lungs are not part of lymphatic system. They are part of respiratory system. And involve in gaseous exchange.

254. Spleen is largest lymphoid structure. It is referred as grave yard of RBCs. It filters the cellular waste of blood.

255.



256. The thymus is a specialized primary lymphoid organ of the immune system. Within the thymus, lymphocytes or T-cells mature. These cells are critical to the adaptive immune system, where the body adapts specifically to foreign invaders.

257. Antibodies are formed by four polypeptide chains (Two heavy and two light chains).

258. The humoral immune system deals with antigens from pathogens that are freely circulating, or outside the infected cells. Cellular immunity occurs inside infected cells and is mediated by T-lymphocytes.

259. Two types of immunity exist e.g. active and passive: Active immunity occurs when our own immune system is responsible for protecting us from a pathogen. Passive immunity occurs when we are protected from a pathogen by immunity gained from someone else.

260. Humoral immunity is the aspect of immunity that is mediated by macromolecules found in extracellular fluids such as secreted antibodies, complement proteins, and certain antimicrobial peptides. Humoral immunity is named so because it involves substances found in the humors, or body fluids.

261. Transplant rejection is caused primarily by a cell-mediated immune response to HLA antigens expressed on donor antigen-presenting cells transferred along with the transplanted organ. Recognition of donor HLA antigens on the cells of the graft induces vigorous T-cell proliferation in the recipient.

262. Passive immunity is given from mother to child through the placenta before birth, and through breast milk after birth. It can also be given medically through blood products that contain antibodies, such as immune globulin. This type of immunity is fast acting but lasts only a few weeks or months.

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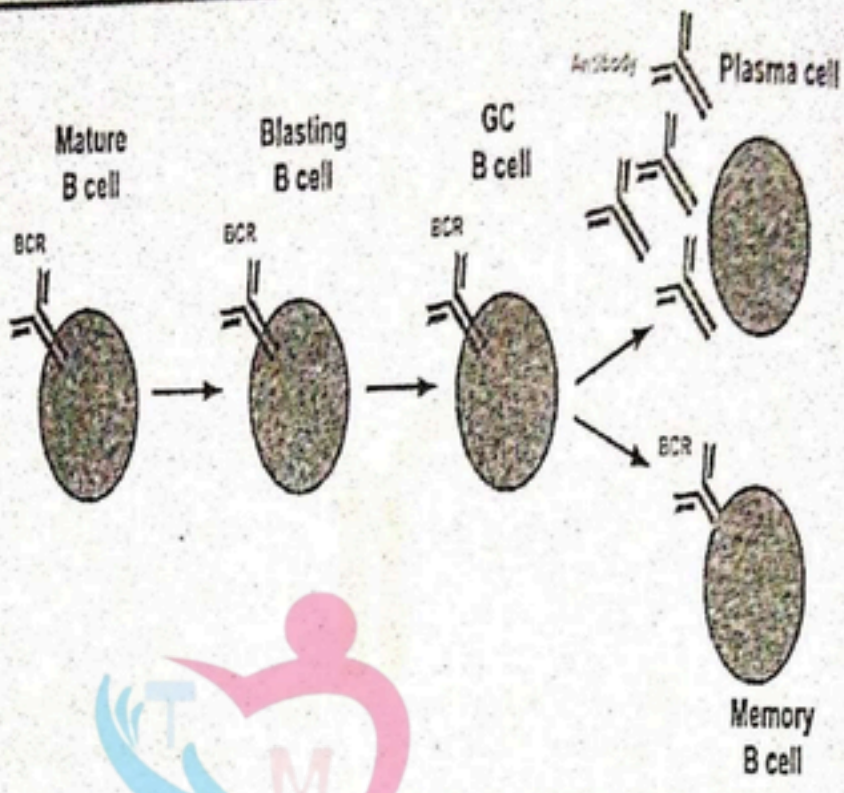
263.



264. Active immunity is always antigen based while passive immunization is antibodies based.

265. Cell-mediated immunity is an immune response that does not involve antibodies. Rather, cell-mediated immunity is the activation of phagocytes, antigen-specific cytotoxic T-lymphocytes, and the release of various cytokines in response to an antigen

266. Anti-venom, also known as antivenin, venom antiserum, and anti-venom immunoglobulin, is a specific treatment for envenomation. It is composed of antibodies and used to treat certain venomous bites and stings. Anti-venoms are recommended only if there is significant toxicity or a high risk of toxicity.

267. A substance used to stimulate the production of antibodies and provide immunity against one or several diseases, prepared from the causative agent of a disease, its products, or a synthetic substitute, treated to act as an antigen without inducing the disease.

268. Naturally acquired active immunity occurs when the person is exposed to a live pathogen, develops the disease, and becomes immune as a result of the primary immune response. Artificially acquired active immunity can be induced by a vaccine, a substance that contains the antigen.

269. Gene therapy is use for genetic problem's treatment. Drugs are used for infectious diseases. Antibodies used for passive immunization.

270. An antibiotic is a type of antimicrobial substance active against bacteria. Transposon, class of genetic elements that can "jump" to different locations within a genome.

271. An autoimmune disease is a condition in which your immune system mistakenly attacks your body. The immune system normally guards against germs like bacteria and viruses. When it senses these foreign invaders, it sends out an army of fighter cells to attack them.

272. Lymphocytes belong to WBCs. Some lymphocytes produce antibodies on the entrance of antigens in body.

273. Chemotherapy and radiotherapy are used against tumors cells. Antibiotics are only used against bacteria.

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274. Parasitic nutrition involves obtaining food by living in or on another organism (host), harming it in the process.
275. Apoplast theory explains the movement of water and dissolved substances through cell walls and intercellular spaces, avoiding the cytoplasm.
276. Symplast pathway involves water movement through plasmodesmata, allowing direct cytoplasmic transport between cells.
277. Osmotic potential refers to the movement of water from a higher to a lower solute concentration across a semipermeable membrane.
278. Iliac artery bifurcates from the descending aorta and further divides into the femoral artery to supply the thigh muscles.
279. Four pulmonary veins bring oxygenated blood from the lungs to the left atrium of the heart.
280. Left ventricle being strongest heart chamber pumps oxygenated blood into the aorta, which distributes it throughout the body.
281. Arterioles → Metarterioles → Thoroughfare channel → Capillaries is the correct sequence of blood flow.
282. Mesenteric veins drain blood from the large intestine into the hepatic portal vein.
283. Chordae tendineae are fibrous structures in the ventricles that prevent valve prolapse during contraction.
284. Trituspid valve regulates blood flow between the right atrium and right ventricle.
285. Purkinje fibers are specialized muscle fibers in the human heart that aid in electrical conduction for contraction.
286. Vasa vasorum are small blood vessels that supply the walls of larger vessels, hence called "vessels of vessels."
287. Sinoatrial (SA) node is located in the upper dorsal wall of the right atrium and functions as the heart's natural pacemaker.
288. Alveoli lack smooth muscles as they are the primary sites of gas exchange and rely on elastic fibers for expansion and recoil.
289. Ventilation refers to the process of moving oxygenated air into the lungs and expelling carbon dioxide.

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290. The alveolar wall is 0.1 μm thick (not 0.1 cm) to facilitate efficient gas exchange.
291. The trachea is ventral to the esophagus, meaning it lies in front of it.
292. Chymotrypsin helps in protein digestion and works in basic pH at 7.00-8.00.
293. Enterokinase activates trypsinogen by converting it into trypsin in the small intestine.
294. Lactase differs as it breaks down carbohydrates (lactose), while the others are proteolytic enzymes.
295. Erypsin is secreted in its active form, unlike pepsin, trypsin, and chymotrypsin, which are secreted as inactive precursors.
296. Duodenum (20-25 cm long) is the first segment of the small intestine, where most digestion occurs.
297. Saliva is secreted by salivary glands in response to mastication, aiding in digestion and lubrication.
298. Pepsinogen is activated into pepsin by HCl, which provides an acidic environment in the stomach.
299. Intrinsic factor, essential for vitamin B12 absorption, is secreted by the stomach's parietal cells.
300. Carbohydrate digestion (starch to maltose) starts in the oral cavity due to the action of salivary amylase (ptyalin).
301. Interferons belong to cytokines, activate immune and NK cells, but do not secrete interleukins, which are secreted by other immune cells.
302. Macrophages clean up pus by engulfing dead cells and debris during healing.
303. Antibodies neutralize, precipitate, and enhance phagocytosis but do not secrete cytokines, which are produced by immune cells.
304. Lymphocytes (B and T cells) play a major role in immunity by producing antibodies and killing infected cells.
305. Vaccination is a type of acquired (artificial) active immunity, as it stimulates antibody production.
306. The thymus gland is responsible for the maturation of T-lymphocytes, essential for immune responses.
307. Cytotoxic T-cells directly kill infected cells and aid B-cells in antibody production.
308. Neutrophils are not made by the thymus gland, as they are produced in the bone marrow.
309. Vaccination is the most effective method for preventing viral infections
310. Lymph capillaries join to form larger and larger lymph vessels; and ultimately form thoracic lymph duct, which opens into subclavian vein.
311. Spleen is the largest lymphoid organ, filtering blood and housing immune cells It is also regarded as graveyard of RBCs.
312. Bradykinin is produced at injury sites and promotes fluid leakage, causing inflammation.
313. Carnivorous plants digest animals for nitrogen (not carbs, fats, or water) and when nitrate enter the roots, they convert into ammonium ion.
314. *Dionaea muscipula* (Venus flytrap) has bilobed leaves with stiff bristles to trap and capture the prey.
315. Casparian strips made up of waxes in the endodermis block apoplast pathway, forcing water into symplast.
316. Adding salt lowers water potential, making water less likely to move freely, so osmotic pressure will get increased.
317. Plants in saline soil dehydrate as Ψw (water potential) of root is more than that of roots.
318. There is a delay of approximately 0.15 second in conductance from the S-A node to A-V node, permitting atrial systole to be completed before ventricular systole begins.
319. Veins have a larger bore, thin walls, have semilunar walls and a non-pulsatile nature due to low blood pressure comparative to aorta and arteries.
320. Weak papillary muscles of the right ventricle cause backflow into the right atrium through tricuspid valve.
321. Veins have valves to prevent backflow of blood, thinner walls compared to arteries, and a larger diameter (typically 40-50 μm).
322. Blood contains RBCs and large plasma proteins, which are absent in interstitial fluid due to capillary filtration limits.
323. Veins have semilunar valves throughout the body, especially in the lower limbs, not just in the upper part of the body.
324. The labelling A shows carotid artery while B shows inferior vena cava.

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325. About 70% of CO_2 is transported as bicarbonate ions (HCO_3^-) in the blood after reacting with water and carbonic anhydrase.
326. The total lung capacity (TLC) in an average adult human ranges between 5-6 liters, depending on age, sex, and body size.
327. When the diaphragm contracts and ribs move outward, chest cavity volume increases, and lung pressure decreases, allowing air inflow.
328. The lungs are enclosed in a double-layered sac called the pleura, which provides protection and reduces friction during breathing.
329. Respiratory distress syndrome occurs due to the absence of surfactant, a lipoprotein that reduces surface tension in alveoli.
330. At the tissue level, hemoglobin releases O_2 instead of forming oxyhemoglobin, while CO_2 is taken up for transport.
331. Collagen provides structural support, and elastin allows alveoli to expand and recoil efficiently during breathing.
332. The mediastinum is the space between the two lungs that contains the heart, trachea, esophagus, and major blood vessels.
333. Mucus cells in the gastric glands secrete mucin, which protects the stomach lining from acidic gastric juice.
334. Gastrin is a hormone that stimulates the secretion of gastric juice, including HCl and digestive enzymes.
335. The sub-maxillary (submandibular) gland is located behind the lower jaw and secretes both mucus and serous fluid.
336. Gallstones form due to the precipitation of cholesterol being bile component, leading to bile duct blockages.
337. The ileocolic sphincter regulates the movement of digested food from the ileum to the large intestine.
338. Without a gallbladder, bile is not stored and released in uncontrolled manner, affecting fat digestion.
339. Pancreatic juice is alkaline (pH ~8.0) to neutralize stomach acid and aid enzyme function.
340. Parietal cells secrete HCl and intrinsic factor, while chief cells secrete pepsinogen, the inactive form of pepsin.
341. Interferons activate natural killer (NK) cells, which help destroy virus-infected and cancerous cells.
342. Bradykinin increases capillary permeability, causing fluid leakage and swelling during inflammation.
343. Passive immunity is when ready-made antibodies (e.g., IgA antibodies from mother's milk) are transferred.
344. Surviving an HIV infection means the body produces its own antibodies, leading to natural active immunity.
345. Histamine causes inflammation in the upper respiratory tract by increasing blood vessel permeability.
346. Recovered COVID-19 patients' plasma contained antibodies, which provided passive immunity to infected individuals.
347. MMR vaccine induces long-term immunity by stimulating the immune system (artificial active immunity).
348. Helper T-cells activate B-cells to produce antibodies in response to pathogens.
349. Immunity transferred through colostrum (breast milk) is natural passive immunity as colostrum has IgA antibodies.
350. B-lymphocytes manufacture antibodies as part of the adaptive immune response. The manufactured antibodies are released into blood and lymph.
351. The lymphatic system does not transport oxygen, so oxygen-carrying capacity remains unaffected.

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10 TOPIC PROKARYOTES

PRACTICE EXERCISE

Q.1 If the division of a bacterium is in one plane, it may produce a chain of cocci which is called:
A. Streptococci
B. Sarcina
C. Tetrad
D. Diplococci

Q.2 When the division of cell is in two planes it will produce an arrangement having _____ cocci.
A. 2
B. 4
C. 8
D. 1

Q.3 Largest bacteria among followings:
A. *Acanthurus nigrofuscus*
B. *Epulopiscium fishelsoni*
C. *Bacillus subtilis*
D. *Spirochaeta plicatilis*

Q.4 Bacteria that are pleomorphic:
A. *Helicobacter pylori*
B. *Epulopiscium fishelsoni*
C. *Bacillus subtilis*
D. *Spirochaeta plicatilis*

Q.5 Primary stain used in gram staining is:
A. Crystal violet
B. Alcohol
C. Safranin
D. Iodine

Q.6 Archaeobacteria lack in their structure/composition:
A. Cell wall
B. Glycoprotein
C. Plasma membrane
D. Peptidoglycan

Q.7 Glycocalyx is made up of:
A. Lipopolysaccharides
B. Polysaccharides
C. Lipoproteins
D. Peptidoglycan

Q.8 In Gram negative bacteria, the outer membrane is made up of:
A. Lipopolysaccharides
B. Polysaccharides
C. Lipoproteins
D. Peptidoglycan

Q.9 All are the characteristics of Gram positive bacteria except:
A. High content of peptidoglycan
B. High permeability
C. Teichoic acid is present
D. Stain pink with primary dye

Q.10 Cell envelope of a bacterium does not include:
A. Capsule
B. Cell wall
C. Slime
D. Plasma membrane

Q.11 Some bacteria are resistant to phagocytosis due to the presence of:
A. Cell wall
B. Capsule
C. Flagella
D. Granules

Q.12 Respiratory enzymes in bacteria are present in/at:
A. Mesosomes
B. Cell wall
C. Nucleoid
D. Cytoplasm

Q.13 Dormant thick-walled desiccation resistant body:
A. Endospore
B. Mesosomes
C. Exospore
D. Cyst

Q.14 Bacterial plasma membrane is not involved in:
A. Maintenance of cell shape
B. Cell Division
C. DNA replication
D. Respiratory meabolism

Q.15 Bacterial membranes differ from eukaryotic membrane as they lack:
A. Peptidoglycan
B. Lipids
C. Phospholipid
D. Cholesterol

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Q.16 What is not true about bacterial spore?
A. Produced during differentiation of vegetative cells
B. Are heat resistant
C. Are desiccation resistant
D. May be exospores or endospores

Q.17 It is not true about archaea:
A. Inhibited by antibiotics
B. Introns are present in some genes
C. Peptidoglycan is absent in cell wall
D. Branched carbon chains in membrane lipids

Q.18 A similarity that can be present between flagella of bacteria and an animal cell:
A. Motility as function
B. Type of protein
C. Length
D. Number

Q.19 Chances of _____ to have a flagella are rare.
A. *Hyphomicrobium*
B. *Escherichia*
C. *Bacillus*
D. *Diplococcus*

Q.20 What is false statement about pili?
A. It is made up of pilin protein
B. True pili present in Gram negative bacteria
C. Crucial for conjugation
D. Means of attachment with various surfaces

Q.21 Bacteria that live in intestine and produce vitamin 'K' belongs to:
A. Coccus
B. Spirilla
C. Bacillus
D. Spirochetes

Q.22 Resistance against antibiotics is mainly increasing because of:
A. Misuse of antibiotics
B. Greenhouse effect
C. Global warming
D. Allergies

Q.23 Chemotherapeutic agent is/are:
A. Antibiotics
B. Disinfectants
C. Vaccines
D. Antiseptics

Q.24 Bacteria present in canned foods are:
A. *Clostridium botulinum*
B. *Campylobacter jejuni*
C. *Salmonella typhii*
D. *Streptococcus pneumoniae*

Q.25 Antibiotics and hormones can be sterilized by using:
A. Membrane filtration
B. Radiations
C. Dry heat
D. Moist heat

Q.26 What is true about antibiotics?
A. Always protein in nature
B. Never cause side effects
C. Always produced from living cells
D. Can also be synthesized in laboratory

Q.27 Which of the followings can have microbicidal effect?
A. Alcohol
B. Formaldehyde
C. Antibiotics
D. All A, B, C

Q.28 _____ are in general used for sterilization process.
A. X-rays
B. Ultrasounds
C. Beta rays
D. Gamma rays

Q.29 All of the followings can be sterilized by membrane filters except:
A. Antibiotics
B. Seras
C. Hormones
D. Flasks

Q.30 According to five kingdom classification, bacteria are placed in kingdom:
A. Plantae
B. Monera
C. Protista
D. Animalia

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Q.31 Germ theory of disease by Robert Koch can be used to find out _____ of disease:
A. Way of transmission
B. Causal Agent
C. Pathology
D. All of these

Q.32 Which of the following is incorrect about bacteria?
1. It is grouped under five categories on the basis of shape
2. It can live in hot spring, deep ocean, snow and desert areas
3. It can live as a parasite
4. They show complex multi-cellular nature

A. Both 1 and 2
B. Both 2 and 3
C. Both 1 and 4
D. Both 3 and 4

Q.33 The morphological shape of *Staphylococcus aureus* is:
A. Spherical
B. Spiral
C. Irregular
D. Chain

Q.34 It determines shape of bacterium:
A. Cell membrane
B. Cell wall
C. Capsule
D. Slime

Q.35 Arrange the position of cell wall, cell membrane, slime and capsule from exterior to interior surface in bacterial cell:
A. Cell wall → capsule → slime → cell membrane
B. Slime → capsule → cell wall → cell membrane
C. Capsule → slime → cell wall → cell membrane
D. Cell wall → cell membrane → slime → capsule

Q.36 Glycocalyx is:
A. Loose capsule
B. Appendage
C. Another name of plasmid
D. Invaginated cell membrane

Explanation: (EASY-SIMPLE)
Glycocalyx is a less organized, loosely attached form of the bacterial capsule.

Q.37 Bacteria can be classified into different taxonomic groups on the basis of all of the following except:
A. Presence or absence of flagella
B. Number of flagella
C. Attachment of flagella
D. Composition of flagella

Q.38 Which of the following correctly represents DNA molecule of chromatin body in bacterial cell?

	Copies	Type	Nature
A.	Single	Circular	Single stranded
B.	Single	Circular	Double stranded
C.	Multiple	Linear	Double stranded
D.	Multiple	Circular	Double stranded

Q.39 Literal meaning of antibiotics is:
A. Against bacteria
B. Against antigens
C. Against life
D. Against biomass

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(MDCAT-2016)

Q.40 Syphilis is caused by a:
A. Spirochete
B. Water blooms
C. *Nostoc*
D. Cyanobacteria

Q.41 In which of the following shapes, gut living symbiont *Escherichia coli* is found? (MDCAT -2017)
A. Round
B. Spiral
C. Oval
D. Rod

(MDCAT-2017)

Q.42 Arrangement of coccus bacteria in chain is called:
A. Streptococci
B. Tetrad
C. Staphylococci
D. Sarcina

(MDCAT-2018)

Q.43 Rod-shaped bacteria are known as _____.
A. Bacilli
B. *Vibrio*
C. Cocci
D. Sarcina

(UHS-2022)

Q.44 Which of the following is a prokaryote?
A. Protista
B. *E. coli*
C. Amoeba
D. Fungi

Q.45 The division of cocci in three planes form sarcina, which is a cube of _____ cocci. (UHS-2022)
A. 02
B. 04
C. 08
D. 16

Q.46 Peptidoglycan or murein is a special or distinctive feature of cell wall in: (MDCAT-2014)
A. Algae
B. Bacteria
C. Fungi
D. Plants

Q.47 Which of the following can be considered as waste product of bacteria? (BUMHS-2022)
A. Alcohol, acetic acid and lactic acid
B. Alcohol, glycogen and phosphate
C. Alcohol, potassium and sulphur
D. Glycogen, fat and potassium

Q.48 Cell wall structure of a cell of unknown origin was studied and found to contain polysaccharide chain linked with short chains of amino acid. What do you think it can be? (MDCAT-2017)
A. Bacteria
B. Algae
C. Fungi Cell
D. Cortex cells

(MDCAT-2017)

Q.49 Find the characteristic true for Gram positive bacteria.
A. Periplasmic space present in all
B. Two major layers
C. Less lipids than Gram-ve
D. Outer membrane present

Q.50 If lipopolysaccharides did not appear in the wall of bacteria on staining, then it will be known as _____. MDCAT-2018)
A. Gram positive
B. Gram negative
C. Gram positive & gram negative
D. Capsule

(UHS-2022)

Q.51 Number of layers present in Gram negative bacterial cell wall:
A. One
B. Two
C. Three
D. Four

(SZABMU-2022)

Q.52 The unique macro-molecule in the bacterial cell wall is:
A. Polysaccharides
B. Proteins
C. Peptidoglycan
D. Cholesterol

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Q.53 Which of the following is devoid of cell wall? (BUMHS-2022)
A. Archaebacteria
B. Cyanobacteria
C. Eubacteria
D. *Mycoplasma*

Q.54 Many bacteria are motile due to presence of: (MDCAT-2016)
A. Flagella
B. Cilia
C. Pilli
D. Microtubules

Q.55 Nucleoid is a structure not found in: (MDCAT-2017)
A. *Campylobacter*
B. Spirochete
C. Cyanobacteria
D. Goblet cells

Q.56 _____ is an invagination of cell membrane which helps in cell division. (MDCAT-2016)
A. Fimbriae
B. Mesosome
C. Nucleoid
D. Endospore

Q.57 Students were asked to guess a unicellular organism with darkly stained nucleus. Which of the following can be straight away excluded from the list? (MDCAT-2017)
A. *Paramecium*
B. *Plasmodium*
C. *Amoeba*
D. *Lactobacillus*

Q.58 DNA of bacteria is present in: (MDCAT-2017)
A. Nucleoid
B. Mitochondria
C. Nucleus
D. Mesosome

Q.59 When tuft of the flagella is present at both the ends in the structure of bacterial cell, then the condition is called:
A. Atrichous
B. Peritrichous
C. Lophotrichous
D. Amphitrichous

Q.60 The following are sexual reproduction methods in bacteria, except: (ETEA-2019)
A. Transformation
B. Transduction
C. Binary fission
D. Conjugation

Q.61 Extremely thin appendages helping during conjugation in bacteria: (DUHS-2022)
A. Pili
B. Membrane
C. Flagella
D. Tentacle

Q.62 Treatment by using attenuated culture of bacteria is called _____. (MDCAT-2014)
A. Chemotherapy
B. Antisepsis
C. Sterilization
D. Vaccination

Q.63 Which one of the following antibiotic causes permanent discoloration of teeth in young children if it is misused? (MDCAT-2014)
A. Penicillin
B. Sulfonamide
C. Streptomycin
D. Tetracycline

Q.64 Antibiotics interfere with some aspect of growth or metabolism of the target organism such as: (KMDC-2014)
A. Synthesis of bacterial walls
B. Plasma membrane function
C. Protein synthesis
D. All A, B, C

Q.65 Select the method which causes the oxidation of chemical constituents of a bacterial cell: (PMC-2020)
A. Steam
B. Filtration
C. Dry heat
D. Radiation

Q.66 The method which helps in developing immunity against bacteria is: (NUMS-2022)
A. Radiotherapy
B. Chemotherapy
C. Vaccination
D. Antibiotics

Q.67 All of the following are physical methods to control bacteria except: (SZABMU-2022)
A. Sterilization
B. Boiling
C. Radiation
D. Antiseptics

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Q.68 The pasteurization of milk is done effectively through ultra-high temperature (UHT) in which milk is treated for 3 seconds at: (ETEA-2022)
A. 72°C
B. 100°C
C. 140°C
D. 170°C

Q.69 Helicobacter pylori is an example of: (UHS-2023)
A. Cocci
B. Bacilli
C. Pleomorphic
D. Spiral

Q.70 Which of the following is a prokaryote? (ETEA-2023 Retake)
A. Protista
B. *E. coli*
C. *Amoeba*
D. Fungi

Q.71 Number of major layers of cell wall in Gram positive bacteria is: (UHS-2023)
A. 1
B. 2
C. 3
D. 4

Q.72 Bacterial cell has ability to maintain its shape through (UHS-2023)
A. Cell wall
B. Capsule
C. Cell wall & slime
D. Slime

Q.73 Which structure of prokaryotic will play the role of mitochondrion? (UHS-2023)
A. Spores
B. Cyst
C. Nucleoid
D. Mesosomes

Q.74 The unique macro-molecule in the bacterial cell wall is: (SZABMU-2023)
A. Polysaccharides
B. Proteins
C. Peptidoglycan
D. Cholesterol

Q.75 Function of pilus in bacteria is to: (SZABMU-2023)
A. Increase pathogenicity
B. Degrade host plasma membrane
C. Degrade host enzymes
D. Exchange genetic material

Q.76 Mesosomes are the invagination of which bacterial cell structure? (SZABMU-2023)
A. Cell wall
B. Plasma membrane
C. Plasmid
D. Cysts

Q.77 Which of the following is absent from membrane of prokaryotes? (SZABMU-2023)
A. Glycolipid
B. Cholesterol
C. Glycoprotein
D Phospholipid

Q.78 The capsule of a bacterial cell is a sticky gelatinous structure made up of protein and: (ETEA-2023)
A. Lipid
B. Carbohydrates
C. Nucleotide
D. Alcohol

Q.79 The prokaryotic cell wall is composed of: (ETEA-2023)
A. Cellulose
B. Chitin
C. Murein
D. Pectin

Q.80 _____ increases the pathogenicity of bacteria. (NUMS-2023)
A. Plasmid
B. Cell wall
C. Capsule
D. Cell membrane

Q.81 Which component is present only in the cell wall of Gram-positive bacteria but not in Gram negative bacteria? (ETEA-2023 Retake)
A. Teichoic acid
B. Lipids
C. Peptidoglycan
D. Periplasmic space

Q.82 A bacterium with single polar flagellum is: (ETEA-2023 Retake)
A. Amphitrichous
B. Atrichous
C. Lophotrichous
D. Monotrichous

Q.83 Endospore formation is _____. (ETEA-2023 Retake)
A. A reproductive process
B. A vegetative process
C. Can be reproductive or vegetative depending on the conditions
D. Is related to invading host cells

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Q.84 Which of the following is an example of spiral shaped bacteria? (UHS-2023)
A. Diplococcus pneumoniae
B. Hyphomicrobium
C. Escherichia coli
D. Pseudomonas

Q.85 The smallest known bacteria belong to the genus: (NUMS-2023)
A. Mycoplasma
B. Streptococcus
C. Escherichia
D. Bacillus

Q.86 Which mode of genetic exchange between bacteria involves cell-to-cell contact between the bacterial cells? (ETEA-2023 Retake)
A. Transduction
B. Transformation
C. Conjugation
D. A and B

Q.87 *Salmonella typhi* causing typhoid and *Clostridium tetani* causing tetanus are which type of bacteria? (ETEA-2023)
A. Bacilli
B. Spirilla
C. Cocci
D. Comma

Q.88 All of the following are disinfectants to control bacterial growth except: (UHS-2023)
A. Tincture of Iodine
B. Potassium permanganate
C. Mercuric Chloride
D. Hydrogen peroxide

Q.89 Autoclave chamber is used for _____ of surgical instruments. (ETEA-2023 Retake)
A. Sterilization
B. Filtration
C. Desiccation
D. Radiation

Q.90 In which phase of bacterial growth, they divide at exponential rate: (SZABMU-2023)
A. Lag phase
B. Log phase
C Stationary phase
D. Decline phase

Q.91 The cells of non-virulent strain of *Streptococcus pneumoniae*: (ETEA-2023 Retake)
A. Capsulated and called S-type
B. Non-capsulated and called S-type
C. Capsulated and called R-type
D. Non-capsulated and R-type

Q.92 Prokaryotic cells lack: (UHS-2024)
A. Mesosomes
B. Ribosomes
C. Storage bodies
D. Membrane bound organelles

Q.93 One of the following is CORRECT regarding flagella: (UHS-2024)
A. Made up of macrofilaments
B. Contains centriole
C. Originates from basal bodies
D. They are immotile

Q.94 Which option is CORRECT about endospore? (UHS-2024)
A. Has a short dormant period
B. Contains moisture for survival
C. Metabolically actively
D. Endures extreme condition

Q.95 Mesosomes are the invagination of bacterial cell structure: (UHS-2024)
A. Cell wall
B. Cell membrane
C. Plasmid
D. Cysts

Q.96 Which of the following is NOT true about plasmids found in streptococci? (KMU-2024)
A. Carry fewer genes than the chromosome
B. Replicate autonomously from the chromosome
C. They are considered as genetic element
D. The bacterial chromosome depends on plasmids for replication

Q.97 Which of the following bacteria produce endospores? (KMU-2024)
A. Both gram negative and positive bacteria
B. Gram negative
C. Gram positive
D. Mycobacteria

Q.98 The peptidoglycan cell wall is specific to: (KMU-2024)
A. *Amoeba*
B. Bacteria
C. Protozoa
D. Virus

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Q.99 Bacteria that lack flagella are called: (KMU-2024)
A. Amphitrichous
B. *Atrichous*
C. Lophotrichous
D. Peritrichous

Q.100 All are the characteristics responsible for better survival of encapsulated bacteria except: (NUMS-2024)
A. High pathogenicity
B. Withstand dehydration
C. Strict adhesion to internal surface
D. Easy recognition by host

Q.101 Function of pilus in bacteria is to: (SZAMBU-2024-Reconduct)
A. Increase pathogenicity of bacteria
B. Degrade host plasma membrane
C. Degrade host enzymes
D. Exchange of genetic material

Q.102 Which of the following is not a prokaryote? (SZAMBU-2024)
A. *Acanthurus nigrofuscus*
B. *Epulopiscium fishelsoni*
C. *Hyphomicrobium*
D. *Myxococcus sp.*

Q.103 Bacterial genome becomes diploid: (UHS-2024)
A. After fertilization of gametes
B. Before spore formation
C. During binary fission
D. After binary fission

Q.104 Bacteria divide at exponential rate during which growth phase? (UHS-2024)
A. Lag
B. Log
C. Stationary
D. Decline

Q.105 In which phase of bacterial growth, do they divide at exponential rate? (SZAMBU-2024-Reconduct)
A. Lag phase
B. Log phase
C. Stationary phase
D. Decline phase

Q.106 Respiration in *Pseudomonas* bacteria is: (UHS-2024)
A. Aerobic
B. Anaerobic
C. Facultative
D. Microaerophilic

Q.107 Autotrophic mode of nutrition in organism depends upon: (UHS-2024)
A. Saprotrophic mode
B. Parasitic mode
C. Photosynthesis mode
D. Obligate mode

Q.108 Which of the following is anaerobic bacterium? (SZAMBU-2024)
A. *E. coli*
B. *Campylobacter*
C. *Spirochete*
D. *Pseudomonas*

Q.109 _____ is used in the production of Humulin. (KMU-2024)
A. Bacteria
B. Fungi
C. Protozoa
D. Virus

Q.110 The chemicals used on living tissue to inhibit the growth of microorganisms are called: (SZAMBU-2024)
A. Antiseptics
B. Chemotherapeutics
C. Disinfectants
D. Antibiotics

Q.111 Which of the following organelle is present only in cyanobacteria? (SZAMBU-2024)
A. Heterocyst
B. Lysosome
C. Mitochondria
D. DNA

Q.112 Probiotics in infants' formula milk are the normal bacterial flora to humans. They keep the babies healthy by doing all of the following actions except: (NUMS-2024)
A. Produce important vitamins
B. Kill pathogenic bacteria
C. Prevent colonization of pathogens
D. Enhance immunity

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ANSWER KEY

PRACTICE EXERCISE

1	A	11	D	21	C	31	B
2	B	12	A	22	A	32	C
3	B	13	D	23	A	33	C
4	A	14	A	24	A	34	B
5	A	15	D	25	A	35	B
6	D	16	A	26	D	36	A
7	B	17	A	27	D	37	D
8	C	18	A	28	D	38	B
9	D	19	D	29	D	39	C
10	D	20	B	30	B		

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40	A	50	A	60	C	70	B	80	C	90	B	100	D	110	A
41	D	51	B	61	A	71	A	81	A	91	D	101	D	111	A
42	A	52	C	62	D	72	A	82	D	92	D	102	A	112	B
43	A	53	D	63	D	73	D	83	B	93	C	103	C		
44	B	54	A	64	D	74	C	84	B	94	D	104	B		
45	C	55	D	65	C	75	D	85	A	95	B	105	B		
46	B	56	B	66	C	76	B	86	C	96	D	106	A		
47	A	57	D	67	D	77	B	87	A	97	C	107	C		
48	A	58	A	68	C	78	B	88	A	98	B	108	C		
49	C	59	D	69	C	79	C	89	A	99	B	109	A		

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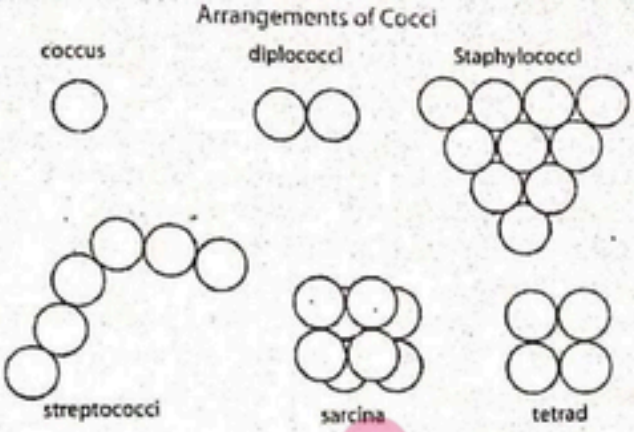
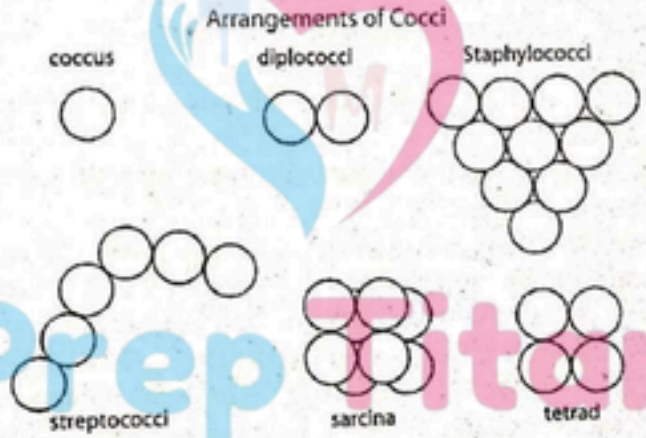
EXPLANATORY NOTES

PRACTICE EXERCISE

1. 

2. 

3. The largest bacteria *Epulopiscium fishelsoni* was discovered in brown surgeon fish *Acanthurus nigrofuscus*. It is 80 µm in thickness whileits length is about 600 µm.
4. Both *Epulopiscium* and *Bacillus* are rod shaped bacteria while *Spirochaeta* are spiral shaped. Pleomorphic bacteria have no fixed shape and *Helicobacter* comes under this category.
5. The primary stain used in Gram staining is crystal violet while safranin is the secondary stain.
6. Cell walls of Archaeobacteria are composed of different polysaccharides and proteins, but no peptidoglycan.
7. Glycocalyx is an outer coating that covers the outside of bacterial cell wall. It exists in two forms; slime and capsule. This glycocalyx is generally made up of polysaccharides.
8. Gram positive bacteria has no outer membrane but gram negative bacteria has one and that outer membrane is formed of lipoproteins.
9. Gram positive bacteria show purple colour when stained with primary dye (crystal violet), while gram negative bacteria show purple colour due to safranin.
10. Capsule, slime and cell wall are included in the cell envelope of bacteria while cell membrane is not included.

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11. Some bacteria are resistant to phagocytosis due to the presence of a capsule, which is a protective layer surrounding the bacterial cell. This capsule helps the bacteria evade the immune system by inhibiting the ability of phagocytes (such as macrophages and neutrophils) to recognize and engulf the bacteria.
12. Membranous invaginations present in bacteria are known as mesosomes. These carry enzymes for respiration and cell division.
13. Dormant, thick walled desiccation resistant structures are cyst while spores are metabolically dormant bodies and are produced at a late stage of cell growth.
14. Bacterial plasma membrane is involved in DNA replication, cellular divison and respiratory metabolism while maintenance of cell shape is the function of cell wall.
15. Phospholipid and proteins are components of membrane of prokaryotic cell and eukaryotic cells. Cholesterol is present in the cell membrane of eukaryotic cells only.
16. As spore formation occurs during unfavorable conditions i.e. selective antibiotic pressure and heat while differentiation of vegetative cells takes place in favorable conditions.
17. Archaea are ancient group of bacteria. They are different form eubacteria and more related to eukaryotes. One of the feature is their resistance against antibiotics.
18. Flagella of prokaryotes differ from eukaryotic flagella in many aspects such as type of protein, their length and number. They have one similarity and that is their function as both help in motility.
19. Many bacteria have flagella but there are some exceptions. Oval shaped bacteria (Cocci) rarely have flagella.
20. True pili are present only in Gram negative bacteria.
21. Bacteria that live in intestine and produce vitamin K are useful strain of *E. coli* which are Gram negative bacilli.
22. Now antibiotics are used on regular basis and bacteria are getting resistance against antibiotics due to enhanced exposure.
23. Chemotherapeutic agents are the antibiotics that work with natural defense and stop the growth of bacteria and other microbes.
24. The bacteria present in canned food is *C. botulinum* and causes severe form of food poisoning. Botulism develops by the use of improperly canned or otherwise preserved food, especially meat.
25. Antibiotics and hormones are heat sensitive molecules and can be degraded if sterilized with the dry heat or moist heat. That is why such substances are sterilized by using specialized filters.
26. Antibiotics are of two types i.e. natural and synthetic. So these can be synthesized in laboratory, moreover these can be or cannot be protein in nature and produce side effects.
27. Microbistatic effect is the reduction of reproductive abilities of bacteria by chemicals and icrobicidal effect is killing of all forms of bacteria. Alcohol, antibiotics and formaldehyde kills all living forms of bacteria so they have microbicidal effect.
28. Gamma rays have wavelength below 300 nm. They effectively eradicate bacteria and all living cells.
29. Membrane filters sterilize compounds that are heat sensitive like seras, hormone and antibiotics. Flasks have glassy material and it can be sterilized by heat.
30. Bacteria are classified under the kingdom *Monera*, which includes all prokaryotes.
31. Koch's postulates helped identify the causal agents of diseases by linking specific microbes to specific diseases.
32. Bacteria do not exhibit complex multicellular nature, being fundamentally unicellular organisms.
33. Staphylococcus aureus is spherical and forms grape-like clusters due to division in multiple planes.
34. Cell wall is rigid and provide shape to bacterial cells. Moreover it also protects bacterial cells from osmotic lysis.

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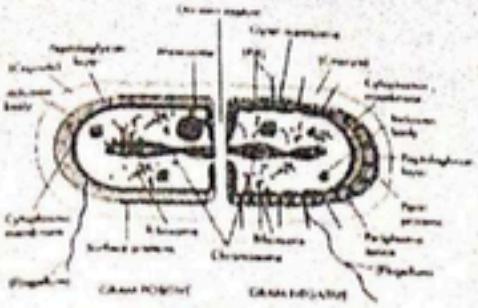
35.



36. Glycocalyx is a less organized, loosely attached form of the bacterial capsule.
37. Bacteria are classified based on flagella number, arrangement, and presence, but not the composition of flagella.
38. Nucleoid or chromatin body has single molecule of double stranded, circular DNA.
39. The word antibiotic is derived from Greek words meaning against life. As these are used to kill microbes in living organisms.

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40. Syphilis is an infection caused by the bacteria *Treponema pallidum* (Spirochete). Syphilis is spread by direct contact with an infected individual, such as: Sexual contact. Nostoc, cyanobacteria are mostly spherical shape.
41. *Escherichia coli* is a member of the family *Enterobacteriaceae*, which includes gram-negative, facultative anaerobic rod-shaped bacteria.
42. Pairs of cocci are *called* diplococci; rows or chains of such cells are called streptococci; grapelike clusters of cells is called staphylococci; packets of eight or more cells is called sarcina; and groups of four cells in a square arrangement is called tetrads.

43.



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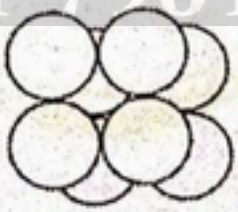
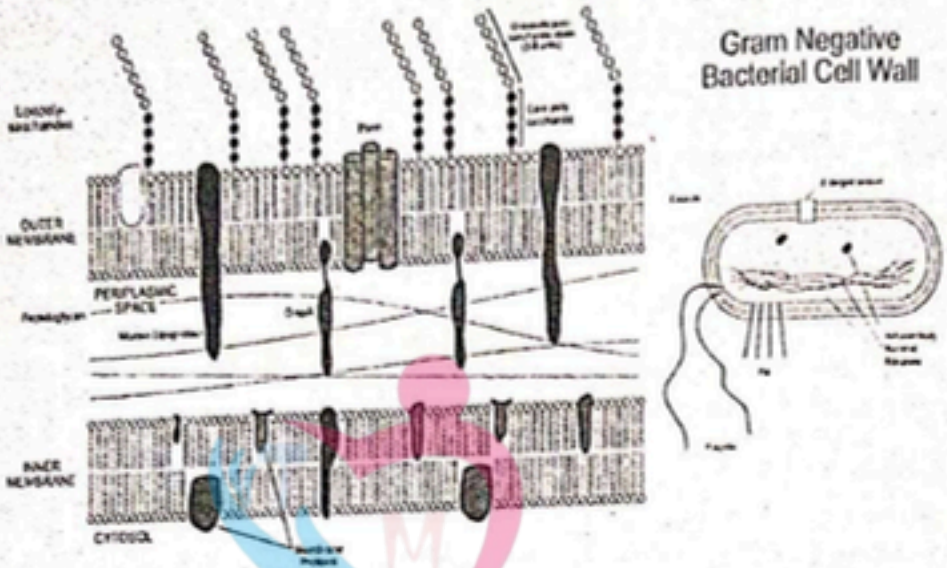
44. *E. coli* is a bacterium while other are members of eukaryotes.
45.



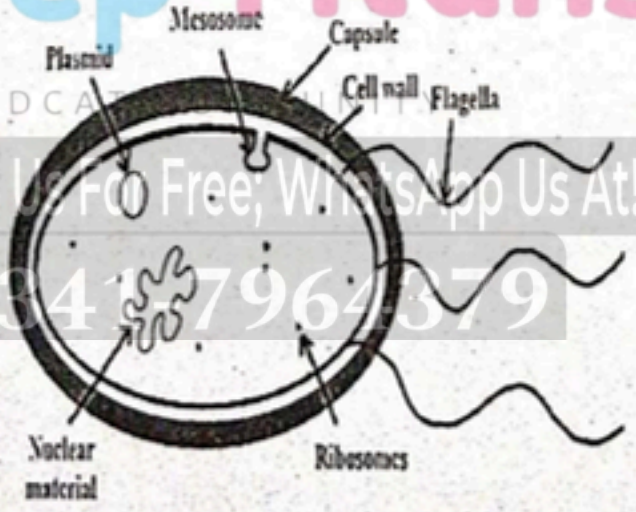
sarcina

46. The cell wall is the principal stress-bearing and shape maintaining element in bacteria formed of Peptidoglycan, also called *murein*.
47. Phosphate, fats, potassium and Sulphur are the useful substances for bacteria. Alcohol, acetic acids and lactic acids are waste products of bacteria.

48. Peptidoglycan or murein is a polymer consisting of sugars and amino acids that forms a mesh-like layer outside the plasma membrane of most bacteria, forming the cell wall.
49. Gram positive bacteria have less lipids and more peptidoglycan as compared to Gram negative bacteria.
50. If lipopolysaccharides did not appear in the wall of bacteria on staining then it will be known as Gram positive as we know lipopolysaccharide layer is a feature of Gram negative bacteria.
51.



52. Cholesterol is not present in cell wall. A conjugated (peptide + glycan) structure is present which is known as peptidoglycan.
53. *Mycoplasma* is genus of smallest bacteria. They do not have cell wall.
54. For many pathogenic bacteria, flagellum-dependent motility and chemotaxis are present.
55. Goblet cells are eukaryotic cells and have nucleus in them while nucleoid is found in prokaryotic cells. These cells produce mucus.
56.



57. *Lactobacillus* is a genus of Gram-positive, aerotolerant anaerobes or microaerophilic, rod-shaped, non-spore-forming bacteria. So don't have nucleus for being a prokaryotic cell.
58. Bacteria do not have a membrane-bound nucleus, and their genetic material is typically a single circular bacterial chromosome of *DNA* located in the cytoplasm in an irregularly shaped body called the nucleoid.

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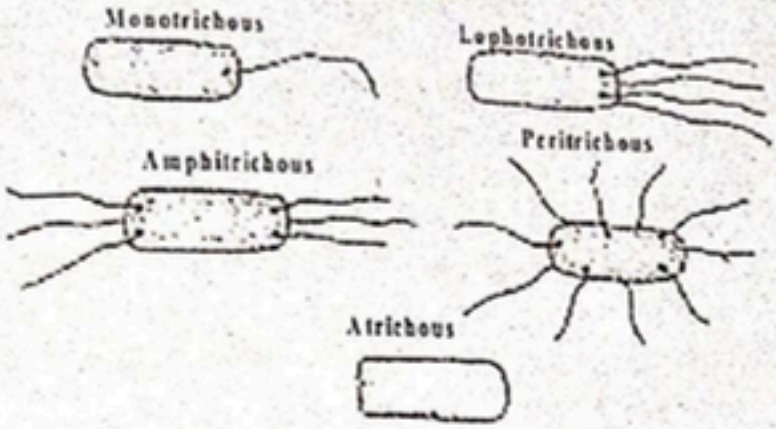
59.



60. Binary fission is asexual mode of reproduction in which one bacteria divide itself into two daughter cells.
- Bacterial transformation is a process of horizontal gene transfer by which some bacteria take up foreign genetic material (naked DNA) from the environment. Conjugation is the process by which one bacterium transfers genetic material to another through direct contact.
- Transduction is the process by which a virus transfers genetic material from one bacterium to another.

61. Pilli are involved conjugation. While other structures do not play role in in conjugation.
- Flagella give motility.
- Cell membrane surrounds cytoplasm.
- Tentacles are not present in bacteria.

62. A vaccine is a biological preparation that provides active acquired immunity to a particular infectious disease and this treatment is done by using attenuated culture of bacteria.

63. Tetracycline has been on the market for over 60 years and is used in the treatment of many gram negative and gram positive infections; it causes permanent staining of the teeth if used in children less than the age of 8.

64. Antibiotics are medications that destroy or slow down the growth of bacteria by interfering with bacterial cell wall synthesis, plasma membrane functions, protein synthesis, enzymes actions, and DNA replication etc.

65. Heating is the most commonly used method of sterilization and dry heat kills by oxidation effects.

66. Vaccine contains dead or weak pathogens which cannot cause disease. It triggers immune system.
- Radiotherapy is the use of radiations against tumor cells.
- Chemotherapy is the use of chemical against tumor cells.
- Antibiotics are the chemicals that stop the growth of bacteria.

67. Antiseptic: chemicals are used to prevent the division of microbes.
- Sterilization is the destruction of all life forms.
- Boiling can destroy the microorganism.
- Radiations below 300nm are used to kill microbes.

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68. The process of pasteurization involves heating milk to 71.7°C for at least 15 seconds. For UHT 140° C is required for 3 seconds.

69. *Helicobacter pylori* is pleomorphic, meaning it can change its shape, often appearing as spiral or curved forms. This adaptability helps it survive in varying conditions.

70. *E. coli* is a prokaryote because it lacks a nucleus and membrane-bound organelles, characteristic of all prokaryotic cells.

71. The Gram-positive bacteria has one major layer, unlike Gram negative bacteria which has two major layers.

72. The bacterial cell wall provides structural support and helps maintain the shape of the cell by protecting it from osmotic pressure.

73. Mesosomes are infoldings of the cell membrane in prokaryotes that are believed to be involved in cellular respiration, similar to the mitochondria in eukaryotes.

74. Peptidoglycan is a unique macromolecule found in bacterial cell walls, providing structural support and rigidity. It consists of sugars and amino acids, forming a mesh-like structure.

75. Pili in bacteria facilitate the transfer of genetic material between cells through a process called conjugation. This helps in genetic diversity and adaptation.

76. Mesosomes are infoldings of the plasma membrane in bacteria, which are thought to be involved in cellular processes like respiration and DNA replication.

77. Prokaryotic cell membranes lack cholesterol, which is commonly found in the membranes of eukaryotic cells, and are primarily composed of phospholipids.

78. The capsule of a bacterial cell is primarily composed of polysaccharides (carbohydrates) and sometimes proteins, providing protection and aiding in adhesion.

79. The prokaryotic cell wall is mainly composed of murein (also known as peptidoglycan), a polymer made of sugars and amino acids that provides structural support.

80. The capsule increases bacterial pathogenicity by protecting bacteria from the host immune system, aiding in adherence, and preventing phagocytosis.

81. Teichoic acids are unique to the cell walls of Gram-positive bacteria, contributing to the structural integrity and negative charge of the cell wall.

82. A monotrichous bacterium has a single flagellum located at one pole of the cell, allowing it to move in a directed manner.

83. Endospore formation is a survival mechanism, not a reproductive process. It occurs under unfavorable conditions to protect the bacterium from extreme environments.

84. Hyphomicrobium is a type of spiral-shaped bacteria, while the others are either spherical or rod-shaped.

85. Mycoplasma species are the smallest known bacteria, lacking a cell wall and exhibiting minimal cellular structures.

86. Conjugation involves direct cell-to-cell contact where genetic material is transferred via a pilus, typically in the form of plasmids.

87. *Salmonella typhi* and *Clostridium tetani* are both rod-shaped bacteria, classified as bacilli.

88. Tincture of iodine is an antiseptic, not a disinfectant, as it is primarily used on living tissues.

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89. Autoclaves use high pressure and temperature to sterilize surgical instruments by killing bacteria, viruses, and spores.
90. In the log phase, bacteria divide at an exponential rate, rapidly increasing in number.
91. Non-virulent strains of *Streptococcus pneumoniae* are non-capsulated and are referred to as R-type (rough).
92. Prokaryotic cells lack membrane-bound organelles such as the nucleus and mitochondria.
93. Flagella originate from basal bodies, which anchor them to the cell membrane and facilitate movement.
94. Endospores are highly resistant to extreme conditions like heat, desiccation, and radiation, allowing survival in harsh environments.
95. Mesosomes are invaginations of the bacterial cell membrane, involved in cellular processes like respiration and DNA replication.
96. This is false because plasmids replicate independently from the bacterial chromosome, not relying on it for replication.
97. Endospore formation is typically found in gram-positive bacteria, such as Bacillus and *Clostridium* species.
98. Peptidoglycan is a unique component of bacterial cell walls, providing structure and rigidity.
99. Bacteria that lack flagella are called atrichous, meaning they have no flagella for motility.
100. Encapsulated bacteria are less easily recognized by the host immune system, which is why the capsule helps protect them from immune detection.
101. Pili in bacteria are involved in the exchange of genetic material during conjugation enhancing genetic diversity.
102. *Acanthurus nigrofuscus* is a species of fish, which is a eukaryote, not a prokaryote. The other options are all prokaryotic organisms.
103. During binary fission, the bacterial genome replicates, and each daughter cell receives an identical copy, making the genome temporarily diploid before division is complete.
104. Bacteria divide at an exponential rate during the log phase, leading to rapid growth in population.
105. In the log phase, bacteria divide at an exponential rate, resulting in rapid cell growth and population increase.
106. Pseudomonas bacteria are typically aerobic, meaning they require oxygen for respiration.
107. Autotrophic organisms use photosynthesis to convert light energy into chemical energy, enabling them to produce their own food.
108. Spirochetes, such as *Treponema* and *Borrelia*, are anaerobic bacteria that can survive and grow in environments without oxygen.
109. Bacteria, specifically genetically modified strains of *E. coli*, are used in the production of Humulin, a synthetic form of human insulin.
110. Antiseptics are chemicals used on living tissues to prevent or inhibit the growth of microorganisms without harming the tissue.
111. Heterocysts are specialized cells found only in cyanobacteria, involved in nitrogen fixation.
112. Probiotics in infant formula help by preventing pathogen colonization, producing vitamins, and enhancing immunity, but they do not directly kill pathogenic bacteria.

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11 TOPIC REPRODUCTION

PRACTICE EXERCISE

Q.1 **Which one of the following is a diploid structure?**
A. Secondary spermatocyte
B. Spermatid
C. Primary spermatocyte
D. Spermatozoa

Q.2 **Which one of the following causes growth and development of germinal epithelium of the testes?**
A. Inhibin
B. LH
C. ICSH
D. FSH

Q.3 **Production of slightly acidic fluid with citrate as a main nutrient source is the function of:**
A. Bulbourethral gland
B. Prostate gland
C. Seminal vesicles
D. Cowper's gland

Q.4 **Structure that undergoes meiosis I is:**
A. Primary spermatocyte
B. Spermatid
C. Secondary spermatocyte
D. Spermatogonium

Q.5 **Spermatozoa are formed from spermatids as a result of:**
A. Mitosis
B. Differentiation
C. Meiosis I
D. Meiosis II

Q.6 **Prior to emission and ejaculation, spermatozoa are stored in:**
A. Urethra
B. Seminal vesicles
C. Epididymis
D. Prostate gland

Q.7 **Fructose production as nutritional component for sperms is the function of:**
A. Bulbourethral gland
B. Prostate gland
C. Seminal vesicles
D. Seminiferous tubules

Q.8 **Human sperm and ova show similarities in following aspect:**
A. Both are haploid
B. Both carry identical genetic makeup
C. Both are having approximately same size
D. Both possess good mobility

Q.9 **All of the following contributes to the formation of semen except:**
A. Seminal vesicles
B. Cowper's gland
C. Prostate gland
D. Vas deferens

Q.10 **Correct sequence of events in spermatogenesis is:**
A. Spermatogonia > Spermatids > Spermatocytes > Spermatozoa
B. Primary spermatocytes > Secondary spermatocytes > Spermatozoa
C. Spermatogonia > Primary spermatocyte > Secondary spermatocytes > Spermatid > Spermatozoa
D. Secondary spermatocyte > Spermatozoa > Spermatogonia > Spermatids

Q.11 **All of the following structures are paired except:**
A. Testes
B. Seminal vesicles
C. Bulbourethral gland
D. Prostate gland

Q.12 **Main function performed by bulbourethral gland in humans is/are:**
A. Sperm maturation
B. Neutralization of urethra
C. Sperm production
D. Semen formation

Q.13 **How many spermatozoa and ova are produced from 50 primary spermatocytes and 50 primary oocytes?**
A. 200 spermatozoa and 100 ova
B. 200 spermatozoa and 50 ova
C. 100 spermatozoa and 50 ova
D. 100 spermatozoa and 100 ova

Q.14 **Motile and completely mature cell with flagellum is:**
A. Spermatid
B. Spermatocyte
C. Spermatogonium
D. Spermatozoa

Q.15 **All of the following are parts of male copulatory organ except:**
A. Prepuce
B. Urethra
C. Glans penis
D. Ejaculatory duct

Q.16 **Sperms are nourished and activated through:**
A. Vas deferens
B. Semen
C. Seminal vesicle
D. Prostate gland

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Q.17 A cell containing two copies of each functional gene:
A. Polar body
B. Ovum
C. Secondary spermatocytes
D. Spermatogonium

Q.18 Which of the following hormone is responsible for the control of spermatogenesis at normal rate?
A. FSH
B. Testosterone
C. LH
D. Inhibin

Q.19 Layer of uterus that is under control of estrogen:
A. Mesometrium
B. Endometrium
C. Myometrium
D. Perimetrium

Q.20 After fertilization, embryo implants itself to the _____ part of uterus.
A. Endometrium
B. Myometrium
C. Mesometrium
D. Perimetrium

Q.21 Cervix is blocked normally by:
A. Layer of tissues
B. Plug of mucus
C. Sphincter
D. Bacterial colonies

Q.22 Fertilization of a secondary oocyte by sperm takes place at:
A. Proximal part of cervix
B. Distal part of oviduct
C. Proximal part of oviduct
D. Distal part of cervix

Q.23 The development of secondary oocyte into ovum is completed in:
A. Uterine tube
B. Ovary
C. Uterus
D. Graffian follicle

Q.24 Pick the correct statement among the followings:

	Fertilization	Implantation	Conception
A.	Oviduct	Cervix	Uterus
B.	Uterine tube	Endometrium	Uterus
C.	Fallopian tube	Vagina	Uterus
D.	Oviduct	Endometrium	Cervix

Q.25 What will be the effect on the duration of menstrual cycle if one of the ovaries is removed?
A. Duration will be more than 28 days
B. Menstrual cycle stops completely
C. Duration will be less than 28 days
D. Menstrual cycle remains unaffected

Q.26 Progesterone production within ovaries is accomplished by following structure:
A. Primary follicle
B. Ruptured follicle
C. Graffian follicle
D. Corpus albicans

Q.27 The layer of uterus that is shed with each reproductive cycle is:
A. Mesometrium
B. Endometrium
C. Myometrium
D. Perimetrium

Q.28 Maximum chances of fertilization in human females exist usually during _____ of reproductive cycle.
A. 11th to 14th day
B. Immediately after menstruation
C. 14th to 16th day
D. 6th to 9th day

Q.29 In a menstrual cycle of 45 days, what would be the most probable day of ovulation?
A. 14th
B. 31th
C. 40th
D. 20th

Q.30 Endometrium shows maximum thickness during:
A. Start of proliferative phase
B. Secretary phase
C. End of Proliferative phase
D. Menstruation

Q.31 Menstruation is the discharge of:
A. Blood, water and cellular debris
B. Blood, mucous and cellular debris
C. Lymph, mucous and solid debris
D. Lymph, blood and cellular debris

Q.32 Menstruation usually continues for:
A. 3–7 days
B. 20–22 days
C. 1–3 days
D. 15–17 days

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Q.33 In young females, ovulation occurs at _____ day of reproductive cycle.
A. 18th
B. 14th
C. 28th
D. 24th

Q.34 At ovulation, egg is released as:
A. Primary oocyte
B. Ovum
C. Secondary oocyte
D. Polar body

Q.35 Which one of the followings is related to ovary?
A. Menstrual phase
B. Proliferative phase
C. Secretary phase
D. Luteal phase

Q.36 Only Graffian follicle grows with egg. Rest of follicles are destroyed by a process:
A. Follicle atresia
B. Osteoporosis
C. Ovulation
D. Both A and C

Q.37 Fraternal twins, triplets and quadruplets in humans occur when:
A. There is an excess of sperms
B. Over activity of pituitary occurs
C. Menstruation occurs
D. Multiple ovulations occurs

Q.38 Which layer of uterus undergoes cyclic changes during menstrual cycle?
A. Mesoderm
B. Myometrium
C. Perimetrium
D. Endometrium

Q.39 First menstrual cycle starts at puberty. This is termed as:
A. Menopause
B. Menarche
C. Metrorrhagia
D. Andropause

Q.40 Maintenance of pregnancy is made possible mainly by:
A. FSH
B. Progesterone
C. Prolactin
D. Both A and B

Q.41 Complete stop of menstrual cycle is called:
A. Menopause
B. Menarche
C. Andropause
D. Menstruation

Q.42 Shortest phase in the menstruation cycle is:
A. Ovulatory phase
B. Luteal phase
C. Follicular phase
D. Menstrual phase

Q.43 Female menstrual cycle is controlled by:
A. Progesterone
B. Gonadotropin
C. Estrogen
D. ICSH

Q.44 Oxytocin performs action on:
A. Perimetrium
B. Myometrium
C. Epimetrium
D. Endometrium

Q.45 It is false about placenta:
A. Produces hormones
B. Provides oxygen and nutrients to fetus
C. Develops during 1st month of pregnancy
D. Removes waste material from fetus blood

Q.46 In _____, mucous membrane of urinogenital tract is mainly affected.
A. Gonorrhea
B. Genital herpes
C. Syphilis
D. AIDS

Q.47 *Neisseria gonorrhea* causes:
A. Syphilis
B. Genital herpes
C. Gonorrhoeae
D. AIDS

Q.48 It affects reproductive organs, eye bone joints and CNS in patient:
A. Syphilis
B. Genital herpes
C. Gonorrhoeae
D. AIDS

Q.49 Sexually transmitted disease caused by a virus and results in genital ulcers:
A. Syphilis
B. Genital herpes
C. Gonorrhoeae
D. AIDS

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Q.50 **Reproduction is necessary for survival of:**
A. Individual
B. Species
C. Community
D. Biome

Q.51 **It is not true about asexual reproduction:**
A. Identical off springs
B. Common in plants
C. No gamete formation
D. Less rapid increase in number

Q.52 **The diagram shows the human male reproductive system.**



What would be the result of cutting the tubes marked X?
A. Male sex hormones could not reach the blood
B. The flow of urine would be prevented
C. The production of sperm would stop
D. The man would become sterile

Q.53 **It is said to be the 'primary sex structure' with respect to the male reproductive system:**
A. Penis
B. Testis
C. Prostate
D. Scrotum

Q.54 **Optimum temperature for spermatogenesis is:**
A. 2 °C above body temperature
B. 5 °C above body temperature
C. 2 °C below body temperature
D. 5 °C below body temperature

Q.55 **Change that occurs during conversion of spermatid into sperm is:**
A. Formation of nucleus
B. Formation of tail
C. Storage of food
D. Division through mitosis

Q.56 **Sexual characteristics in females develop during/at:**
A. Menstruation
B. Ovulation
C. Puberty
D. Birth

Q.57 **Female reproductive system is derived form:**
A. Ectoderm
B. Endoderm
C. Mesoderm
D. Hypoderm

Q.58 **This event transforms graafian follicle into an endocrine gland/structure:**
A. Gamete formation
B. Follicles formation
C. Follicle atresia
D. Ovulation

Q.59 **How many ova are produced in a female in one year?**
A. 24
B. 12
C. 5-6
D. 24-36

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11 TOPIC REPRODUCTION
PAST PAPER MCQ'S

Q.60 The first cells produced by the repeated cell division of germinal epithelium of testis are: (MDCAT-2010)
A. Interstitial cells
B. Secondary spermatocytes
C. Spermatogonia
D. Spermatids

Q.61 A type of cell in human testes which produces testosterone is called: (MDCAT-2011, 2013)
A. Interstitial cells
B. Sertoli cells
C. Germ cells
D. Spermatocytes

Q.62 Which one of the following differentiates directly into mature sperm? (MDCAT-2011)
A. Primary spermatocyte
B. Spermatogonia
C. Secondary spermatocyte
D. Spermatid

Q.63 What is the location of interstitial cells in testes? (MDCAT-2013)
A. Inside the seminiferous tubules
B. Among the germinal epithelial cells
C. Between the seminiferous tubule
D. Around the testes

Q.64 Spermatogonia differentiate directly into: (MDCAT-2013)
A. Primary spermatocytes
B. Spermatozoa
C. Secondary spermatocytes
D. Spermatids

Q.65 During spermatogenesis, the _____, which are haploid cells eventually mature into spermatozoa/mature sperms? (MDCAT-2019)
A. Secondary spermatocytes
B. Spermatogonia
C. Primary spermatocytes
D. Spermatids

Q.66 Each human testis is divided into: (UHS-2022)
A. 50-100 lobules
B. 150-200 lobules
C. 200-300 lobules
D. 250-300 lobules

Q.67 In male reproductive system, the hormone involved in regulation of rate of spermatogenesis is called: (NUMS-2022)
A. Luteinizing hormone
B. Follicle stimulating hormone
C. Testosterone
D. Inhibin

Q.68 The process of spermatogenesis (formation of sperm) takes place in which part of male reproductive system? (ETEA-2022)
A. Urethra
B. Epididymis
C. Oviduct
D. Seminiferous tubules

Q.69 Which one of the following cells have haploid number of chromosomes? (ETEA-2022)
A. Sperm cell
B. Mesophyll cell
C. Skin cell
D. Muscular cell

Q.70 The terminal portion of the male reproductive duct system is: (ETEA-2022)
A. Vasa efferentia
B. Vasa deferens
C. Urethra
D. Epididymis

Q.71 Average sperm count per ml is: (BUMHS-2022)
A. 20-150 million
B. 2-10 million
C. 20-150 thousand
D. 2-10 thousand

Q.72 Uterus opens to the vagina by a narrow opening bounded by muscular sphincter at its bottom known as: (DUHS-2022)
A. Urinary bladder
B. Cervix
C. Oviduct
D. Labia

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Q.73 Yellowish glandular structure formed after the release of egg from follicle is called: (MDCAT-2014)
A. Corpus callosum
B. Corpus luteum
C. Graffian follicle
D. Follicle atresia

Q.74 On puberty, the development of primary follicles is stimulated by: (MDCAT-2014)
A. ICSH
B. LH
C. FSH
D. Estrogen

Q.75 In females, FSH stimulates the ovary to produce: (MDCAT-2015)
A. Progesterone
B. Estrogen
C. Prolactin
D. Oxytocin

Q.76 The oocyte released during ovulation is in: (MDCAT-2015)
A. Anaphase I
B. Metaphase I
C. Prophase I
D. Metaphase II

Q.77 In which phase of human female menstrual cycle, endometrium prepares for the implantation of embryo? (MDCAT-2015)
A. Proliferative phase
B. Secretory phase
C. Menstrual phase
D. Ovulation phase

Q.78 Events of menstrual cycle are regulated by the: (MDCAT-2016)
A. Ethylene
B. Auxins
C. Gonadotrophins
D. Gibberellins

Q.79 Decrease of FSH and increase of estrogen cause pituitary gland to secrete: (MDCAT-2016)
A. Somatotrophin
B. Testosterone
C. Luteinizing hormone
D. Spermatogonium

Q.80 FSH stimulates the production of estrogen hormone which has two targets_____ and _____. (MDCAT-2017)
A. Uterus, posterior pituitary
B. Uterus, anterior pituitary
C. Ovaries, uterus
D. Ovaries, hypothalamus

Q.81 Which of the following hormone suppresses ovulation? (MDCAT-2017)
A. Progesterone
B. FSH
C. Insulin
D. Prolactin

Q.82 Which of the following hormone causes ovulation? (MDCAT-2017)
A. LH
B. Estrogen
C. Progesterone
D. FSH

Q.83 Which hormone is released in female in response to FSH from pituitary gland? (MDCAT-2018)
A. Oxytocin
B. LH
C. ADH
D. Progesterone

Q.84 Which of the following hormone acts on the uterus wall for thickening? (MDCAT-2018)
A. Zona pellucida
B. Oxytocin
C. Progesterone
D. Follicle stimulating hormone

Q.85 Which hormonal pair would maintain the endometrium and make it receptive for implantation of embryo? (MDCAT-2019)
A. Luteinizing Hormone and Progesterone
B. Estrogen and Follicle Stimulating Hormone
C. Luteinizing Hormone and Follicle Stimulating Hormone
D. Estrogen and Progesterone

Q.86 Which of the following hormone stimulates the ovulation from the follicle into oviduct? (MDCAT-2019)
A. Luteinizing hormone
B. Estrogen
C. Follicle stimulating hormone
D. Progesterone

Q.87 On the onset of puberty in the females, the pituitary gland releases the: (AJK-2019)
A. Progesterone
B. Luteinizing hormone
C. Oxytocin
D. Follicle stimulating hormone

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Q.88 Secretion of FSH is inhibited by: (AJK-2019)
A. Testosterone
B. Estrogen
C. Aldosterone
D. LH

Q.89 Progesterone is secreted by: (ETEA-2019)
A. Corpus luteum
B. Ripening follicles
C. Uterine epithelium
D. Fertilized egg

Q.90 Which one of the following represents the changes that occur in the ovary and the uterus approximately every 28 days involving ovulation with the breakdown and loss of the lining of the uterus? (PMC-2020)
A. Ovulation
B. Uterine cycle
C. Menstrual cycle
D. Embryo formation

Q.91 Which of the following hormones of the pituitary gland regulate the menstrual cycle? (PMC-2020)
A. Follicle stimulating hormone and estrogen
B. Luteinizing hormone and estrogen
C. Follicle stimulating hormone and Luteinizing hormone
D. Estrogen and progesterone

Q.92 Level of luteinizing hormone (LH) is maximum in blood during which stage of menstrual cycle? (UHS-2022)
A. Menstrual stage
B. Proliferative stage
C. Ovulation stage
D. Secretory stage

Q.93 During menstrual cycle, after the female gamete is release from the ovary (ovulation), the remains of the follicle secretes: (NUMS-2022)
A. Progesterone
B. FSH
C. LH
D. Testosterone

Q.94 Normal gestation period in human is about _____ days. (NUMS-2022)
A. 300-320
B. 320-350
C. 270-280
D. 240-250

Q.95 After fertilization zygote takes _____ for its journey from fallopian tube to uterus. (SZABMU-2022)
A. 6-7 days
B. 3-6 days
C. 10-12 days
D. 12-15 days

Q.96 The longest phase of the menstrual cycle is: (ETEA-2022)
A. Pre-ovulatory phase
B. Secretary phase
C. Ovulatory phase
D. Menstrual phase

Q.97 Corpus luteum secretes the hormones: (BUMHS-2022)
A. Testosterone
B. Parathormone
C. Oxytocin
D. Progesterone

Q.98 The vacated vesicular follicle forms a fatty yellow structure on ovary called as: (DUHS-2022)
A. Graafian luteum
B. Corpus luteum
C. Ruptured ovum
D. Follicle

Q.99 *Treponema pallidum* is the causative organism for which disease? (BUMHS-2022)
A. Gonorrhea
B. Syphilis
C. AIDS
D. Diabetes

Q.100 The function of hyaluronidase enzyme is: (UHS-2023)
A. Penetration of the sperm into the ovum
B. Entrance of sperm into the vagina
C. Entrance of the sperm into the fallopian tube
D. Inactivation of sperms after their failure to fertilize ovum

Q.101 In human males, inhibin hormone is produced by: (SZABMU-2023)
A. Leydig cells
B. Hensen's node cells
C. Sertoli cells
D. Interstitial cells

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Q.102 The testes are male gonads which are situated outside the abdomen within a skin pouch called: (ETEA-2023)
A. Vas deferens
B. Epididymis
C. Scrotum
D. Vasa efferentia

Q.103 Leydig cells are responsible for: (NUMS-2023)
A. Testosterone production
B. FSH production
C. Sperm production
D. Testosterone inhibition

Q.104 Which among the following is not the role of Sertoli cells? (ETEA-2023 Retake)
A. Protect sperms
B. Provide liquid medium to sperms
C. Provide nourishment to sperms
D. Secrete testosterone

Q.105 The term menopause means: (UHS-2023)
A. Start of menstruation
B. Start of ovulation
C. Stop of ova production
D. Degeneration of ovaries

Q.106 In human females, what is the small, pear-shaped, muscular, distensible, sac-like organ where gestation takes place? (UHS-2023)
A. Uterus
B. Kidney
C. Fallopian tube
D. Stomach

Q.107 The labour pains to expel fetus are due to action of oxytocin on: (UHS-2023)
A. Endometrium
B. Myometrium
C. Perimetrium
D. Ovaries

Q.108 Which function is not directly performed by ovaries? (SZABMU-2023)
A. Progesterone production
B. Estrogen production
C. Ovulation
D. hCG production

Q.109 During menstrual cycle, after the female gamete is released from the ovary at ovulation, the remains of the follicle (corpus luteum) secretes: (SZABMU-2023)
A. Progesterone
B. FSH
C. LH
D. Testosterone

Q.110 Fallopian tube is also known as: (ETEA-2023)
A. Oviduct
B. Ovaries
C. Uterus
D. Cervix

Q.111 Which hormone induces labour pain? (NUMS-2023)
A. Estrogen
B. Oxytocin
C. Progesterone
D. LH

Q.112 The estrogen hormone secretion during the oogenesis is stimulated by: (NUMS-2023)
A. Luteinizing hormone
B. Inhibin hormone
C. Follicle stimulating hormone
D. Testosterone hormone

Q.113 Which of the following hormones of pituitary gland regulate the menstrual cycle? (NUMS-2023)
A. Follicle stimulating hormone and estrogen
B. Luteinizing hormone and estrogen
C. Follicle stimulating hormone and luteinizing hormone
D. Estrogen and progesterone

Q.114 At the beginning of the menstrual phase, the _____ are at the lowest level. (ETEA-2023 Retake)
A. Follicle stimulating hormone
B. Gonadotropins
C. Ovarian hormones
D. None of these

Q.115 The syphilis is a _____ disease. (ETEA-2023)
A. Bacterial
B. Fungal
C. Protozoic
D. Viral

Q.116 The most common symptom of gonorrhea in males is: (ETEA-2023)
A. Skin rash on neck
B. Joint pain
C. Painful urination
D. Chancre

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Q.117 The incubation period of syphilis is: (ETEA-2023 Retake)
A. 1-2 weeks
B. 2-3 weeks
C. 3-4 weeks
D. 07 days

Q.118 Fluid secreted by sertoli cells provides liquid medium, protection and nourishment to: (UHS-2024)
A. Oocyte
B. Sperms
C. Polar body
D. Spermatogonia

Q.119 Main function of the epididymis is to: (UHS-2024)
A. Transport sperms
B. Connect with urethra
C. Produce semen
D. Hold the process of spermatogenesis

Q.120 Immediate next stage of spermatogonia differentiation is: (UHS-2024)
A. Secondary spermatocyte
B. Spermatids
C. Primary spermatocytes
D. Sperms

Q.121 The _____ in semen facilitate the transport of sperms. (KMU-2024)
A. Androgen
B. Prostaglandins
C. Oxytocin
D. Testosterone

Q.122 The acidity of urine is neutralized by: (KMU-2024)
A. Cowper's gland
B. Prostate gland
C. Seminal vesicle
D. Vas deferens

Q.123 In humans' testis, the spermatozoa are present in: (SZAMBU-2024)
A. Seminiferous tubules
B. Epididymis
C. Sertoli cells
D. Interstitial cells

Q.124 Select the mismatched pair: (SZAMBU-2024-Reconduct)

	Glands	Location
A.	Seminal vesicle	Junction of sperm duct and ejaculatory duct
B.	Prostate gland	Encircles urethra
C.	Ejaculatory duct	Enters the testis
D.	Bulbourethral gland	Junction of ejaculatory duct and urethra

Q.125 Pick the correct event of luteal phase/secretory phase: (SZAMBU-2024-Reconduct)
A. Increased secretion of progesterone
B. Increased secretion of FSH
C. Increased secretion of LH
D. Increased secretion of estrogen

Q.126 Which of the following diseases is sexually transmitted? (SZAMBU-2024-Reconduct)
A. Tuberculosis
B. AIDS
C. Dengue fever
D. Cholera

Q.127 In human males, inhibin hormone is produced by: (SZAMBU-2024-Reconduct)
A. Leydig cells
B. Hensen's node cells
C. Sertoli cells
D. Interstitial cells

Q.128 Female reproductive system consists of all of the followings EXCEPT: (UHS-2024)
A. Ovaries
B. Oviduct
C. Cervix
D. Seminiferous tubules

Q.129 Corpus luteum during female reproductive cycle produces: (UHS-2024)
A. Testosterone
B. Follicle stimulating hormone
C. Luteinizing hormone
D. Progesterone

Q.130 Due to the process of follicle atresia: (UHS-2024)
A. Follicles reach maximum size
B. Follicle degenerates
C. Graafian follicle ovulates
D. Follicle starts to mature

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Q.131 The corpus luteum is essentially formed from: (KMU-2024)
A. Graafian follicle
B. Ovum
C. Oogonium
D. Oocyte

Q.132 The outer layer of uterus is called as: (KMU-2024)
A. Endometrium
B. Myometrium
C. Mesometrium
D. Perimetrium

Q.133 Which of the following gives rise to first polar body? (SZAMBU-2024)
A. Oogonium
B. Oocyte
C. Primary oocyte
D. Secondary oocyte

Q.134 The ovulation in human females takes place on: (SZAMBU-2024)
A. 6th day after first day of menstruation
B. 10th day after first day of menstruation
C. 14th day after first day of menstruation
D. 27th day after first day of menstruation

Q.135 Choose the mismatched pair: (NUMS-2024)
A. Graffian follicle – Progesterone
B. ICSH – Interstitial cell
C. Estrogen – Inhibits FSH
D. LH – Ovulation

Q.136 If reproductive cycle of a-female starts on 10th of July, the ovulation is most likely to occur on: (NUMS-2024)
A. 1st august
B. 28th of July
C. 24th of July
D. 5st August

Q.137 Which of the following would be produced as a result of reduction division during gametogenesis? (NUMS-2024)
A. Oogonium
B. Primary oocyte
C. Primary spermatocyte
D. Secondary oocyte

Q.138 _____ is spread through sexual contact. (KMU-2024)
A. Gonorrhea
B. Influenza
C. Tuberculosis
D. Typhoid

Q.139 Which of the following STD affect T4 lymphocytes? (SZAMBU-2024)
A. AIDS
B. Syphilis
C. Genital Herpes
D. Gonorrhea

Q.140 Which one of the following hormones is responsible for the labor pains in human female at the time of birth of baby? (UHS-2024)
A. Estrogen
B. Progesterone
C. Oxytocin
D. Corticosteroid

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ANSWER KEY

PRACTICE EXERCISE

1	C	11	D	21	B	31	B	41	A	51	D
2	D	12	B	22	C	32	A	42	A	52	D
3	B	13	B	23	A	33	B	43	B	53	B
4	A	14	D	24	B	34	C	44	B	54	C
5	B	15	D	25	D	35	D	45	C	55	B
6	C	16	B	26	B	36	A	46	A	56	C
7	C	17	D	27	B	37	D	47	C	57	C
8	A	18	D	28	C	38	D	48	A	58	D
9	D	19	B	29	B	39	B	49	B	59	B
10	C	20	A	30	B	40	B	50	B		

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60	C	71	A	82	A	93	A	104	D	115	A	126	B	137	D
61	A	72	B	83	B	94	C	105	C	116	C	127	C	138	A
62	D	73	B	84	C	95	B	106	A	117	B	128	D	139	A
63	C	74	C	85	D	96	B	107	B	118	B	129	D	140	C
64	A	75	B	86	A	97	D	108	D	119	A	130	B		
65	D	76	D	87	D	98	B	109	A	120	C	131	A		
66	D	77	B	88	B	99	B	110	A	121	B	132	D		
67	D	78	C	89	A	100	A	111	B	122	A	133	C		
68	D	79	C	90	C	101	C	112	C	123	B	134	C		
69	A	80	C	91	C	102	C	113	C	124	C	135	A		
70	C	81	A	92	C	103	A	114	C	125	A	136	C		

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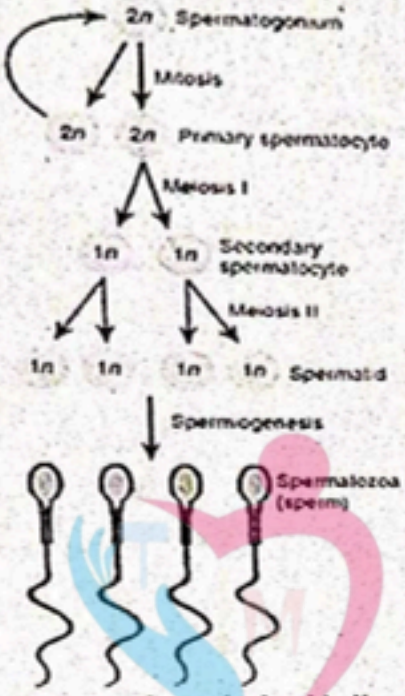
EXPLANATORY NOTES

PRACTICE EXERCISE



FSH causes the growth and development of germinal epithelium of testes. LH / ICSH stimulates production of testosterone. Inhibin controls spermatogenesis.

The prostate gland is a male reproductive organ whose main function is to secrete prostate fluid (acidic fluid with citrate), one of the components of semen.

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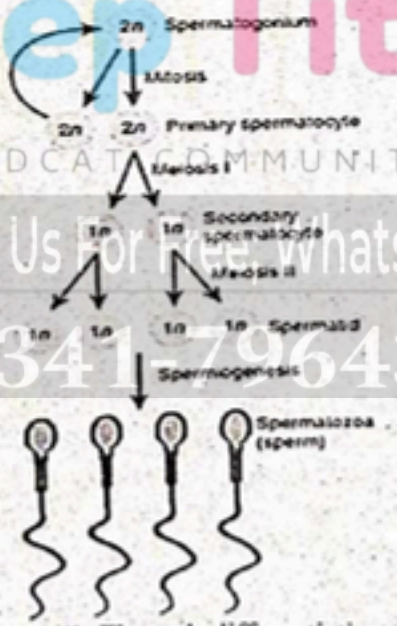
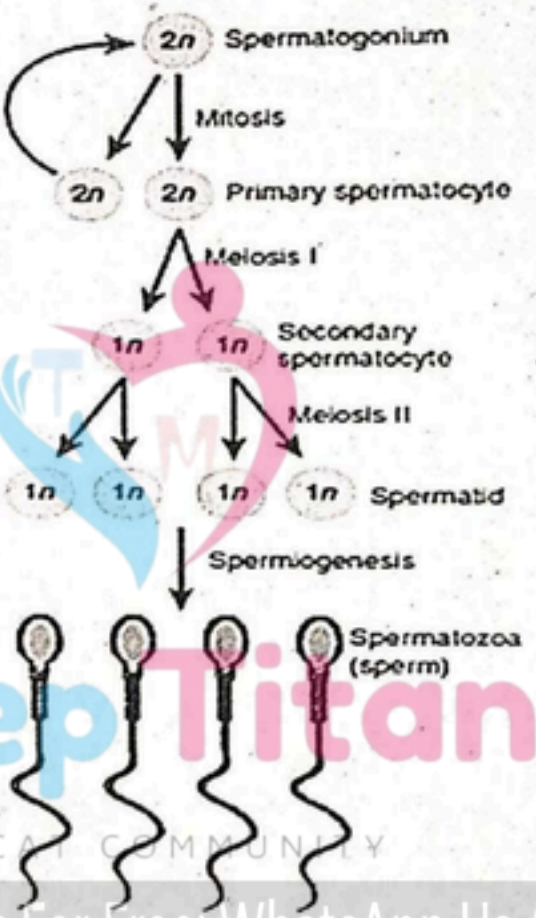


5. Spermatid is spherical, non-motile cell. Through differentiation, it is changed into spermatozoa where it forms tail and becomes motile.

6. The answer is epididymis. The epididymis is a tightly coiled mass of thin tubes that carries sperm from the testes to the vas deferens. Sperm matures as it passes through the epididymis.

7. Seminal vesicles release up to 60% of the fluid found in semen. The other 40% is produced by the prostate and bulbourethral glands. The fluid produced by seminal vesicles contains several key components e.g. fructose that is produced to provide energy for swimming sperm cells. Bulbourethral gland cleans and lubricates the urethra.
8. Both the sperm and ova are haploid cells. All others are dissimilarities. They carry different genetic makeup, having different sizes and ovum is non-motile.
9. The vas deferens transports mature sperm to the urethra while other options are glands which contribute in semen production.
10.



11. The accessory glands of the male reproductive system are the seminal vesicles (paired), bulbourethral gland (paired) and the prostate gland (unpaired). Testes are also paired.
12. Bulbourethral glands produce a mucus-like fluid called pre-ejaculate. This fluid is a viscous, clear, and salty liquid that neutralizes any residual acidity in the urethra.
13. Each primary spermatocyte produces four sperms while each primary oocyte gives rise to one ovum (secondary oocyte) and three polar bodies.
14. Spermatozoa are the complete mature motile sex cells of an animal, by which the ovum is fertilized, typically having a compact head and one or more long flagella for swimming.
15. Ejaculatory duct is formed by combining of ductus deferens and duct of seminal vesicle so it is not part of male copulatory organ.
16. Semen is formed by secretion of 3 accessory glands. It contains different compounds such as fructose, citrate etc. These chemicals are required for nourishment and activation of sperms.
17. Ovum, polar body and secondary spermatocytes have one copy of each functional gene as they all are formed by meiosis I. Spermatogonium is diploid because it has not undergone meiosis yet.
18. Inhibin hormone is produced by sertoli cell. It serves to control the spermatogenesis at normal rate.

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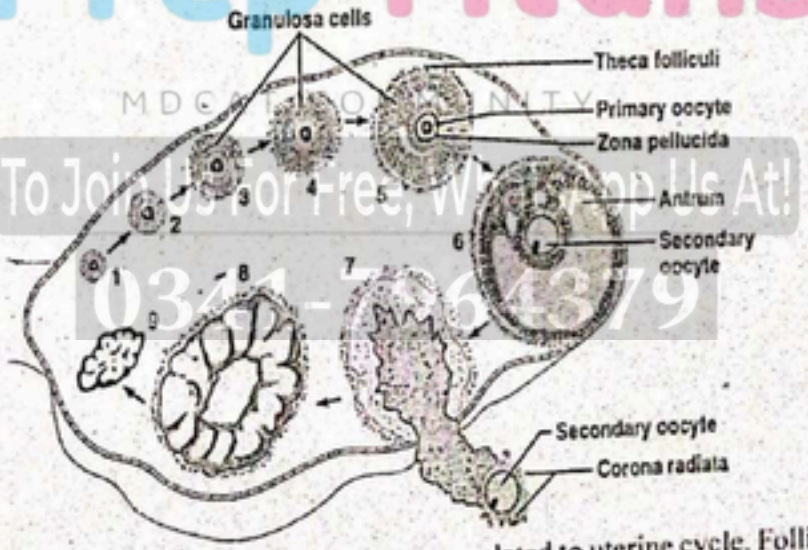
19. Thickness of endometrium changes in different phases of menstrual cycle. Estrogen and progesterone make it thicker and spongier.
20. Under normal circumstances, fertilization occurs in one of the Fallopian tubes, and then the fertilized egg begins to make its way to the uterus. By about the fifth day after fertilization, the embryo finally reaches the uterus, where it implants itself in the endometrium.
21. Cervix is a narrow entrance to the uterus form the vagina. It is normally blocked by a plug of mucus.
22. Oviduct is also called as uterine tube. Its proximal end is important for fertilization.
23. Secondary oocyte proceeds to ovum if it is fertilized. The site of fertilization is uterine tube.
24. Fertilization takes place in oviduct, zygote implanted in endometrium and conception takes place in uterus.
25. An oophorectomy is a surgical procedure to remove one or both ovaries. The ovaries produce eggs as well as the hormones estrogen and progesterone. Removal of one ovary still allows a woman to continue to menstruate and to have children, as long as the remaining ovary is not damaged.
26. Ruptured follicle after ovulation change to yellow glandular structure called as corpus luteum, which secrete progesterone.
27. The endometrium changes throughout the menstrual cycle. It becomes thick and rich with blood vessels to prepare for pregnancy. If pregnancy does not occur, part of the endometrium is shed, causing menstrual bleeding.
28. Normally, 14th day is the day of ovulation and according to the life span of egg and sperms option C is the most appropriate one.
29. Under normal conditions, luteal phase of menstrual cycle is of 14 days. If cycle is going to be completed in 45 days, then 45-14=31, so 31st day will be day of ovulation.
30. During the secretory or luteinizing phase (14th to 28th day) the endometrium differentiates itself due to the influence of progesterone (from the corpus luteum) and attains its full maturity.
31. About half of menstrual fluid is blood. This blood contains sodium, calcium, phosphate, iron, and chloride, the extent of which depends on the woman. As well as blood, the fluid consists of cervical mucus, vaginal secretions, and endometrial tissue.
32. The menstrual cycle is governed by hormonal changes. It takes 3-7 days to regain original form of uterus for next cycle.
33. In normal menstrual cycle, ovulation usually occurs at mid cycle, i.e., 14th day. Ovulation is release of egg from ovary.
34.



35. Menstrual phase, proliferative and secretory phases are related to uterine cycle. Follicular and luteal phases are related to ovaries.
36. Due to stimulus of FSH more than one follicle undergo development. Single one will survive due to competition remaining will degenerate by process of follicle atresia.

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37. A woman can have multiple ovulations in a single cycle. This means that several eggs (most often two) are released from the ovaries. However, both eggs will be released within 24h from the ovaries and result in multiple births.

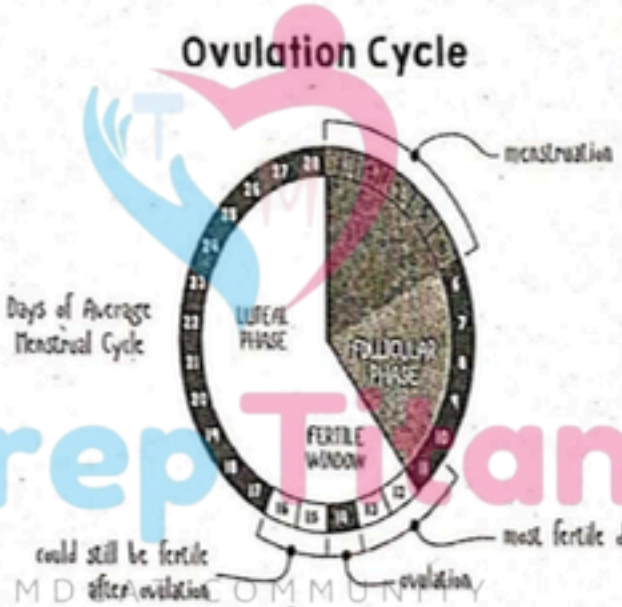
38. During menstruation hormone dependent layers which developed on endometrium, released out from body.

39. Menarche is the term used for first menstrual cycle at puberty in females. While menopause is the complete stop of menstruation in old age women.

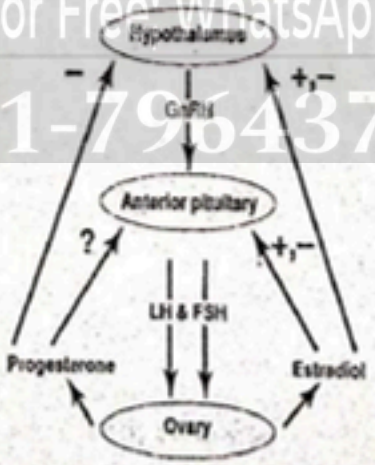
40. Progesterone's continuous production will maintain thickness of endometrium longing which help to maintain pregnancy.

41. The complete stop of menstrual cycle is called Menopause. Andropause is a condition that is associated with the decrease in the sex hormones. Menarche is first menstrual cycle of female. Menstruation is first phase of menstrual cycle in which bleeding start.

42.



43. FSH and LH are called as Gonadotropins. They are responsible for regulation of menstrual cycle.



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Oxytocin is released from posterior pituitary and it starts muscle contraction and relaxation of smooth muscles in myometrium. This activity results in process of birth.

Placenta is a connection between mother and developing child for transport of material. It starts establishing during 4th to 5th month of pregnancy.

In Gonorrhea, bacteria invades mucous membrane of urinogenital tract and in females it can damage cervix also.

Syphilis is caused by *Treponema pallidum*. Genital herpes and AIDS are caused by viruses; Herpes simplex type II and HIV respectively.

Syphilis spreads in three stages known as primary, secondary and tertiary syphilis. Initially it affects skin only but at stage of tertiary syphilis, this diseases damages most of the vital organs in body.

Genital herpes is caused by a virus and it affects genital parts resulting in genital ulcers and soreness.

58. Reproduction is essential for the continuation of a species, allowing it to produce offspring and avoid extinction. An individual does not need to reproduce to survive.

59. Asexual reproduction produces identical offspring quickly without the need for gamete formation, leading to faster population growth.

52. The route of sperms in male reproductive system from testis to urethra is as follows; Seminiferous tubules (sperm production) → Epididymis→ vas deferens→×→ ejaculatory duct→ urethra. So, if the Vas deferens shown is trimmed, the man would become sterile.

53. The testes are the primary sex organs in the male reproductive system, responsible for producing sperm and hormones like testosterone.

54. Spermatogenesis requires a temperature slightly lower than the normal body temperature (around 2°C below) for optimal function.

55. Spermatids are not motile. Spermatozoa have a tail for mobility.

56. Sexual characteristics in females develop during puberty, when hormonal changes trigger physical development.

57. The female reproductive system is derived from the mesoderm, one of the three primary germ layers.

58. The event that transforms the Graafian follicle into an endocrine structure is ovulation.

59. A single ovum is produced each month in a female. So, the total number of ova produced by a female in one year is 12.

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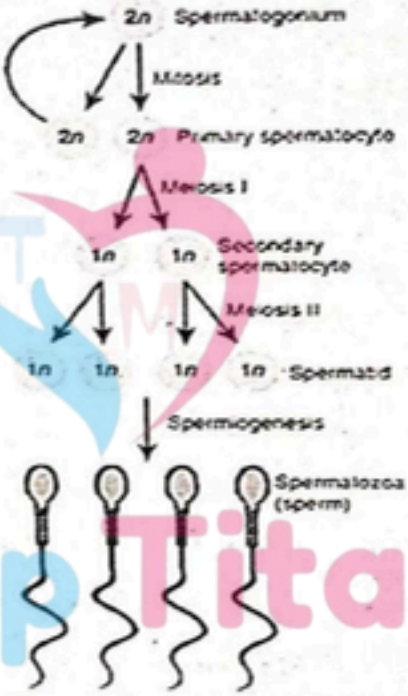
60. Spermatogonium cell produced at an early stage in the formation of spermatozoa, formed in the wall of a seminiferous tubule and giving rise to spermatocytes by mitosis.

61. Leydig cells or interstitial cells are the cells present in the interstitial space of the testis. In fact, they are located in the connective tissue that surrounds the seminiferous tubules. These cells are responsible for testosterone production in male body. Sertoli cells nourish spermatozoa.

62. Spermatid is spherical, non-motile cell. Through differentiation, it is changed into spermatozoa where it forms tail and becomes motile. Primary spermatocytes and spermatogonia are diploid cells.

63. Leydig cells or interstitial cells are the cells present in the interstitial space of the testis. In fact, they are located in the connective tissue that surrounds the seminiferous tubules. These cells are responsible for testosterone production in male body.

64.



65.



66. Each testis contains 250-300 lobules and each lobule contains 1 to 4 tightly coiled seminiferous tubules.

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67. Inhibin is produced by sertoli cells and serves to control the spermatogenesis at normal rate.
- **Testosterone** causes the growth and development of germinal epithelium to form sperms.
- **LH** stimulates Leydig cells to release testosterone.
- **FSH** stimulates spermatogenesis by stimulating the Sertoli cells to complete the development of sperms from spermatids.

68. Spermatogenesis takes place in seminiferous tubules of testes. Urethra is common passage for excretion of urine and release of sperms.
- Epididymis stores mature sperms.
- Oviduct is a part of female reproductive system and gives medium for fertilization.

69. Sperm cells are produced in the result of meiosis. They are haploid, they contain single set of chromosomes, while other cells are product of mitosis division. They are diploid and contain two set of chromosomes.

70. The terminal portion of the male reproductive duct system is urethra. Vasa deferens and vasa efferentia are different names of sperm duct.

71. The amount of semen propelled out of the male duct system ejaculation is about 2-5 ml and there are between 20 to 150 million sperms per ml.

72. Cervix is part of the uterus and is narrow entrance to the uterus from vagina. It is normally blocked with mucus plug.

73. The follicle cells, after release of egg, are modified to form a special structure called corpus luteum. This yellowish glandular structure starts secreting progesterone, which develops endometrium and makes it receptive for implantation and placentation.

74. Pituitary gland on the onset of puberty, releases FSH which stimulates the development of several primary follicles.

75. Ovary under influence of FSH produces estrogen. FSH also stimulates the follicle development.

76. Secondary oocyte undergoes through meiosis II but arrested in Metaphase II. It is released in this stage from ovary and does not proceed further until fertilized.

77. The second half of the menstrual cycle after ovulation; the corpus luteum secretes progesterone which prepares the endometrium for the implantation of an embryo.

78. Events of menstrual cycle are regulated by pituitary gonadotropins. Other chemicals are plants hormones.

79. Decrease of FSH and increase of estrogen, causes the pituitary gland to secrete LH which induces ovulation.

80. Estrogen, on one hand, stimulates the endometrium and vascularizes it. On the other hand, it inhibits secretion of FSH from anterior lobe of pituitary.

81. An increase of progesterone inhibits the release of LH, that's why it inhibits the ovulation.

82. LH causes ovulation, which results the formation of ruptured follicles known as carpus luteum which is source of progesterone.

83. Ovary under influence of FSH produces estrogen from follicle cells, which cause thickness of endometrium and stimulate LH from anterior lobe of pituitary

84. Thickness of endometrium changes in different phases of menstrual cycle. Estrogen and progesterone make it thicker and spongier.

85. Both estrogen and progesterone have supportive effect on endometrium. They vascularize it and also increase its thickness.

86. LH causes ovulation, which results the formation of ruptured follicles known as corpus luteum which is source of progesterone.

87. On onset of puberty pituitary gland start FSH production which stimulate follicles development in ovary.

88. Estrogen act as inhibitor for FSH and play stimulatory role for LH, which cause ovulation.

89. A corpus luteum is a mass of cells that forms in an ovary and is responsible for the production of the hormone progesterone during early pregnancy. The role of the corpus luteum depends on whether or not fertilization occurs.

90. Menstrual cycle is the monthly cycle of changes in the ovaries and the lining of the uterus (endometrium), starting with the preparation of an egg for fertilization.

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91. The menstrual cycle is regulated by hormones. LH and FSH, which are produced by the pituitary gland, promote ovulation and stimulate the ovaries to produce estrogen and progesterone.
92. During ovulation, level of LH is at its maximum level. This high level of LH promotes release of ovum from ripen follicle. While in other phase, its level is low.
93. After ovulation, rupture follicle become glandular structure and releases progesterone. This hormone vascularizes the endometrium.
94. Total gestation period is usually about 280 days. Once placenta is established, it starts secreting progesterone hormone which maintains the pregnancy.
95. The zygote travels from the fallopian tube to the uterus in **3-6 days**. During this time, it divides and forms a blastocyst before implantation.
96. The **secretory phase** is the longest phase of the menstrual cycle, lasting about **14 days** after ovulation. During this time, the uterine lining prepares for a potential pregnancy.
97. Corpus luteum secretes progesterone. Testosterone is secreted by Leydig cells. Parathormone is secreted by parathyroid gland. Oxytocin is released by posterior lobe of pituitary gland.
98. LH converts the rupture follicle to a yellowish glandular mass called corpus luteum. It secretes progesterone.
99. *Treponema pallidum* is the causative organism for Syphilis. Gonorrhea is caused by gram negative bacterium *Neisseria gonorrheae*, mainly affects the mucous membrane of urinogenital tract.
    - AIDS is caused by HIV.
    - Diabetes is a condition in which body is unable to produce insulin.
100. Hyaluronidase is an enzyme released by sperm cells, especially during fertilization. It helps in breaking down hyaluronic acid in the zona pellucida, a glycoprotein layer surrounding the ovum, facilitating sperm penetration and fusion with the egg.
101. Inhibin is produced by Sertoli cells in the testes. It regulates the production of sperm by inhibiting the secretion of FSH (Follicle Stimulating Hormone) from the pituitary gland.
102. The testes are located in the scrotum, which is a pouch of skin that hangs outside the male body. This location helps to maintain the testes at a lower temperature, which is necessary for sperm production.
103. Leydig cells, located in the interstitial space between seminiferous tubules in the testes, are responsible for producing testosterone, the primary male sex hormone.
104. Sertoli cells provide support, nourishment, and a protective environment for developing sperm cells. They do not secrete testosterone, which is the role of Leydig cells.
105. Menopause refers to the natural biological process marking the end of a woman's menstrual cycles and the cessation of ovulation, resulting in the stop of ova (egg) production.
106. The uterus is a muscular organ in which a fertilized egg implants and grows during pregnancy.
107. Oxytocin stimulates the contraction of the myometrium (the muscle layer of the uterus), which helps in labor and the expulsion of the fetus.
108. Human Chorionic Gonadotropin (hCG) is produced by the placenta, not the ovaries. The ovaries are responsible for estrogen and progesterone production, as well as ovulation.
109. After ovulation, the ruptured follicle transforms into the corpus luteum, which secretes progesterone. This hormone prepares the endometrium for possible implantation of a fertilized egg.
110. The Fallopian tube, or oviduct, is the tube through which the egg travels from the ovaries to the uterus. Fertilization typically occurs in the Fallopian tube.
111. Oxytocin stimulates the uterine muscles (myometrium) to contract, which is essential for labor and expulsion of the baby.
112. Follicle stimulating hormone (FSH) stimulates the ovarian follicles to produce estrogen during the menstrual cycle and oogenesis.
113. FSH and LH, both secreted by the pituitary gland, regulate the ovarian cycle. FSH stimulates follicle growth, and LH triggers ovulation.
114. During the menstrual phase, the levels of estrogen and progesterone are low due to the breakdown of the corpus luteum.
115. Syphilis is a sexually transmitted disease caused by the bacterium *Treponema pallidum*.
116. Gonorrhea is a bacterial infection that often causes painful urination and discharge from the urethra in males.

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117. The incubation period for syphilis typically ranges from 2 to 3 weeks, after which the primary stage (chancre) appears.
118. Sertoli cells secrete a fluid that nourishes and protects developing sperm cells in the seminiferous tubules.
119. The epididymis is responsible for storing sperm and transporting them from the seminiferous tubules to the vas deferens.
120. Spermatogonia are the stem cells of spermatogenesis. The next stage of differentiation is the primary spermatocyte, which undergoes meiosis I to form secondary spermatocytes.
121. Prostaglandins in semen play a key role in facilitating the transport of sperm. They help by stimulating the smooth muscles in the female reproductive tract, which aids in sperm motility and movement towards the egg.
122. The Cowper's glands secrete an alkaline fluid that neutralizes the acidity of urine remaining in the urethra, creating a safer environment for sperm.
123. Spermatozoa (mature sperm) are stored and undergo maturation in the epididymis.
124. The ejaculatory duct does not enter the testis; it is formed by the fusion of the vas deferens and the seminal vesicle duct and transports semen to the urethra.
125. During the luteal phase, the corpus luteum secretes progesterone, which helps maintain the uterine lining for possible pregnancy.
126. AIDS (Acquired Immunodeficiency Syndrome) is caused by the HIV virus, which is transmitted through sexual contact, blood, or other bodily fluids. While all other are bacterial diseases.
127. Sertoli cells produce inhibin, which helps regulate the secretion of FSH and plays a role in feedback control of spermatogenesis.
128. Seminiferous tubules are part of the male reproductive system, not the female reproductive system.
129. The corpus luteum produces progesterone after ovulation to prepare the uterine lining for potential implantation of a fertilized egg.
130. Follicle atresia refers to the degeneration of follicles that do not reach full maturity.
131. After ovulation, the Graafian follicle transforms into the corpus luteum, which secretes progesterone.
132. The perimetrium is the outermost layer of the uterus, surrounding the myometrium and endometrium.
133. The primary oocyte undergoes meiosis to produce a secondary oocyte and a first polar body.
134. Ovulation typically occurs around the 14th day of a 28 days menstrual cycle.
135. The Graffian follicle primarily secretes estrogen, not progesterone. Progesterone is secreted by the corpus luteum.
136. Ovulation usually occurs around the 14th day of a typical 28 days menstrual cycle. If the cycle starts on July 10th, ovulation would likely occur on July 24th.
137. In females, during gametogenesis (oogenesis), the primary oocyte undergoes meiosis, but it gets arrested at a certain stage. The primary oocyte undergoes the first meiotic division (**reduction division**) to form a **secondary oocyte** (which is haploid). The second meiotic division occurs only if fertilization happens.
138. Gonorrhea is a sexually transmitted infection (STI) caused by the bacterium *Neisseria gonorrhoeae*, and it is primarily spread through sexual contact, including vaginal, anal, and oral sex. While other are not included in sexually transmitted diseases.
139. AIDS (Acquired Immunodeficiency Syndrome) is caused by the Human Immunodeficiency Virus (HIV), which specifically targets and destroys $CD4^+$ T lymphocytes (T4 cells), a type of white blood cell crucial for the immune system's function. The destruction of these cells leads to immunodeficiency.
140. Oxytocin is a hormone released by the posterior pituitary gland that plays a key role in childbirth. It stimulates uterine contractions, which are responsible for the labor pains during childbirth. Oxytocin also helps in the ejection of milk from the mammary glands during lactation.

PrepTitans

12 TOPIC SUPPORT & MOVEMENT
PRACTICE EXERCISE

Q.1 **It is not a true statement about bones and cartilages:**
A. Both contain living cells
B. Both contain various types of living cells
C. Both have ground matrix of collagen
D. Both are part of endoskeleton

Q.2 **Which type of cartilage is/are present in our respiratory passage?**
A. Fibro cartilage
B. Elastic cartilage
C. Hyaline cartilage
D. All A, B, C

Q.3 **Cartilage is covered by:**
A. Periosteum
B. Perichondrium
C. Perimysium
D. Perineurium

Q.4 **Major protein of connective tissues is:**
A. Collagen
B. Actin
C. Titin
D. Albumin

Q.5 **Tibia is found in:**
A. Skull
B. Lower leg
C. Face
D. Upper arm

Q.6 **Number of bones present in vertebral column:**
A. 24
B. 26
C. 33
D. 35

Q.7 **It is not part of axial skeleton:**
A. Sternum
B. Atlas and axis
C. Inferior Choncha
D. Patella

Q.8 **Ribs which are only attached to vertebral column are:**
A. True ribs
B. False ribs
C. Floating ribs
D. Costal arch

Q.9 **How many coxal bones are present in human body?**
A. 3
B. 6
C. 2
D. 4

Q.10 **Knee and elbow joints are examples of:**
A. Ball and socket joint
B. Cartilaginous joint
C. Hinge joint
D. Fibrous joint

Q.11 **Pelvic and pectoral joint is an example of:**
A. Ball and socket joint
B. Fibrous joint
C. Hinge joint
D. Pivot joint

Q.12 **Joint that is immoveable:**
A. Sutures
B. Saddle
C. Ball and Socket
D. Pubic symphysis

Q.13 **Joint between costal arch and sternum is:**
A. Fibrous
B. Cartilaginous
C. Ball and Socket
D. Synovial

Q.14 **Acute forms of arthritis usually result from _____ invasion.**
A. Viral
B. Fungal
C. Bacterial
D. Bacteriophage

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Q15 **Antibodies attack joints in:**
A. Osteoarthritis
B. Juvenile arthritis
C. Gouty arthritis
D. Rheumatoid arthritis

Q16 **Irregular striations and involuntary control is related to:**
A. Smooth muscle cells
B. Cardiac muscle cells
C. Skeletal muscle cells
D. Fibroelastic cartilage cells

Q17 **Which one of the following is correct regarding ligaments and tendons?**
A. Both are inelastic
B. Both are specialized connective tissue fibrils
C. Both are elastic
D. Both form joint capsule

Q18 **Earliest form of muscles is:**
A. Cardiac
B. Skeletal
C. Smooth
D. Striated

Q19 **Brachioradialis:**
A. Originates from radius
B. Originates from ulna
C. Is inserted into radius
D. Is inserted into ulna

Q20 **The main functional partners of bones are:**
A. Tendon
B. Ligament
C. Skeletal muscle
D. Nerves

Q21 **The type of muscle which exhibits striations at regular intervals, is multinucleated and whose control is neurogenic (controlled by the nervous system) is the:**
A. Smooth muscle
B. Cardiac muscle
C. Skeletal muscle
D. Involuntary muscle

Q22 **Connective tissue wrapping around a muscle that is found continuous with tendons:**
A. Perimysium
B. Endomysium
C. Epimysium
D. Perichondrium

Q23 **Sarcoplasmic reticulum is like:**
A. Golgi bodies
B. Smooth endoplasmic reticulum
C. Cytoskeletal fibers
D. Ribosome

Q24 **Sarcolemma is primarily made up of:**
A. Lipoprotein
B. Glycolipids
C. Glycoprotein
D. Nucleoproteins

Q25 **Which one of the following structures serves as a center of sarcomere?**
A. H-Zone
B. Z-band
C. M-line
D. A-band

Q26 **Which one of the following is correct regarding A-band?**
A. It is non-polarizing
B. It contains only myosin
C. It is isotropic
D. Myosin acts as a polarizer of light

Q27 **T-tubules in human skeletal muscles are present at:**
A. Z-line
B. M-line
C. A-I junction
D. H-zone

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Q.28 **Which of the following is a true statement?**
A. Muscle cell has many muscle fibers
B. Muscle fiber has many muscle cells
C. Muscle cell has many myofibrils
D. Sarcomere has bundles of muscle fibers

Q.29 **Which of the following band allows most of the light to pass through it?**
A. A-band
B. Muscle bundle
C. I-band
D. Muscle fiber

Q.30 **Chief component of thin filaments is:**
A. Actin
B. Troponin
C. Myosin
D. Fibrous proteins

Q.31 **The sliding protein of muscle:**
A. Tubulin
B. Myoglobin
C. Myosin
D. Actin

Q.32 **The point of attachment of the nerve to the muscle is called a _____ junction.**
A. Neuro-muscular
B. Mechanical
C. Chemical
D. Synaptic

Q.33 **A muscle protein that has 3 polypeptides:**
A. Actin
B. Myosin
C. Troponin
D. Tropomyosin

Q.34 **Cross bridges form between:**
A. Troponin and tropomyosin
B. Actin filaments and myosin heads
C. Calcium and sodium
D. Sarcolemma and sarcoplasmic reticulum

Q.35 **When a muscle is at rest, what blocks myosin from binding to actin?**
A. Tropomyosin
B. Tubulin
C. Troponin
D. Sarcomere

Q.36 **All of the following are true regarding muscle contraction except:**
A. I band shortens
B. A band remains unchanged
C. Z-lines gets closer
D. M-line disappears

Q.37 **Contractile protein of skeletal muscle cells involving ATPase activity is:**
A. Actin
B. Myosin
C. Troponin
D. Tropomyosin

Q.38 **Which triggers the release of calcium ions from sarcoplasmic reticulum?**
A. Formation of actin-myosin cross bridges
B. An action potential
C. Sarcomere contraction
D. An increase in calcium ion concentration

Q.39 **A motor unit is made up of:**
A. All the muscle fibers within a given muscle
B. A motor neuron and the muscle fibers it innervates
C. All the neurons going into an individual section of a body
D. A fascicle and a nerve

Q.40 **It acts as immediate source of energy for muscles contraction.**
A. ATP
B. Phosphocreatine
C. Fatty acids
D. Glycogen

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Q41 When muscle contracts, thick and thin filaments undergo:
A. Overlapping
B. Shortening
C. Lengthening
D. Contraction

Q42 Pick the correct pair from the following:
A. Ligament – Bone to muscle attachment
B. Tendon – Bone to bone attachment
C. Ligament – Collagen proteins
D. Tendon – Elastic in nature

Q43 The movement which results in a change of place or location is known as:
A. Contraction
B. Abduction
C. Adduction
D. Locomotion

Q44 Multistage joint is formed at:
A. Proximal end of humerus
B. Distal end of humerus
C. Proximal ends of radius & ulna
D. Distal ends of radius & ulna

Q45 Movement possible on pivot joint is:
A. Flexion
B. Rotation
C. Extension
D. No movement allowed

Q46 Ball and socket joints can be seen in:
A. Wrist
B. Neck
C. Fingers
D. Shoulders

Q47 In cartilaginous joints, the joint cavity is:
A. Small
B. Absent
C. Large
D. Irregular

Q48 Which one of following receives the nerves from somatic nervous system?
A. Skeletal muscle
B. Smooth muscle
C. Cardiac muscle
D. All involuntary muscles

Q49 The T-tubule and sarcoplasmic reticulum form:
A. Muscle fiber
B. Triad
C. T system
D. Z disc

Q50 Many sarcomeres placed end to end and form a:
A. Muscle
B. Muscle fascicles
C. Myofibrils
D. Muscle fibers

Q51 When calcium gates of the smooth endoplasmic reticulum are open, then calcium is released into:
A. Cytosol
B. Organelle lumen
C. Nucleoplasm
D. Directly taken up by myofilament

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(UHS-2022)

Q.52 What is false about cartilage?
A. There are many blood vessels in cartilage
B. It is a form of connective tissue
C. It covers ends of the bone at joints
D. It is much softer than bone

(NUMS-2022)

Q.53 Which of the following type of cartilage is most abundant in human body?
A. Fibrous
B. Hyaline
C. Elastic
D. Flexible

(BUMHS-2022)

Q.54 Which of the following is a connective tissue?
A. Cartilage
B. Epithelium
C. Muscle
D. Nerve

(UHS-2022)

Q.55 Hinge joint is present between which of the following bones?
A. Humerus and radio-ulna
B. Femur and pectoral girdle
C. Femur and acetabulum
D. Humerus and pectoral girdle

(NUMS-2022)

Q.56 Which of the following is an example of joint called 'suture'?
A. Intervertebral discs
B. Skull bones
C. Costal cartilage
D. Pubic symphysis

(SZABMU-2022)

Q.57 A joint in which ends of bones are covered with hyaline cartilage and held together by surrounding tube like capsule of dense fibrous tissue:
A. Cartilaginous joint
B. Synovial joint
C. Fibrous joints
D. Immoveable joints

(ETEA-2022)

Q.58 Those joints in which the articulating bones are separated by a fluid-containing joint cavity are called:
A. Fibrous joints
B. Cartilaginous joints
C. Synovial joints
D. Immovable joints

(ETEA-2022)

Q.59 The joints present in the elbow and knee are the example of which type of joint:
A. Immovable joint
B. Slightly movable joint
C. Hinge joint
D. Ball and socket joint

(BUMHS-2022)

Q.60 What is the study of joints:
A. Arthralgia
B. Arthrology
C. Mycology
D. Cytology

(SZABMU-2022)

Q.61 _____ is the inflammation of joints.
A. Osteoarthritis
B. Osteoporosis
C. Arteriosclerosis
D. Osteosclerosis

(ETEA-2022)

Q.62 Which one of the following is not related to arthritis?
A. Inflammation of joint
B. An autoimmune disease
C. The leading cause of disability in patients over the age of 65
D. Inflammation of nerve

(PMC-2020)

Q.63 Which of the following muscles are considered as 'voluntary muscles'?
A. Smooth muscles
B. Skeletal muscles
C. Cardiac muscles
D. Glandular muscles

(PMC-2020)

Q.64 Which one of the following are 'myogenic' type of muscles?
A. Smooth muscles
B. Skeletal muscles
C. Cardiac muscles
D. Glandular muscles

(NUMS-2022)

Q.65 Smooth muscles are long and spindle shaped with _____ nucleus per cell.
A. One
B. Two
C. Three
D. Many

(MDCAT-2014)

Q.66 The repeated protein pattern of myofibrils is called:
A. Sarcomere
B. Sarcolemma
C. Zyomere
D. Cross bridges

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Q.67 A sarcomere is the region of a myofibril between two successive: (MDCAT-2015)
A. M-lines
B. I-bands
C. Z-lines
D. T-tubules

Q.68 Each muscle fiber is surrounded by a modified cell membrane called: (MDCAT-2016, 2017)
A. Sarcolemma
B. Myosin Filament
C. Sarcomere
D. Myofilament

Q.69 Over lapping of thick filament occurs in: (MDCAT-2017)
A. A-Band
B. M-line
C. I-Band
D. Z-line

Q.70 Sarcolemma is the membrane around? (ETEA-2017)
A. Bone
B. Joints
C. Muscle fiber
D. Heat

Q.71 Each muscle fiber contains long threads that extend along its entire length. These are called as: (AJK-2019)
A. Myosin
B. Microtubules
C. Microfilaments
D. Myofibrils

Q.72 Thin filaments of muscles contain _____ chains of actin molecules. (MDCAT-2019)
A. Four
B. Three
C. One
D. Two

Q.73 The thick filaments in a myofibril of muscles are made up of _____. (MDCAT-2019)
A. Haemoglobin
B. Actin
C. Myoglobin
D. Myosin

Q.74 What do we call the cell surface membrane of a muscle fiber? (PMC-2020)
A. Sarcolemma
B. Sarcoplasm
C. Plasma membrane
D. Myofibrils

Q.75 Which of the following is not found in skeletal muscle fibers in human? (UHS-2022)
A. Multiple nuclei
B. Multiple mitochondria
C. Large amount of myoglobin
D. Large amount of hemoglobin

Q.76 The hollow elongated tube formed when muscle fiber penetrates deep into the cell is known as: (ETEA-2022)
A. A-tubule
B. M-tubule
C. T-tubule
D. Z-tubule

Q.77 Each myosin is surrounded by: (DUHS-2022)
A. Motor nerves
B. Myosin head
C. 6-actin filaments
D. 2-actin filaments

Q.78 According to sliding filament theory, when muscle fibers are stimulated by nervous system, which of the following changes occurs? (MDCAT-2015)
A. I-bands shorten
B. Z-lines move further apart
C. H-zone becomes more visible
D. A-bands shorten

Q.79 The function of calcium ions in muscle contraction is to: (MDCAT-2019)
A. Bind to troponin molecule and cause them to move
B. Polarize visible light
C. Aid in the transmission of nerve impulse
D. Bind to tropomyosin molecule and cause them to form cross bridges

Q.80 Which of the following is a muscle component that acts as store for energy? (UHS-2022)
A. ATP
B. Creatine-PO_4
C. Myoglobin
D. Creatinine-PO_4

Q.81 Which event does not occur during muscle contraction? (NUMS-2022)
A. I-band shortens
B. A-band shorten
C. H-zone disappears
D. Z-line move closer

Q.82 The muscle contraction involves the breakdown of cross bridges of actin and myosin filaments due to the following process: (SZABMU-2022)
A. ATP is oxidized
B. ATP is reduced
C. ATP is hydrolyzed
D. ATP is synthesized

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Q.83 What is the function of myoglobin? (SZABMU-2023)
A. Store oxygen
B. Store CO_2
C. Transport Oxygen
D. Transport CO_2

Q.84 Cartilage is a type of which tissue? (UHS-2023)
A. Connective tissues
B. Epithelial tissues
C. Muscular tissues
D. Nervous tissues

Q.85 Which of the following connective tissues consists of cells known as chondrocytes: (ETEA-2023)
A. Myocardium
B. Cartilage
C. Bone
D. Periosteum

Q.86 Hip joint and shoulder joint are example of: (ETEA-2023 Retake)
A. Cartilaginous joint
B. Synovial joint
C. Hinge joint
D. Ball and socket joint

Q.87 Cartilage is more difficult to heal than bone because cartilage: (NUMS-2023)
A. Lacks vascular supply
B. Lacks minerals deposits in matrix
C. Has less number of cells deep down
D. Lacks protein in matrix

Q.88 Which cartilage is found at the end of long bones? (ETEA-2023 Retake)
A. Calcified
B. Elastic
C. Fibrous
D. Hyaline

Q.89 Mature bone cells are called: (SZABMU-2023)
A. Osteoblasts
B. Osteocytes
C. Osteoclasts
D. Chondrocytes

Q.90 Irregular striations and involuntary control is related to? (UHS-2023)
A. Cardiac muscle cells
B. Fibroelastic cartilage cell
C. Skeletal muscle cells
D. Smooth muscle cells

Q.91 Which feature is possessed by smooth muscles? (SZABMU-2023)
A. Multinucleate cells
B. Contractile sarcomeres
C. Uninucleate cells
D. Striated appearance

Q.92 Which feature is absent in cardiac muscles? (NUMS-2023)
A. Intercalated discs
B. Multinucleated cells
C. Light and dark bands
D. Contractile sarcomeres

Q.93 The cell membrane of muscle cell is: (UHS-2023)
A. Sarcoplasm
B. Sarcolemma
C. Sarcomere
D. Myofibrils

Q.94 What do we call the cell surface membrane of a muscle fibre? (SZABMU-2023)
A. Sarcolemma
B. Plasma membrane
C. Sarcoplasm
D Myofibrils

Q.95 A sarcomere is the region of a myofibril between two successive: (ETEA-2023)
A. I-lines
B. A-lines
C. Z-line
D. M-lines

Q.96 How many actin filaments surround the myosin at each end? (ETEA-2023 Retake)
A. 2
B. 4
C. 6
D. 8

Q.97 During sliding of actin filaments, ATP is used for? (UHS-2023)
A. Cross bridge formation
B. Cross bridge breaking
C. Dragging filaments
D. Shortening of filaments

Q.98 According to sliding filament hypothesis, the release of _____ ions from the sarcoplasmic reticulum causes the reorientation of certain components in thin filament, permitting them to bind with extension from the thick myosin filaments: (ETEA-2023)
A. Sodium
B. Calcium
C. Magnesium
D. Potassium

Q.99 Muscle fatigue results due to deficiency of _____ and excess accumulation of _____. (ETEA-2023 Retake)
A. Adenosine triphosphate, lactic acid
B. Adenosine triphosphate, ionic imbalance
C. Glucose, lactic acid
D. glucose, ionic imbalance

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Q.100 Pubic symphysis and intervertebral disc are example of: (NUMS-2023)
A Fibrous joints
B. Synovial joints
C. Cartilaginous joints
D. Gliding joints

Q.101 A condition in which a joint becomes swollen painful and immoveable is called: (SZABMU-2023)
A. Spondylosis
B. Arthritis
C. Sciatica
D. Rickets

Q.102 The joint present between wrist bones is: (ETEA-2023)
A. Fibrous joint
B. Cartilaginous joint
C. Synovial joint
D. Ball and socket joint

Q.103 The living cells of cartilage are called: (SZAMBU-2024)
A. Chondroblasts
B. Chondrocytes
C. Chondroclasts
D. Osteocytes

Q.104 Cartilage cells contain small cavities distributed in the matrix and are called: (SZAMBU-2024-Reconduct)
A. Shaft
B. Periosteum
C. Perichondrium
D. Lacunae

Q.105 Which of the following type of cartilage is most abundant in human body? (SZAMBU-2024-Reconduct)
A. Fibrous
B. Hyaline
C. Elastic
D. Flexible

Q.106 Bone forming cells are: (UHS-2024)
A. Osteoblasts
B. Osteocytes
C. Osteoclasts
D. Osteons

Q.107 The cells contained in the lacunae of the bone are called: (KMU-2024)
A. Chondrocytes
B. Osteoblasts
C. Osteocytes
D. Osteoclast

Q.108 Bone resorption is performed by: (SZAMBU-2024-Reconduct)
A. Osteoblasts
B. Osteocytes
C. Osteoclasts
D. Osteopores

Q.109 Which feature is possessed by smooth muscles? (UHS-2024)
A. Voluntary
B. Branched
C. Uni-nucleate
D. Striated appearance

Q.110 Which of the following does NOT relate to smooth muscles? (KMU-2024)
A. Controlled by the autonomic nervous system
B. Have spindle shaped cells
C. Line the wall of heart
D. Lack striations

Q.111 Contractile unit between two Z lines is absent in: (SZAMBU-2024-Reconduct)
A. Skeletal muscles
B. Skeletal and cardiac muscles
C. Smooth muscles
D. Skeletal and smooth muscles

Q.112 Which one of the following muscles are considered as 'Voluntary Muscles'? (SZAMBU-2024-Reconduct)
A. Smooth muscles
B. Cardiac muscles
C. Skeletal muscles
D. Glandular muscles

Q.113 The _____ surrounds the muscle fibre of the skeletal muscle. (KMU-2024)
A. Cytoplasm
B. Lacunae
C. Myofibrils
D. Sarcolemma

Q.114 Thick filaments in skeletal muscles are composed of: (UHS-2024)
A. Actin
B. Myosin
C. Tropomyosin
D. Troponin

Q.115 What do we call the cell surface membrane of a muscle fiber? (SZAMBU-2024-Reconduct)
A. Sarcolemma
B. Plasma membrane
C. Sarcoplasm
D. Myofibrils

Q.116 The accumulation of 'lactic acid' in the muscles results in: (UHS-2024)
A. Extreme fatigue
B. Muscle contraction
C. Paralysis
D. Convulsion

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Q.117 Sarcomere is part of myofibril between: (UHS-2024)
A. Two I bands
B. Two A bands
C. Two M lines
D. Two Z lines

Q.118 What happens to calcium when skeletal muscles recover from contraction? (KMU-2024)
A. Released from the sarcoplasmic reticulum
B. Released from the myosin head
C. Pumped into the sarcoplasmic reticulum
D. Exchanged for sodium ions

Q.119 When the skeletal muscle contracts, the two Z lines gets _____ and I band gets _____. (SZAMBU-2024)
A. Closer, distant
B. Closer, shorten
C. Enlarged, distant
D. Enlarged, shorten

Q.120 Choose the correct, for muscle in relaxed position: (NUMS-2024)
A. Exposed binding sites on actin
B. Broad H-zone in sarcomere
C. Formation of cross bridges
D. Ca^{+2} released in cytosol

Q.121 Sequence of nerve impulse initiation leading to muscle contraction: (SZAMBU-2024-Reconduct)
1. Nerve impulse travels through sarcolemma to the T-tubules
2. Nerve impulse travels to sarcoplasmic reticulum
3. Arrival of nerve impulse at neural muscular junction
4. Opening of sarcoplasmic reticulum Ca^{++} gates
A. 3,1,2,4
B. 3,4,2,1
C. 4,2,3,1
D. 2,3,4,1

Q.122 By the fusion of ilium, ischium and pubis in the pelvic girdle, _____ joint is formed. (SZAMBU-2024)
A. Ball and socket joint
B. Cartilaginous joint
C. Fibrous joint
D. Synovial joint

Q.123 Which of the following skeletal disorder is an example of autoimmune disorder? (UHS-2024)
A. Sciatica
B. Spondylosis
C. Rheumatoid arthritis
D. Rickets

Q:124 Which of the following is NOT a bone of upper limb? (UHS-2024)
A. Humerus
B. Ulna
C. Femur
D. Radius

Q.125 Which of the following is not a part of human eye orbit? (SZAMBU-2024)
A. Sphenoid
B. Ethmoid
C. Zygomatic
D. Lacrimal

Q.126 You must have often heard about the hamstring injury of players. Which of the following is correct about hamstring muscles? (NUMS-2024)
A. It is an extensive muscle
B. Its insertion is on tibia
C. Originate from pelvic girdle and top of femur
D. Originate from ilium and femur

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ANSWER KEY

PRACTICE EXERCISE

1	B	11	A	21	C	31	D	41	A	51	A
2	C	12	A	22	C	32	A	42	C		
3	B	13	B	23	B	33	C	43	D		
4	A	14	C	24	A	34	B	44	D		
5	B	15	D	25	C	35	A	45	B		
6	C	16	B	26	D	36	D	46	D		
7	D	17	B	27	C	37	B	47	B		
8	C	18	C	28	C	38	B	48	A		
9	C	19	C	29	C	39	B	49	B		
10	C	20	C	30	A	40	A	50	C		

PAST PAPER MCQ'S

52	A	62	D	72	D	82	C	92	B	103	C	113	D	123	C
53	B	63	B	73	D	83	A	93	B	104	B	114	B	124	C
54	A	64	C	74	A	84	A	94	A	105	D	115	A	125	A
55	A	65	A	75	D	85	B	95	C	106	B	116	A	126	B
56	B	66	A	76	C	86	D	96	C	107	A	117	D		
57	B	67	C	77	C	87	A	97	B	108	C	118	C		
58	C	68	A	78	A	88	D	98	B	109	C	119	B		
59	C	69	A	79	A	89	B	99	A	110	C	120	B		
60	B	70	C	80	B	90	A	101	C	111	C	121	A		
61	A	71	D	81	B	91	C	102	B	112	C	122	C		

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EXPLANATORY NOTES

PRACTICE EXERCISE

1. Bones have living tissues like osteoblast, osteocytes and osteoclast, while cartilage have chondrocytes that produce large amount of collagenous extracellular matrix.
2. Fibrocartilage present in intervertebral disc. Elastic cartilage present in ear pinna, epiglottis. Hyaline cartilage is found at the end of long bones and in the nose, at larynx and trachea.
3. Periosteum is covering around bone while perimysium and perineurium are connective tissue coverings around muscle and nerve fascicles, respectively.
4. Collagen is the most abundant protein in animal's body. Actin is most abundant in muscles and albumin is most abundant in blood plasma. Titin is present in skeletal muscle cell and it is the largest protein.
5. Tibia and fibula are bones of lower legs. They are part of appendicular skeleton. Head is consisted of cranial and facial bones. Upper arm is consisted of humerus, ulna, radius, carpels, metacarpal and phalanges.
6. Vertebral column is part of axial skeleton. It contains 33 vertebrae and each vertebra is considered as bone.
7. Patella is a knee bone. It is part of appendicular skeleton.
8. There are 12 pairs of ribs. 7 pairs are directly attached to sternum (True ribs), 3 pair are attached with sternum via costal arch (false ribs) and 2 pairs are not attached to sternum.
9. Coxal bones are known as hip bones. Each hip bone is formed by ossification of three small bones (ilium, ischium and pubis).
10. A hinge joint is a bone joint in which the articular surfaces are molded to each other in such a manner as to permit motion only in one plane. Ball and socket joint shows movement in all directions. Fibrous joints are present in skull bones. Cartilage joints are present among vertebrae.
11.

Type of Joints	Examples
Pivot	Between proximal end of radius and ulna
Ball and socket	Pelvic and pectoral girdle
Hinge	Knee and elbow

12. Joint have three types and one of them is fibrous joints. It is present in different parts of skeleton. One of them is suture (present between skull bones). Saddle, ball and socket and pubic symphysis are different categories of synovial joints.
13. There are three types of joints:
    - Fibrous Joints: Present between skull bones, fix teeth into jaws and shaft regions of long arms in fore arm and legs.
    - Cartilaginous Joints: Present between costal arch and ribs, pubic symphysis and intervertebral disc.
    - Synovial Joints: Present between bones at shoulder, elbow, hip and knee.
14. Bacterial invasions during the arthritis can cause acute forms of inflammation. Inflammation of joints is called arthritis.

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15. Antibodies attach different parts of body during autoimmune response. Between different types of arthritis, rheumatoid arthritis is an autoimmune disorder.
- Osteoarthritis: is a progressive disease in which the articular cartilage gradually softens and disintegrate.
- Gouty arthritis: results from a metabolic disorder in which an abnormal amount of uric acid is retained in blood and sodium urate crystals are deposited in joints.
- Juvenile arthritis: also known as juvenile rheumatoid arthritis.

16. Skeletal muscle cells have regular striation, while smooth muscle cells do not have striation. Cardiac muscle cells, however, have irregular striations with involuntary control.

17.

Tendon	Ligament
Inelastic, tough fibrous tissue	Strong, elastic fibrous tissue
Connects bone with muscle	Connects bone with bone (form joint)

18. Smooth muscles are found both in invertebrates and vertebrates while cardiac and skeletal muscles are found only in vertebrates and are most developed.

19.



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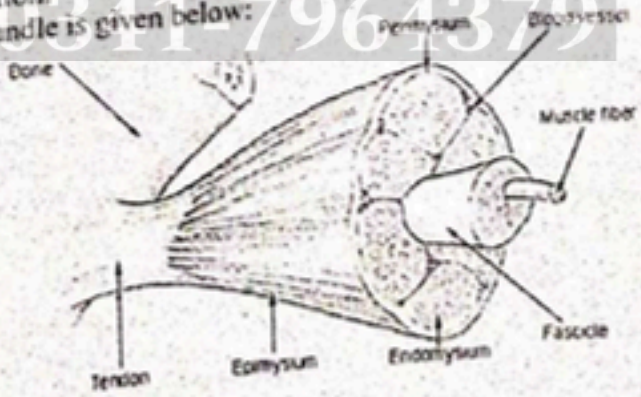
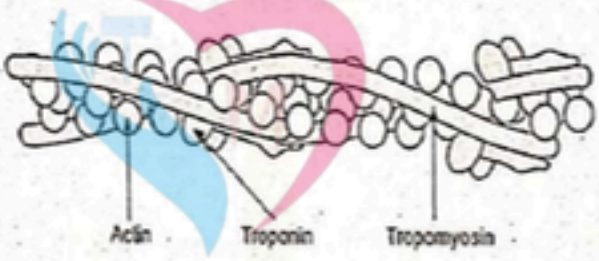
20. The main functional partner of bones is skeletal muscles. Both these can work together to bring about movement in the body.

21. Cardiac and smooth muscles have irregular striations and no striations respectively. They are involuntary in their action.

22. Anatomy of muscle bundle is given below:



23. Sarcoplasmic reticulum is the modified form of smooth endoplasmic reticulum as they devoid of ribosomes and found in muscles. It regulates Ca^{2+} ions concentration in sarcoplasm.
24. Since sarcolemma is the membrane of muscle cells, so its chemical composition is lipoproteins.
25. A sarcomere is bounded by two Z-lines and its center is bisected by dark line called M-line.
26. Each dark band in the skeletal muscles is called A-band because it is anisotropic i.e. it can polarize visible light. This polarization of light is due the presence of myosin. It also contains overlapping actin.
27. T-tubule is found at A-I junction in skeletal muscle while at Z-line in cardiac muscle.
28. When viewed in high magnification, each muscle fiber is seen to contain large number of myofibrils 1-2 μm in diameter that run in parallel fashion and extend entire length of the cell.
29. Isotropic bands contain only actin-containing thin filaments. They indicate the behavior of polarized light as it passes through I bands. These are with low refractive index thus appears brighter.
30. Most abundant protein in thin filament is actin, while most abundant protein found in thick filaments is myosin.
31.



32. The point of attachment of the nerve to the muscle is called neuromuscular junction. All the fibres innervated by a single motor neuron are a motor unit and contract simultaneously in response to action potential fired by motor neurons.
33. Actin has 2 polypeptide chains. Myosin has 6 polypeptides. Tropomyosin has 2 polypeptides. Troponin has 3 chains. (i) **TnI**: Binds with actin, (ii) **TnC**: Binds with calcium, (iii) **TnT**: Binds with tropomyosin.
34. Upon the reception of stimulus, the myosin-binding sites on actin filaments are set free. They myosin head attaches to these binding sites making the cross-bridges. When muscles contract myosin heads attach to the actin.
35. When the muscle is at rest, the tropomyosin is disposed in such a way that it covers the sites on the actin chain where the head of myosin attaches.
36. During muscle contraction;
    - I-band shortens
    - Z-lines get closer to each other
    - H-zone disappears
    - A-band and M-line remain unchanged.
37. In muscle, myosin is found abundantly. Its head region has ATPase activity and involves in ATP hydrolysis during muscle contraction.

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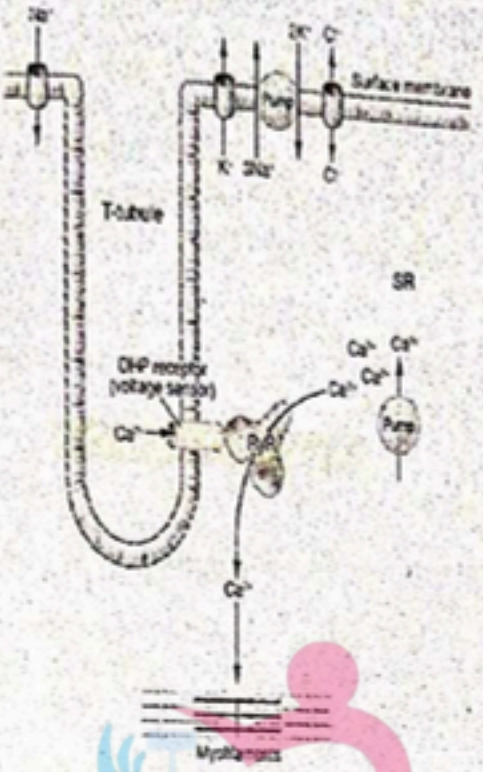
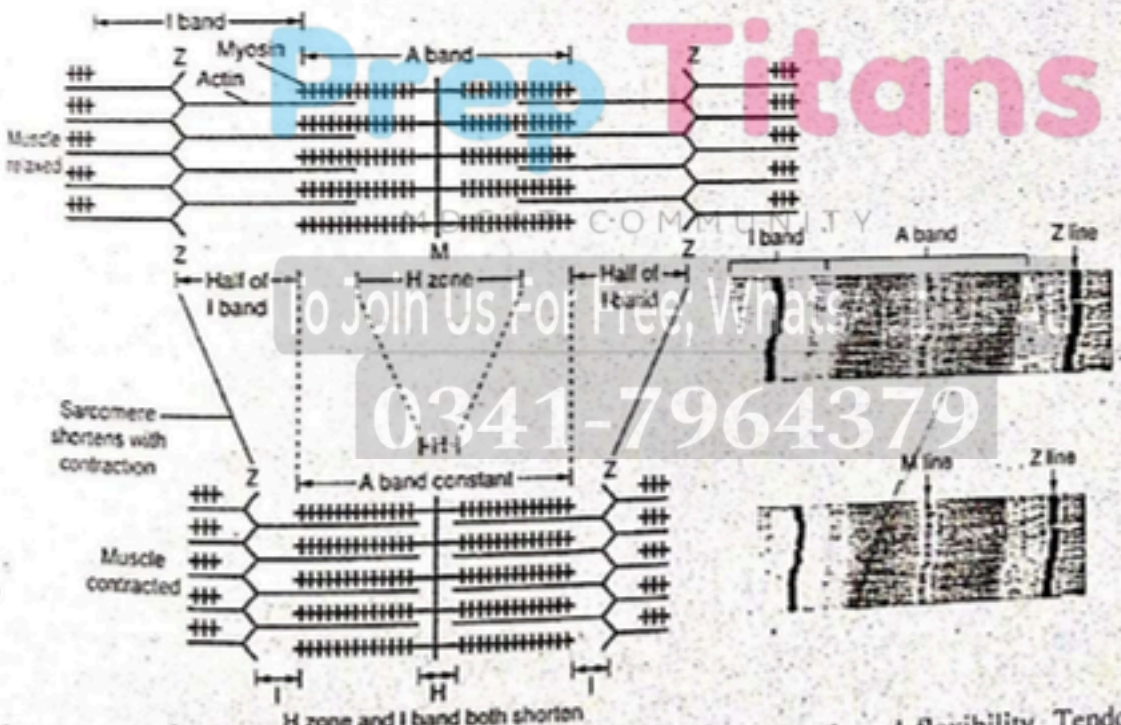


39. Muscle contraction is initiated by nerve impulse arriving at the neuromuscular junction. All the fibres innervated by a single motor neuron are a 'motor unit' and contract simultaneously in response to the action potential fired by the motor neurons.

40. ATP is energy currency which radially available for cellular working. When more energy is required due to high metabolism, it is provided by another energy storing substance called creatine phosphate.

41.



42. Ligaments are made of collagen fibers, which provide strength and flexibility. Tendons attach muscle to bone, while ligaments attach bone to bone.

43. Locomotion is the movement that enables an organism to change its position, such as walking or running.

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44. A multistage joint is present at the proximal ends of the radius and ulna, allowing rotational movement.
45. A pivot joint allows rotational movement around a single axis.
46. Ball and socket joints allow movement in all directions and are found in the shoulders and hips.
47. Cartilaginous joints lack a joint cavity and are connected by cartilage.
48. Skeletal muscles receive nerves from the somatic nervous system for voluntary movement.
49. The triad consists of one T-tubule and two terminal cisternae of the sarcoplasmic reticulum, helping in muscle contraction.
50. Many sarcomeres linked in series form a myofibril, the structural unit of muscle fibers.
51. When calcium channels open in the sarcoplasmic reticulum, calcium ions are released into the cytosol to trigger muscle contraction.

PAST PAPER MCQ'S

52. Cartilage is avascular structure of endoskeleton. It is not supplied with blood vessels. While other features belong to it.
53. Hyaline is most abundant cartilage in human body. It is present in respiratory tract. It lines joints and caps the ends of your bones.
54. Cartilage, bones and blood belong to connective tissues. Muscles fibers from muscle tissues. Neuron cells form nervous tissues. Epithelial tissues have different type of cells.
55. Femur and acetabulum, humerus and pectoral girdle show ball and socket joint. Other structures are not possible.
56. Intervertebral discs, pubic symphysis and coastal cartilage are example cartilage joint. Suture is example of fibrous joints.
57. Knee is best example of synovial joint. Suture belongs to fibrous joint and they are immovable joints. Pubic symphysis is example of cartilage joint.
58. Only synovial joints have synovial fluid containing cavity. This fluid reduces the friction between jointed bones.
59. Hinge joint present at knee and elbow. They allow movement in two directions. At these points, muscles are arranged in the same plane as that of joints.
60. Arthralgia: pain in a joint
    - Mycology: study of fungi, a group that includes the mushrooms and yeasts.
    - Cytology: is the exam of a single cell type, as often found in fluid specimens.
    - Arthology: is the study of joints.
61. **Osteoarthritis** is a progressive disease in which the articular cartilage gradually softens and disintegrate.
    - **Osteoporosis**: mostly occurs in aged women, which is related to decreased estrogen level.
    - **Arteriosclerosis** is a degenerative arterial change associated with advancing age. Primarily a thickening of middle layer of arteries and usually associated with some degree of atheroma.
    - **Osteosclerosis** is a disorder that is characterized by abnormal hardening of bone and an elevation in bone density.
62. Arthritis term is associated with inflammation of joints. It has different types. Osteoarthritis, rheumatoid arthritis and gouty arthritis.
63. Cardiac and smooth muscles are involuntary in action, while skeletal muscles are voluntary in their functions.
64. The muscles of the human heart are stimulated to contract by nerve impulses generated by the sinoatrial node. It is a cluster of cells which are part of the heart muscle. Hence the human heart is myogenic. It does not require nerves to start contracting, it can contract on its own.
65. Skeletal muscle cells are multinucleated while smooth muscle cells are mono-nucleated and involuntary in nature.
66. A myofibril is a basic rod-like unit of a muscle cell. The repeated protein pattern of myofibrils is called sarcomere and it is the complicated unit of striated muscle tissue. It is the repeating unit between two Z-lines.

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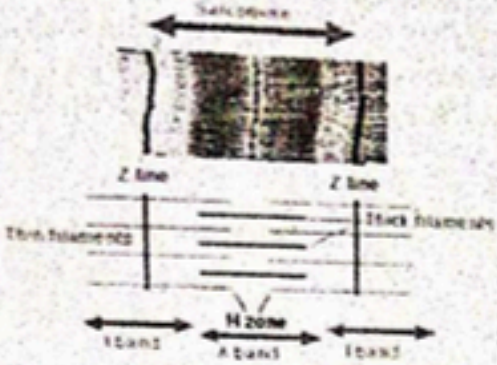
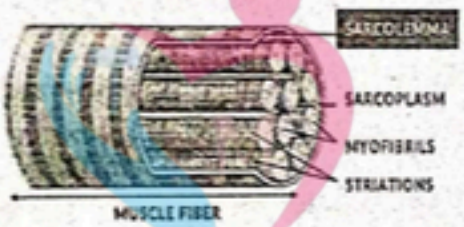


68. The sarcolemma is a specialized cell membrane which surrounds striated muscle fiber cells. The sarcolemma is similar to a typical plasma membrane but has specialized functions for the muscle cell.

69. Thick filaments occur only in the A-band of a myofibril. The region at which thick and thin filaments overlaps has a dense appearance, as there is little space between the filaments. Thin filaments do not extend all the way into the A-bands, leaving a central region of the A-band that only contains thick filaments.

70.



71.



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72. Actin is a spherical protein that forms the thin filament in muscle cells. Thin filaments are composed of two long chains of these actin molecules that are twisted around one another. Each actin molecule has a myosin-binding site where a myosin head can bind.

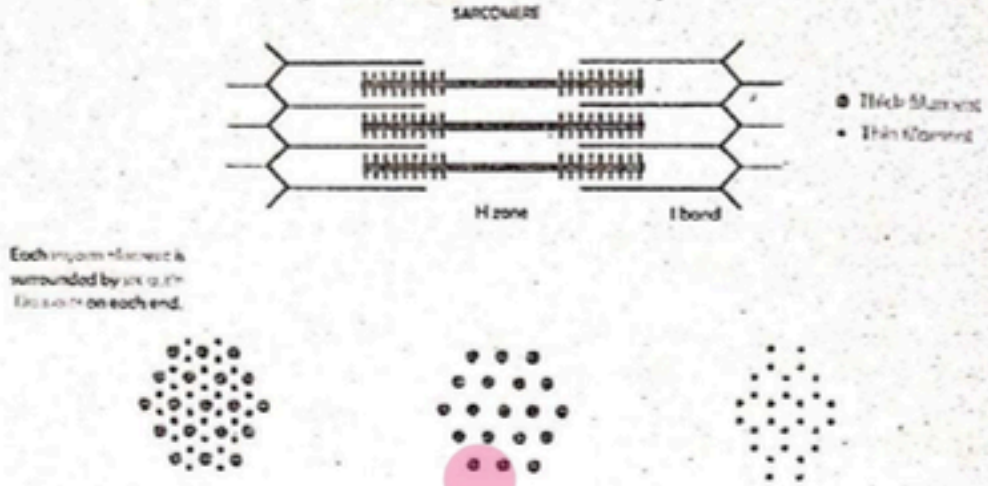
73. Thick filaments composed of several hundred molecules of myosin. A myosin molecule is shaped like a golf club, with a tail formed of two intertwined chains and a double globular head projecting from it.

74. The sarcolemma, also called as the myolemma, is the cell membrane of a striated muscle fiber cell. It consists of a lipid bilayer and a thin outer coat of polysaccharide material (glycocalyx) that contacts the basement membrane.

75. Haemoglobin is oxygen carrying protein. It is not present in muscle. It circulates in blood. Muscle contains myoglobin which is oxygen storing protein.

76. T-tubules are extensions of the cell membrane that penetrate into the center of skeletal and cardiac muscle cells. The function of T-tubules is to conduct impulses from sarcolemma down into the cell and specifically, to another structure in the cell called sarcoplasmic reticulum.

77. Each myosin filament is surrounded by six acting filament on each side.



78. According to sliding filament model of muscle contraction, the following changes can occur
- Z-lines come brought closer together
- I-band shortens
- H-zone disappears

79. Inside the muscle, Ca^{2+} facilitates the interaction between actin and myosin during contractions. Calcium binds with the troponin, causing a position change in tropomyosin, exposing the actin sites that myosin will attach to, for a muscle contraction.

80. Energy for muscle contraction comes from ATP, while energy storing substance is creatine phosphate.

81. During muscle contraction;
- I-band shortens
- Z-lines get closer to each other
- H-zone disappears
- A-band and M-line remain unchanged.

82. ATP binds to myosin, causing detachment of myosin from actin; hydrolysis of ATP to ADP and Pi causes redocking of myosin head.

83. Myoglobin is present in sarcoplasm. It stores oxygen. It has single polypeptide chain. 153 amino acids are present in its single chain.

84. Cartilage is a type of connective tissue that provides support and structure. It is avascular and composed of cells (chondrocytes) embedded in a matrix, which provides flexibility and strength.

85. Chondrocytes are the cells found in cartilage. They reside in small cavities known as lacunae and maintain the extracellular matrix, which gives cartilage its flexibility and strength.

86. The hip and shoulder joints are ball-and-socket joints. These joints allow for a wide range of motion in multiple directions due to the ball-shaped head of one bone fitting into the cup-shaped cavity of another.

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87. Cartilage is avascular, meaning it does not have blood vessels. Without a blood supply, it lacks the nutrients and oxygen needed for quick healing and repair, unlike bone which is well vascularized.

88. Hyaline cartilage is found at the ends of long bones, where it forms articular cartilage in joints. It provides smooth surfaces for movement and reduces friction.

89. Osteocytes are mature bone cells that are embedded in the bone matrix. They maintain the bone tissue and communicate with other bone cells to regulate the bone structure.

90. Cardiac muscle cells have irregular striations and are involuntary, meaning they contract without conscious control. These cells are found in the heart and are responsible for pumping blood.

91. Smooth muscle cells are uninucleate, meaning each cell has one nucleus. These muscles are non-striated and are involved in involuntary movements such as digestion and blood circulation.

92. Cardiac muscle cells are typically uninucleate, unlike skeletal muscle cells which are multinucleate. Cardiac muscle also has specialized junctions called intercalated discs that allow for coordinated contraction.

93. The sarcolemma is the plasma membrane of a muscle cell. It surrounds the muscle fiber and is involved in the transmission of action potentials that lead to muscle contraction.

94. The sarcolemma is the membrane that surrounds a muscle fiber (cell) and plays a crucial role in muscle contraction by conducting electrical signals across the muscle.

95. A sarcomere is the functional unit of muscle contraction and is defined as the region between two Z-lines. It contains actin and myosin filaments whose interaction leads to muscle contraction.

96. In skeletal muscle, each myosin filament is surrounded by six actin filaments at each end, forming the basis for muscle contraction.

97. ATP is required to break the cross bridges formed between the myosin and actin filaments during muscle contraction, enabling the cycle of attachment, movement, and detachment to continue.

98. Calcium ions are released from the sarcoplasmic reticulum during muscle contraction. They bind to troponin, causing a conformational change that allows myosin to bind with actin, facilitating contraction.

99. Muscle fatigue occurs when there is a deficiency of ATP, which is necessary for muscle contraction, and an accumulation of lactic acid due to anaerobic respiration, which disrupts muscle function.

100. Pubic symphysis and intervertebral discs are examples of cartilaginous joints, where the bones are connected by cartilage, allowing limited movement.

101. Arthritis is an inflammatory condition of the joints that causes pain, swelling, and stiffness. It can result in limited joint movement and discomfort.

102. The wrist joint is a synovial joint, but it is classified as a condyloid joint, not a ball and socket joint. It allows limited rotation and movement in two planes.

103. Chondrocytes are the living cells within cartilage that maintain the cartilage matrix, which provides structure and flexibility.

104. Lacunae are small cavities in the cartilage matrix that house the chondrocytes. These cavities protect the cells and facilitate the diffusion of nutrients.

105. Hyaline cartilage is the most abundant type in the human body. It is found in areas such as the nose, trachea, and at the ends of long bones, where it provides smooth surfaces for movement.

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06. Osteoblasts are the bone-forming cells that secrete the bone matrix and are responsible for the process of ossification (bone formation).
07. Osteocytes are the mature bone cells that reside in lacunae within the bone matrix. They help maintain the bone tissue and regulate bone metabolism.
08. Osteoclasts are specialized cells that break down bone tissue during the process of bone resorption, helping to regulate calcium levels in the body.
09. Smooth muscles are uninucleate, meaning they have a single nucleus per cell. They are non-striated and involved in involuntary movements like digestion and blood vessel constriction.
10. Smooth muscles do not line the walls of the heart. That function is carried out by cardiac muscle, which is specialized for heart contractions.
11. Smooth muscles do not have the striated structure seen in skeletal muscles, and therefore, do not possess a sarcomere structure with Z-lines.
112. Skeletal muscles are voluntary muscles, meaning they are consciously controlled by the nervous system. They are involved in movements such as walking, lifting, and breathing.
113. Sarcolemma surrounds the muscle fiber of the skeletal muscle.
114. The thick filaments in skeletal muscles are made of myosin, a motor protein that interacts with actin filaments to cause muscle contraction.
115. The sarcolemma is the membrane surrounding muscle fibers. It plays a key role in transmitting electrical impulses and initiating muscle contraction.
116. The buildup of lactic acid in muscles during anaerobic respiration leads to muscle fatigue, as it interferes with the muscles' ability to contract efficiently.
117. A sarcomere is the functional unit of a muscle and extends from one Z line to the next. It is where actin and myosin interact to produce muscle contraction.
118. After muscle contraction, calcium ions are pumped back into the sarcoplasmic reticulum to stop the contraction and allow the muscle to relax.
119. During muscle contraction, the Z-lines move closer together, and the I-band (which contains only actin) shortens, reflecting the contraction of the sarcomere.
120. In a relaxed muscle, the H-zone, which is the region of the sarcomere where only myosin filaments are present, is broad. This zone shortens during contraction.
121. (3) The release of calcium ions from the sarcoplasmic reticulum, the nerve impulse travels through the sarcolemma to the T-tubules (1), then to the sarcoplasmic reticulum (2), followed by the arrival of the impulse at the neuromuscular junction (4).
122. The fusion of the ilium, ischium, and pubis in the pelvic girdle forms a fibrous joint known as the pelvic symphysis, which is immovable.
123. Rheumatoid arthritis is an autoimmune disorder where the immune system attacks the synovial joints, leading to inflammation, pain, and stiffness.
124. The femur is the bone of the lower limb, not the upper limb. The upper limb includes bones like the humerus, radius, and ulna.
125. The zygomatic bone is part of the face but is not considered a part of the eye orbit, which is made up of bones such as the sphenoid, ethmoid, and lacrimal.
126. The hamstring muscles originate from the ischium (part of the pelvic bone) and femur. They are responsible for bending the knee and extending the hip.

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13 VARIATION & GENETICS / INHERITANCE

TOPIC >> PRACTICE EXERCISE

Q.1 **The alleles are:**
A. A pair of genes governing a specific character
B. Genes governing eye characters
C. Multiple forms of genes
D. Genes present on chromosomes

Q.2 **An organism's genetic constitution is called its:**
A. Genotype
B. Genetics
C. Phenotype
D. Gene pool

Q.3 **An allele is said to be dominant if:**
A. It is expressed only in heterozygous combination
B. It is expressed only in homozygous combination
C. It is expressed in both homozygous and heterozygous condition
D. It is expressed only in second generation

Q.4 **An organism with two identical alleles for a given trait is:**
A. Homozygous
B. Dominant
C. Heterozygous
D. Hermaphrodite

Q.5 **In Mendel's experiment, nature of seed coat, flower colour, position of flower, pod colour, stem height, etc., are referred as:**
A. Alleles
B. Phenotypes
C. Genotypes
D. Karyotype

Q.6 **A cross between a homozygous recessive and a heterozygous plant is called:**
A. Monohybrid cross
B. Test cross
C. Dihybrid cross
D. Back cross

Q.7 **Self-cross between Tt and Tt plants results into the genotype ratio of:**
A. 3:1
B. 1:3
C. 1:2:1
D. 4:0

Q.8 **In Mendelism, the linkage was not observed due to:**
A. Mutation
B. Synapsis
C. Independent assortment
D. Crossing over

Q.9 **A cross between plants having RRYY and rryy composition will yield plants with:**
A. Round and yellow seeds
B. Wrinkled and yellow seeds
C. Round and green seeds
D. Wrinkled and green seeds

Q.10 **When a tall plant with rounded seeds (TTRR) is crossed with a dwarf plant with wrinkled seeds (ttrr), then the generation consists of tall plants with rounded seeds. How many types of gametes a plant would produce?**
A. One
B. Four
C. Three
D. Eight

Q.11 **In Mendelian dihybrid cross, how many of progeny in F_2 generation possess genotype rryy?**
A. $\frac{1}{16}$
B. $\frac{3}{16}$
C. $\frac{2}{16}$
D. $\frac{4}{16}$

Q.12 **In the dihybrid cross, the number of round green seeds that were homozygous for round trait:**
A. 2
B. 1
C. 3
D. 4

Q.13 **Alleles from a gene arise by:**
A. Genetic drift
B. Natural selection
C. Mutation
D. Non-random mating

Q.14 **Inheritance of ABO blood group system is an example of:**
A. Multiple allelism
B. Co-dominance
C. Complete dominance
D. Gene linkage

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Q.15 Multiple alleles are the altered forms of a gene whose number is more than two and may have as many as 300 alleles, but a diploid organism can:
A. Have just one of them in its genome
B. Have four of them in its genome
C. Have two of them in its genome
D. Have multiple of them in its genome

Q.16 The genotype of blood group 'A' can be:
A. I^AI^A
B. I^AI^A or I^AI^i
C. I^BI^B
D. I^Ai

Q.17 A person with antigens 'B' present of membrane of RBCs and 'anti-A' antibodies in the blood plasma will have:
A. Blood group 'A'
B. Blood group 'AB'
C. Blood group 'B'
D. Blood group 'O'

Q.18 If a female has 'A' blood group and her husband has 'O' blood group, then the blood group of their children would possibly be:
A. A and B groups only
B. A and O groups only
C. AB only
D. All four groups

Q.19 ABO blood grouping is controlled by gene I which has three alleles and show co-dominance. There are six genotypes. How many phenotypes are possible?
A. Six
B. Four
C. Three
D. Five

Q.20 Which of the following blood groups is not possible in a person whose father is of blood group O?
A. AB
B. B
C. A
D. O

Q.21 A man having a blood group O marries a woman having a blood group A whose father was also O. What is the probability of 'O' in their offspring?
A. 50%
B. 75%
C. 25%
D. 0%

Q.22 Blood group antigens can be found at:
A. RBCs
B. Body fluids
C. Saliva
D. All A, B, C

Q.23 Which of the following is genetically dominant in man?
A. Colour blindness
B. Haemophilia
C. Rh positive
D. Albinism

Q.24 Rh factor may be responsible for:
A. Turner's syndrome
B. Sickle-cell anaemia
C. AIDS
D. Erythroblastosis fetalis

Q.25 Relationships between alleles of ABO blood group system can be explained by:
A. Complete dominance and Co dominance
B. Incomplete dominance and Co dominance
C. Over dominance and Incomplete dominance
D. Complete dominance only

Q.26 ABO blood group system was discovered by:
A. Bernstein
B. Landsteiner
C. Karl Correns
D. Johannsen

Q.27 Genotype for AB blood group:
A. I^AI^Bdd
B. I^AI^BDD
C. I^AI^BDd
D. I^AI^Add

Q.28 Which of the following will not result in variations among siblings?
A. Independent assortment of genes
B. Linkage
C. Crossing over
D. Mutation

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Q.29 If all four phenotypic combinations are (parental and recombinants) are produced in equal ration 1:1:1:1 then there would be:
A. No linkage between genes
B. Partial linkage between genes
C. Complete linkage between genes
D. Tight linkage between genes

Q.30 All of the following can form a linkage group on human chromosome 11 except:
A. Gout
B. Albinism
C. Sickle cell anemia
D. Leukemia

Q.31 The recombination frequency is 20% between the two genes. The distance between them in unit map is:
A. 20
B. 60
C. 30
D. 80

Q.32 Genes A, B, C, and D are located on the same chromosome. The recombination frequencies are as follows:

Relationship	RF
A-B	8%
A-C	23%
A-D	19%
B-C	10%
C-D	37%

What is the most likely order of the genes on the chromosome?
A. BCAD
B. CBAD
C. ACBD
D. ABCD

Q.33 *Drosophila* has four pairs of chromosomes. How many linkage groups does it have?
A. Eight
B. One less than the pairs of chromosomes
C. Four
D. One more than the pairs of chromosomes

Q.34 Genes are present on chromosomes. This was experimentally proved by:
A. Sutton
B. Fleming
C. Morgan
D. Landsteiner

Q.35 Which of the following is not a genetic disorder?
A. Hemophilia
B. Colour blindness
C. Phenylketonuria
D. Epilepsy

Q.36 All of the following are non-allelic X-linked traits except:
A. Hemophilia A
B. Hemophilia C
C. Hemophilia B
D. TFM syndrome

Q.37 Which is not related to color blindness?
A. Zigzag pattern of inheritance
B. Passes directly from father to son
C. Rhodopsin
D. More common in men

Q.38 Regarding color blindness when a normal male marries a carrier female, which is the correct statement?
A. All daughters will be color blind
B. All daughters will be carriers
C. All sons will be color blind
D. Half of the sons will be color blind

Q.39 What is the probability of a hemophilic daughter of a normal man whose father was hemophilic and a carrier woman?
A. 0%
B. 50%
C. 25%
D. 75%

Q.40 Hemophilia is a sex linked _____ trait.
A. Dominant
B. Codominant
C. Pleiotropic
D. Recessive

Q.41 An X-linked trait that results due to hormonal insensitivity of target cells:
A. Gout
B. Duchene muscular dystrophy
C. Testicular feminization syndrome
D. Color blindness

Q.42 Gene responsible for webbing of toes is present on:
A. X-chromosome
B. Y-chromosome
C. Chromosome 11
D. Chromosome 13

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Q.43 All of the following are true about alleles except:
A. They are always identical
B. They control same trait
C. Present on respective homologue
D. Can be expressed independently

Q.44 Which one of the following does not have a fix locus?
A. Polygenes
B. Multiple alleles
C. Pleiotropic gene
D. Jumping gene

Q.45 Seed shape in pea plant is:
A. Trait
B. Phenotype
C. Genotype
D. Genome

Q.46 When two organisms each hybrid for a given trait are crossed a large progeny will show which one of the following percentage of hybrids:
A. 75%
B. 50%
C. 25 %
D. 80 %

Q.47 What percentage of round green seeds in F2 progeny of dihybrid cross was heterozygous for round seed shape?
A. 25%
B. 33%
C. 66%
D. 75%

Q.48 When an affect caused by a gene or gene pair at one locus interferes with another gene or gene pair at another locus. Such a phenomenon is called:
A. Dominance
B. Epistasis
C. Pleiotropy
D. Gene linkage

Q.49 When mismatched blood is given to the recipient, the antigens of the donor react with _____ of the recipient.
A. Immunogens
B. Cytokines
C. Histamine
D. Agglutinins

Q.50 How many types of gametes can be produced from genotype AaBbCc?
A. 3
B. 8
C. 4
D. 6

Q.51 A boy receives his X-chromosome from:
A. His mother only
B. Both father and mother
C. His father only
D. Either father or mother

Q.52 For X-linked recessive traits, the males are referred to as:
A. Homozygous
B. Heterozygous
C. Hemizygous
D. Heterologous

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13 TOPIC VARIATION & GENETICS / INHERITANCE

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Q53 The total number of genes in a population is called: (MDCAT-2016)
A. Gene pool
B. Genome
C. Allele pool
D. Genomic library

Q54 The region of the chromosome or more specifically, a length of the DNA molecule, which has a particular nucleotides sequence that codes for specific protein, is called _____. (MDCAT-2018)
A. Locus
B. Allele
C. Gene
D. Kinetochore

Q55 Homozygous means: (MDCAT-2019)
A. Having two identical alleles of a gene
B. Alleles in an organism
C. Having two identical genes
D. Two different alleles of a gene

Q56 In genetics, the term locus refers to the _____ of the gene on the chromosome. (MDCAT-2019)
A. Frequency
B. Position
C. Copy
D. Inversion

Q57 When both the alleles of a gene pair are same, the organism is said to be: (PMC-2020)
A. Heterozygous
B. Homozygous
C. Genotype
D. Phenotype

Q58 DNA stores biological information in discrete units termed as: (UHS-2022)
A. Genes
B. Phenotypes
C. Karyotypes
D. Cells

Q59 These are the genes which tend to be inherited together and do not assort independently: (SZABMU-2022)
A. Linked genes
B. Dependent genes
C. Recombinant genes
D. Independent genes

Q60 When two or more genes interact in a way that their effect is additive expression, it is: (BUMHS-2022)
A. Co-dominance relation
B. Phylogenetic inheritance
C. Epistasis
D. Incomplete dominance

Q61 Mendel concluded that each organism has two hereditary factors for each trait, now called: (SZABMU-2015)
A. Chromatids
B. Alleles
C. Chromosomes
D. Elementen

Q62 How many pairs of homologous chromosomes are present in *Pisum sativum*? (ETEA-2019)
A. Seven pairs
B. Eight pairs
C. Nine pairs
D. Ten pairs

Q63 Mendel's selected following pair(s) of contrasting character: (DUHS-2022)
A. One/single pair
B. Seven pairs
C. Three pairs
D. Four pairs

Q64 Mendelian inheritance follows which form of dominance relation? (SZABMU-2022)
A. Complete dominance
B. Incomplete dominance
C. Co-dominance
D. Multiple allelic dominance

Q65 An exception to Mendel's law is: (ETEA-2022)
A. Linkage
B. Dominance
C. Purity of gametes
D. Independent assortment

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Q.66 Self-fertilization of F_1 dihybrids, following independent assortment of alleles will result in: (MDCAT-2017)

A. 3/16 tall, round: 3/16 dwarf, wrinkled
B. 9/16 tall, round: 1/16 dwarf, round
C. 9/16 tall, wrinkled: 3/16 dwarf, round
D. 3/16 tall, wrinkled: 3/16 dwarf, round

Q.67 Phenotypic ratio of single trait inheritance: (DUHS-2022)

A. 1:2:1 B. 3:1
C. 1:2 D. 1:3:2

Q.68 As a result of cross-fertilization of true breeding pea plant having purple-colored flowers with that of white colored flowers, the offspring will have flower with: (MDCAT-2017)

A. ¼ purple and ¾ white B. All white
C. ¼ white and ¾ purple D. All purple

Q.69 Incomplete dominance: (PMC-2020)

A. Different alleles of a gene are both expressed in heterozygous condition
B. One allele is completely dominant over the other and the presence of the recessive allele is functionally hidden so the heterozygote has the same round phenotype as homozygote.
C. The phenotype of the heterozygote is intermediate between phenotypes of the two homozygotes.
D. Gene mutations may produce many different alleles of a gene.

Q.70 ABO blood system is an example of: (MDCAT-2015)

A. Polygenes B. Multiple alleles
C. Multiple genes D. Multiple mutation

Q.71 Which one of the following is multiple allelic character? (MDCAT-2018)

A. Length of stem in pea plant B. Blood group of the human being
C. Shape of seed in pea plant D. Colour of flower in pea plant

Q.72 If Sara has blood group O. The genotype of her mother and father is possibly: (AJK-2019)

A. Bi X BB B. BB X BB
C. Bi X Bi D. BB X Bi

Q.73 Blood group which is known as universal donor is: (NUMS-2022)

A. A^+ B. O^-
C. AB^- D. O^+

Q.74 A man of blood group A marries a woman of blood group B and they have one child. Which one of the following statements about the child's blood is correct? (ETEA-2022)

A. It could be group A only
B. It could be group AB only
C. It could be group A or group B only
D. It could be any of the groups A, B, AB and O

Q.75 In which blood group both the antigens are present? (BUMHS-2022)

A. Blood group 'A' B. Blood group 'B'
C. Blood group 'AB' D. Blood group 'O'

Q.76 How many phenotypes are possible for human ABO blood group system? (BUMHS-2022)

A. 2 B. 4
C. 6 D. 8

Q.77 A character determined by three alleles is: (MDCAT-2016)

A. Human skin color B. Human eye color
C. Human blood group D. Human Rh factor

Q.78 What happens when an 'Rh' negative woman married to an 'Rh' positive man conceives a child who is 'Rh' positive? (UHS-2022)

A. Maternal-fetal incompatibility B. Paternal-fetal incompatibility
C. Cancer of fetus D. Death of mother

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Q.79 Rh antigen was first studied in _____. (ETEA-2022)
A. Monkey B. Man
C. Dog D. Mouse

Q.80 Number of pairs of autosomes in humans is: (MDCAT-2015)
A. 23 B. 21
C. 24 D. 22

Q.81 There are _____ linkage groups in human. (MDCAT-2018)
A. 22 B. 46
C. 23 D. 80

Q.82 Chance of a cross over between two loci is directly proportional to their: (MDCAT-2018)
A. Length B. Width
C. Distance D. Thickness

Q.83 A person was married to his cousin and both are heterozygous for sickle cell anemia. Among their four kids, what will be proportion of affected homozygotes? (MDCAT-2019)
A. 50% B. 75%
C. 25% D. 100%

Q.84 In which situation, genes are not assorted independently during meiosis in a chromosome? (MDCAT-2019)
A. When genes are not linked and their loci are far apart
B. When there are too many genes on a chromosome
C. When some genes have mutated on the chromosome
D. When genes are linked and their loci are close to each other

Q.85 Which situation can reduce the chances of variation and genetic recombination? (AJK-2019)
A. Random fusion of gametes B. Crossing over
C. Gene linkage D. Mutation

Q.86 During crossing over, exchange of segments takes place between: (AJK-2019)
A. Sister chromatids of homologous chromosomes
B. Non-sister chromatids of homologous chromosomes
C. Non-sister chromatids of non-homologous chromosomes
D. Sister chromatids of non-homologous chromosome

Q.87 To study sex linkages in *Drosophila*, Morgan mated white eyed males with wild type red eyed females. What will be the phenotype of offspring? (UHS-2022)
A. All red eyed males and females B. Red eyed females and white eyed males
C. White eyed females and red eyed males D. All white eyed females and males

Q.88 White eyed trait in Drosophila is due to: (DUHS-2022)
A. Linkage B. Mutation
C. Crossing over D. Genome

Q.89 X-linked recessive trait is: (MDCAT-2015)
A. Hypophosphatemia B. Haemophilia
C. Vitamin-D resistant rickets D. Diabetes mellitus

Q.90 Which one of the following is X-linked trait? (MDCAT-2016)
A. Male pattern baldness B. Haemophilia
C. Diabetes mellitus D. Erythroblastosis foetalis

Q.91 The gene for red-green color blindness is present on: (MDCAT-2017)
A. Y-chromosome B. Autosome No. 7
C. X-chromosome D. Autosome No.9

Q.92 If a carrier haemophilic female (X^HX^h) is married to a haemophilic male (X^hY). What will be the ratio of presence of haemophilia in the children? (MDCAT-2019)
A. 100% all females and males will be haemophiliac
B. Carrier female 25% haemophilic female 25%, 25% normal male and 25% haemophilic male
C. Females and males both have 25% chances to getting haemophilia
D. Females have 50% chances of getting haemophilia and females will be 100% haemophilic.

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Q.93 Haemophilia A and B, color blindness and testicular feminization are example of: (PMC-2020)
A. X linked dominant traits
B. Y linked inheritance
C. X linked recessive traits
D. Pseudoautosomal traits

Q.94 Which traits are most likely to affect men than women? (PMC-2020)
A. X - linked recessive
B. Autosomal dominant
C. X - linked dominant
D. Autosomal recessive

Q.95 Which one of the following is X-linked dominant disorder? (UHS-2022)
A. Haemophilia
B. Color blindness
C. Hypophosphatemic rickets
D. Hypertrichosis

Q.96 Mode of inheritance in humans can be traced through: (UHS-2022)
A. Experimental mating
B. Chi square chart
C. Pedigree analysis
D. Probability analysis

Q.97 What are the chances that the daughter of a normal man and a heterozygous female will have hemophilia? (ETEA-2022)
A. 75%
B. 5%
C. 25%
D. 0%

Q.98 The frequency of a mutant gene in a population would be likely to be increased if: (SZABMU-2023)
A. The gene was selectively advantageous
B. The gene were dominant
C. The gene were sex linked
D. The population increases

Q.99 A change in the structure of a DNA molecule, producing a different allele of a gene, is a: (SZABMU-2023)
A. Chromosome mutation
B. Gene mutation
C. Chromosomal aberrations
D. Recombination

Q.100 Phenotype is: (SZABMU-2023)
A. The genetic complement i.e the genes in an individual for a particular trait
B. Partner of gene pair
C. The form of appearance of a trait
D. The position of a gene on the chromosome

Q.101 When both alleles of a gene pair are same, organism is said to be: (NUMS-2023)
A. Heterozygous
B. Genotype
C. Homozygous
D. Phenotype

Q.102 The particular array of chromosomes that an individual possesses is called (SZABMU-2023)
A. Genotype
B. Phenotype
C. Karyotype
D. Allele

Q.103 Locus of a gene on a chromosome means its: (ETEA-2023 Retake)
A. Position
B. Function
C. Start point
D. End point

Q.104 According to Mendel Law of Segregation, the one individual out of four in F_2 generation had phenotype that failed to express in _____ generation. (UHS-2023)
A. F1
B. F2
C. F3
D. P1

Q.105 Test cross is made to check the genotype of a trait. Which of the following crosses is a test cross? (UHS-2023)
A. Unknown* At
B. Unknown* tt
C. Unknown* AB
D. Unknown* TT

Q.106 Only those genes can assort independently whose loci are on: (UHS-2023)
A. Same chromatids
B. Same chromosomes
C. Non-homologous chromosomes
D. Homologous chromosomes

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Q.107 In Mendelian cross for heterozygote flower (Pp), what is the probability that the dominant allele will be in sperm and the recessive in the egg? (ETEA-2023)
A. 0.05
B. 0.5
C. 0.25
D. 0.75

Q.108 G. J. Mendel chose _____ as an experimental plant for his study: (ETEA-2023)
A. *Medicago sativa*
B. *Pisum sativum*
C. *Delonix region*
D. *Leus culinary*

Q.109 When round and yellow color seeded plant (RrYy) is self-crossed the number of plants with round and yellow color seeds obtained is _____ in 32 plants. (ETEA-2023)
A. 18
B. 9
C. 3
D. 1

Q.110 Mendel's law of independent assortment can be explained by: (ETEA-2023 Retake)
A. Behavior of chromosomes in mitosis
B. Behavior of chromosomes in meiosis
C. Gene behavior in mitosis
D. Both A and B

Q.111 ABO blood group is controlled by more than two alleles in a population. This shows that ABO blood group is an example of: (UHS-2023)
A. Polygenic Inheritance
B. Multiple alleles
C. Operons
D. Allelic interaction

Q.112 Which of the following example of human inheritance is explained by multiple alleles on an autosomal chromosome? (SZABMU-2023)
A. The ABO blood group system
B. Cystic fibrosis
C. Down's syndrome
D. Haemophilia

Q.113 Which of the following is true about occurrence of erythroblastosis foetalis? (ETEA-2023 Retake)
A. Occurs when both father and mother are Rh +ve
B. Occurs when both father and mother are Rh -ve
C. Occurs when Mother is Rh +Ve and father is -ve
D. Occurs when mother is Rh -ve and father is Rh +ve

Q.114 When are Rh antibodies produced in Rh -ve person? (ETEA-2023 Retake)
A. Naturally before birth
B. Naturally after birth
C. After exposure to Rh antibodies
D. After exposure to Rh antigens

Q.115 To study sex linkages in Drosophila, Morgan mated white eyed males with wild type red eyed females. What will be the phenotype of offspring? (UHS-2023)
A. All red eyed males and females
B. Red eyed females and white eyed males
C. White eyed females and red eyed males
D. All white eyed females and males

Q.116 *Drosophilla melanogaster* is the scientific name of: (ETEA-2023)
A. House fly
B. Fruit fly
C. Flash fly
D. Sand fly

Q.117 Which one of the following is X-linked dominant disorder? (UHS-2023)
A. Haemophilia
B. Color blindness
C. Hypophosphatemic rickets
D. Hypertrichosis

Q.118 Which of the following traits is transmitted directly from affected father to only his son? (NUMS-2023)
A. Autosomal
B. X-linked
C. Y-linked
D. X-Y linked

Q.119 A male or female child of an affected mother has 50% chances of acquiring the disorder, such a disorder is: (ETEA-2023 Retake)
A. X-linked recessive disorder
B. X-linked dominant disorder
C. Y-linked dominant disorder
D. Y-linked recessive disorder

Q.120 When a haemophilic carrier woman marries a haemophilic man, who among her offspring's may be affected? (SZABMU-2023)
A. All her children
B. All her daughters
C. Half of her daughters and all sons
D. Half of her sons and half of her daughters

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Q.121 A condition that renders the individual less able to form blood clot is: (ETEA-2023)
A. Alport's syndrome
B. Coffin-Lowry syndrome
C. Hemophilia
D. Thalassemia

Q.122 Which of the following types of haemophilia are more common in the human population? (ETEA-2023 Retake)
A. Haemophilia A
B. Haemophilia B
C. Haemophilia C
D. Haemophilia VII

Q.123 The genetic makeup that your parents have transferred to you for your hair colour makes up your: (KMU-2024)
A. Genotype
B. Karyotype
C. Phenotype
D. None of the above

Q.124 Which term best describes an organism's physical characteristic? (KMU-2024)
A. Allele
B. Genetic code
C. Genotype
D. Trait

Q.125 What will be the probability of purple and terminal flower in pea plant in F_2 generation if we cross true breeding purple axial flower plant with white terminal flower plant? (NUMS-2024)
A. 1/16
B. 3/16
C. 9/16
D. 1/2

Q.126 In which type of dominance relationship phenotypic ratio is not same as genotypic ratio? (SZAMBU-2024)
A. Complete dominance
B. Incomplete dominance
C. Over dominance
D. Codominance

Q.127 In fruit fly *Drosophila*, the heterozygote (w^+/w) has more quantity of fluorescent pigments in eyes than wild (w^+/w^+) or white eye (w/w) homozygote. This is an example of: (SZAMBU-2024)
A. Over dominance
B. Complete dominance
C. Codominance
D. Partial dominance

Q.128 Which of the following blood groups has anti-A and anti- B antibodies in the serum? (KMU-2024)
A. A
B. AB
C. B
D. O

Q.129 Which type of antibodies are present in person with phenotype of blood group AB? (SZAMBU-2024)
A. Anti-A Antibody
B. Anti-B Antibody
C. Anti-A and Anti-B antibodies
D. No antibodies present at all

Q.130 Which of the following is not related to ABO blood group system? (NUMS-2024)
A. It is an example of multiple alleles
B. I^A and I^B are co-dominant
C. It does not code for any antigen
D. It obeys Mendel's law of inheritance

Q.131 What is the principle of blood transfusion in donor and recipient respectively? (SZAMBU-2024-Reconduct)
A. Antibodies of both
B. Antibodies: antigen of recipient
C. Antigen of both
D. Antigen of donor: Antibodies of recipient

Q.132 Which is true for an X-linked dominant trait? (KMU-2024)
A. All female offspring of the affected father will be affected
B. Half of the female offsprings of the affected father will be affected
C. No male offspring of an affected mother will be affected
D. No female offspring of the affected father will be affected

Q.133 Which of the following option is correct for the pattern baldness? (NUMS-2024)
A. It is sex linked trait
B. Occurs due to hormonal difference between sexes
C. Heterozygous male is patient
D. Heterozygous female is normal

Q.134 Which traits are most likely to affect men than women? (SZAMBU-2024-Reconduct)
A. X linked recessive
B. X linked dominant
C. Autosomal dominant
D. Autosomal recessive

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Q.135 Hemophilia A and B pass from infected _____ grandfather to _____ through carrier daughter. (SZAMBU-2024)
A. Paternal, grandson
B. Maternal, grandson
C. Paternal, granddaughter
D. Maternal, granddaughter

Q.136 A carrier female for hemophilia is married to an affected person. What would be the probable percentage of their sons to be affected? (NUMS-2024)
A. 100%
B. 50%
C. 25%
D. 0%

Q.137 There is a situation in which hemophilia effects both gender equally. What is the reason behind it? (SZAMBU-2024-Reconduct)
A. X-linked
B. Y-linked
C. Co-dominant
D. Autosomal

Q.138 When both the alleles of a gene pair are same, the organism is said to be: (SZAMBU-2024-Reconduct)
A. Heterozygous
B. Genotype
C. Homozygous
D. Phenotype

Q.139 Phenotype is: (SZAMBU-2024-Reconduct)
A. The genetic complement i.e the genes in an individual for a particular trait
B. Partner of gene pair
C. The form of appearance of a trait
D. The position of a gene on the chromosome

Q.140 Which one of the following is sterile male in *Drosophila*, but a sterile female in human produced through Turner's syndrome? (SZAMBU-2024)
A. XO
B. XXO
C. XXX
D. XXY

Q.141 The blue colour blindness is also called as: (SZAMBU-2024-Reconduct)
A. Protanopia
B. Deuteranopia
C. Tritanopia
D. Tetranopia

Q.142 Two allelic genes at same locus, when expressed fully in an individual, it is considered as: (SZAMBU-2024-Reconduct)
A. Co-dominance
B. Complete dominance
C. Incomplete dominance
D. Epistasis

Q.143 Chromosomal abnormality in Turner's syndrome is represented by? (UHS-2024)
A. XXX
B. XYY
C. XO
D. XXY

Q.144 Which of the following increases variation within a gene pool? (UHS-2024)
A. Chromosome inversion
B. Crossing over
C. Gene mutation
D. Random fusion of gametes

Q.145 What is the primary outcome of crossing over during prophase of meiosis-I? (KMU-2024)
A. Chromosomes duplicate without any exchange of parts
B. Homologous chromosomes exchange different pairs leading to recombinant chromatids and increased genetic variation
C. Homologous chromosomes exchange identical parts, resulting in no genetic variation
D. Non-homologous chromosomes exchange parts

Q.146 In which phase of meiosis crossing over takes place? (SZAMBU-2024)
A. Leptotene
B. Diplotene
C. Pachytene
D. Zygotene

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ANSWER KEY

PRACTICE EXERCISE

1	C	11	A	21	A	31	A	41	C	51	A
2	A	12	B	22	D	32	B	42	B	52	C
3	C	13	C	23	C	33	C	43	A		
4	A	14	A	24	D	34	C	44	D		
5	B	15	C	25	A	35	D	45	A		
6	B	16	B	26	B	36	B	46	B		
7	C	17	C	27	A	37	B	47	C		
8	C	18	B	28	A	38	D	48	B		
9	A	19	B	29	A	39	A	49	D		
10	A	20	A	30	A	40	D	50	B		

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53	A	63	B	73	B	83	C	93	C	103	A	113	D	123	A	133	B	143	C
54	C	64	A	74	D	84	D	94	A	104	A	114	D	124	D	134	A	144	B
55	A	65	A	75	C	85	C	95	C	105	B	115	A	125	B	135	B	145	B
56	B	66	D	76	B	86	B	96	C	106	C	116	B	126	A	136	B	146	C
57	B	67	B	77	C	87	A	97	D	107	B	117	C	127	A	137	D		
58	A	68	D	78	A	88	B	98	A	108	B	118	C	128	D	138	C		
59	A	69	C	79	A	89	B	99	B	109	A	119	A	129	D	139	C		
60	D	70	B	80	D	90	B	100	C	110	B	120	D	130	C	140	A		
61	D	71	B	81	C	91	C	101	C	111	B	121	C	131	D	141	C		
62	A	72	C	82	C	92	B	102	C	112	A	122	A	132	A	142	A		

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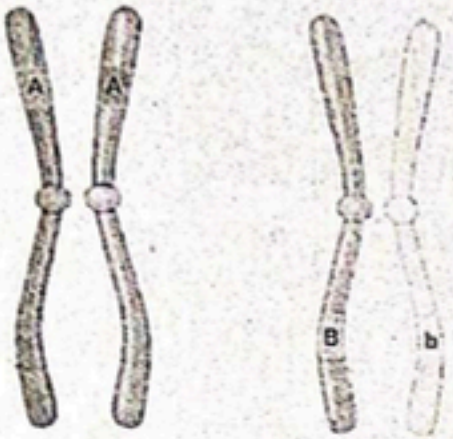
EXPLANATORY NOTES

PRACTICE EXERCISE

1. Partner of a gene pair is known as allele.

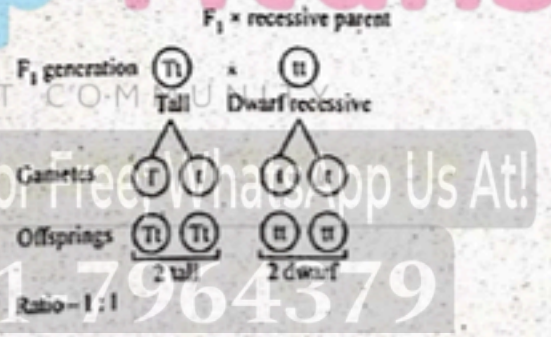


Homozygous
Alleles are same

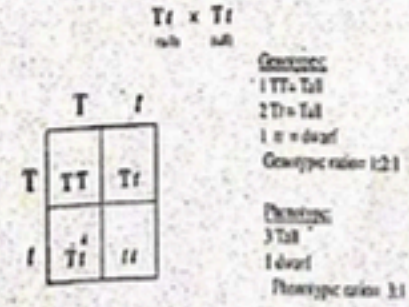
Heterozygous
Alleles are different

Hemizygous
Only one allele
(e.g. XY)

2. Genotype is a genetic makeup of organism that controls the expression of a certain trait.
3. A dominant allele is expressed when present in either one or two copies (homozygous or heterozygous). It masks the expression of the recessive allele in a heterozygous combination.
4. When both alleles of a gene pair in an organism are same, the organism is homozygous for that gene pair. If both alleles of a gene pair are different, the condition is called heterozygous. If both male and female sex organs are present in body of same organism, the condition is called as hermaphrodite.
5. Physical appearance of a trait is called phenotype. For example, round and wrinkled are phenotypes of seed shape as the shape is a trait.
6.



7.



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8. Gene linkage does not obey Mendel law of independent assortment. Allele of Mendel traits do not show gene linkage.
9. Round (RR) phenotype is dominant over wrinkle (rr) and yellow (YY) is dominant over green (yy). In F_1 generation all plants will be round and yellow seeded.
10. The plant with genotype TTRR will produce only one type of gamete, TR, because both alleles for each trait are homozygous (TT and RR). Therefore, only TR gametes can be produced.
11.

	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

12. There is only single plant showing RRyy genotype in F_2 generation of dihybrid cross.
13. Mutation can produce alternative forms a gene known as alleles. Multiple allele phenomena is due to mutation.
14. All such altered alternative forms of a gene, whose number is more than two are called multiple alleles.
15. Any two of these multiple alleles can be present in the genome of a diploid organism, but a haploid organism or a gamete has just one of them in its genome.
16.

Phenotype	Genotype	Antigen	Antibody
A	I^AI^A, I^Ai	A	Anti-B antibody
B	I^BI^B, I^Bi	B	Anti-A antibody
AB	I^AI^B	A & B	No Antibody
O	ii	No	Anti-A antibody Anti-B antibody

17.

Phenotype	Genotype	Antigen	Antibody
A	I^AI^A, I^Ai	A	Anti-B antibody
B	I^BI^B, I^Bi	B	Anti-A antibody
AB	I^AI^B	A & B	No Antibody
O	ii	No	Anti-A antibody Anti-B antibody

18. A female with blood group A can have genotype I^Ai, and a male with blood group i has genotype ii. Their children can inherit either I^A or i from the mother and i from the father, resulting in blood groups A or O.
19. ABO blood group shows four different phenotypes, A, B, AB, and O.
20. A person with blood group O has the genotype ii, so they can only pass on an i allele to their child. Since blood group AB requires both A and B alleles, it is not possible if the father has blood group O.
21. Male has "ii" genotype and female is "I^Ai", there are 50% chances for the child with O blood group.
22. Blood group antigens can be found in RBCs, body fluids and saliva.

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23. Colour Blindness and Haemophilia are X linked recessive traits while Albinism is autosomal recessive; lastly Rh factor is autosomal dominant trait.
24. Erythroblastosis fetalis is hemolytic anemia in the fetus caused by trans-placental transmission of maternal antibodies to fetal red blood cells. The disorder usually results from incompatibility between maternal and fetal blood groups.
25. Alleles for blood groups A and B are dominant over allele for blood group O but are co-dominant to each other.
26. Karl Landsteiner discovered ABO blood group system and its genetics were explained by Bernstein.
27. A person with AB blood group has genotype of I^AI^B. Gene responsible for presence of Rh factor is designated as D. It can be present as DD or Dd, both of which means presence of Rh factor. dd means absence of Rh factor.
28. Gene linkage minimizes the chances of genetic recombination and variation among offspring while independent assortment and crossing over enhances it.
29. Appearance of recombinants in equal proportions to their parents in next generation indicates that two genes are present farther from each other.
30. Genes for colour blindness, haemophilia, gout etc. form one linkage group on human X chromosome. while leukemia is a type of cancer that can result from various factors, not specifically linked to chromosome 11.
31. The recombination frequency is 20% between the two genes. The distance between them in unit map is 20.
32. A pair of genes with a larger recombination frequency are likely farther apart, while a pair with a smaller recombination frequency are likely to be closer together. Therefore, we should start with the largest recombination frequency (RF) of two genes. In this case, C and D are the farthest apart, so A and B must be between them.
33. Number of linkage groups in an organism is equal to number of chromosomal pairs.
34. Before Morgan, there was speculation about role of chromosomes in inheritance but no one had proved it experimentally. Morgan performed experiments on fruit fly and he concluded that eye color in *Drosophila* resides on X chromosome. This shows that genes for all traits are present on different chromosomes.
35. Hemophilia, colorblindness and Phenylketonuria diseases are genetic disorders. While epilepsy is a nervous disorder.
36. Haemophilia A and B are non-allelic recessive sex-linked but hemophilia C is an autosomal recessive trait (Autosome 4). Testicular feminization syndrome (TFM) is a rare X-linked recessive disease.
37. Like any sex-linked recessive traits, colorblindness also moves zigzags from maternal grandfather through a carrier daughter to a grandson.
38.

Parental
Phenotypes Carrier Female x Normal Male
Genotypes X^NX^n X^NY
Gametes X^N X^n X^N Y

Offspring 1
Genotypes

		Female Gametes	
		X^N	X^n
Male Gametes	X^N	X^NX^N	X^NX^n
	Y	X^NY	X^nY

Phenotypes
Normal Female : Carrier Female : Normal Male : Colour blind Male
1 : 1 : 1 : 1

39. Female can be carrier but phenotypically will be normal.

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40. Gene for hemophilia is linked with X-chromosome in recessive form.
41. Tfm gene encodes a receptor for a hormone known as androgen. Androgens are unable to bind to receptors when mutated tfm gene fails to code for receptor.
42. Y-linked traits are known as holandric traits. A few characters are Y-linked and these are growth of hair on rim of pinna, straight hair on body. Recently two more genes were discovered on Y. chromosome such as testes determining factor and minor histocompatibility.
43. Alleles are partners of a gene pair which are present on homologous chromosomes. An organism can be homozygous (same alleles) or heterozygous (Different alleles) with respect to alleles.
44. Such genes that keep on hooping from one position to another position, also called as transposons do not have fix locus.
45. The inheritable characteristics are traits. i.e. flower colour is a trait and red or white is phenotypes.
46. 50% hybrids appear in the F2 generation because heterozygous (Aa) individuals make up half of the progeny in a monohybrid cross.
47. In a dihybrid cross, out of the round green seeds, two-thirds are heterozygous for round seed shape.
48. Epistasis occurs when one gene at a locus interferes with the expression of another gene at a different locus.
49. Mismatched blood transfusions trigger agglutinins (antibodies) in the recipient, causing clumping and rejection.
50. The number of gametes is calculated using the formula (2^n), where (n) is the number of heterozygous gene pairs (Aa, Bb, Cc → 3), so ($2^3 = 8$).
51. Male is XY and he always receives X chromosome from mother, Y chromosome from father.
52. Males are hemizygous for X-linked traits because they have only one X chromosome.

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53. The total aggregate of genes in a population at any given time is called the population's gene pool. It consists of all the alleles at all genes loci in all individuals of the population. Genome is the collection of all the genes present in an individual.
54. Genes are actually parts of DNA comprising its basic sequence.



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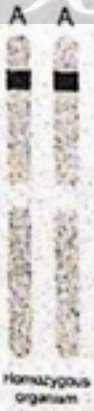
55. When both alleles of a gene pair in an organism are same, the organism is homozygous for that gene pair.



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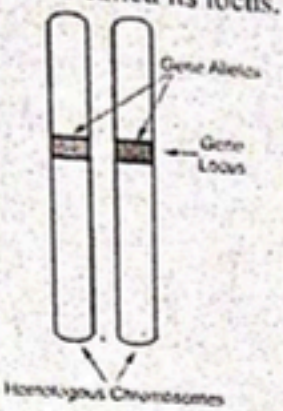
56. The position of a gene on the chromosome is called its locus.



57. When both alleles of a gene pair are the same, the organism is said to be homozygous. In contrast, heterozygous means having two different alleles for a gene.

58. DNA stores biological information in discrete units called **genes**, which are sequences of nucleotides that encode instructions for making proteins. Phenotypes refer to the organism's traits, not the storage of information.
Cell is structural and functional unit of life.

59. Staying together of more than one gene on the same chromosome is called gene linkage.
They do not septate during crossing over.

60. In incomplete dominance, the effects of two alleles are blended, and their expression results in an intermediate phenotype, often showing an additive effect. This differs from epistasis, where one gene masks the expression of another.

61. According to Mendel, particular hereditary factors that carry specific character from parents to offsprings are called as **Elementen.**

62. Total number of chromosomes in *Pisum sativum* (pea plant) are 14. He also studied seven contrasting traits.

63. There are seven contrasting traits in pea plants studied by Mendel :
- Seed shape (Round and wrinkled)
- Seed colour (Yellow and green)
- Flower position (Axial and terminal)
- Flower colour (Violet and white)
- Pod shape (Inflated and constricted)
- Pod colour (Green and yellow)
- Stem height (Tall and dwarf)

64. When one allele is completely dominant over the other, presence of the recessive allele is functionally hidden. In Rr, 'R' is completely dominant over 'r'.

65. Traits which were studied by Mendel controlled by specific allele (genes). These alleles do not show linkage.
Purity of gametes: When the gamete is forming, these paired entities will segregate and each gamete accepts only one copy. This is known as Mendel's law of segregation.

66.

Event No.1	Event No.2	Both Events at a Time
Seed Shape	Seed Colour	Seed Shape & Colour
Independent Probability	Independent Probability	Joint Probability
Round = ¾	Tall = ¾	Round tall = 3/4 × 3/4 = 9/16
Round = ¾	dwarf = ¼	Round dwarf = 3/4 × 1/4 = 3/16
Wrinkled = ¼	Tall = ¾	Wrinkled Tall = 1/4 × 3/4 = 3/16
Wrinkled = ¼	dwarf = ¼	Wrinkled dwarf = 1/4 × 1/4 = 1/16

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67. In monohybrid cross, the phenotypic ratio between dominant and recessive plants during F_2 generation is 3:1.

68. Purple colour flowers are dominant over white colour plants.

69. Incomplete dominance is when one allele does not completely mask the effects of the other allele for the trait in heterozygous condition, and the organism's resulting physical appearance shows a blending of both alleles.

70. ABO blood group is first discovered multiple allelic blood group system in man. Polygene are the genes which are more than one gene control single trait.

71. ABO blood group is first discovered multiple allelic blood group system in man.

72. To give birth to an 'O' blood group type child, parents should have A or B blood group in heterozygous form.

73. Blood group O- is known as the universal donor because it lacks both A and B antigens, and the Rh factor, making it compatible with any recipient's blood type.

74. If both have heterozygous genotype. I^Ai and I^Bi are genotype of man and female respectively. Then all blood groups could appear.

75.

Antigens on RBCs surface	Blood group
Antigen A	A
Antigen B	B
Antigen A and B	AB
No antigens	O

76. Only four possible phenotypes exist in ABO blood group system. Blood group A, B, AB and O.

77. ABO blood group is first discovered multiple allelic blood group system in man. This blood group system is encoded by a single polymorphic gene I on chromosome 9. It has three multiple alleles I^A, I^B and i.

78. Erythroblastosis foetalis is also called maternal incompatibility. When 'Rh' negative mother conceives 'Rh' positive fetus. Mother produces Anti Rh antibodies which destroy different structure of fetus.

79. The Rh blood group is one of the most complex blood groups known in humans. From its discovery 60 years ago where it was named after the Rhesus monkey, it has become second in importance only to the ABO blood group in the field of transfusion medicine.

80. 22 pairs of chromosomes are autosomes in human. One pair is of sex chromosomes. In males, it is XY while in females, it is XX.

81. Number of linkage group is equal to number of homologous chromosomes in a cell. There are 23 linkage groups in human cell.

82. The value of Cross over or recombination frequency is directly proportional to distance between the genes on gene map.

83. Both parents are heterozygous (Ss) for sickle cell anemia. When they have children, the possible genotypes are 25% SS (normal), 50% Ss (carrier), and 25% ss (affected homozygotes), so the proportion of affected homozygotes (ss) is 25%.

84. Linked genes do not obey law of independent assortment. It reduces chance of genetic recombination.

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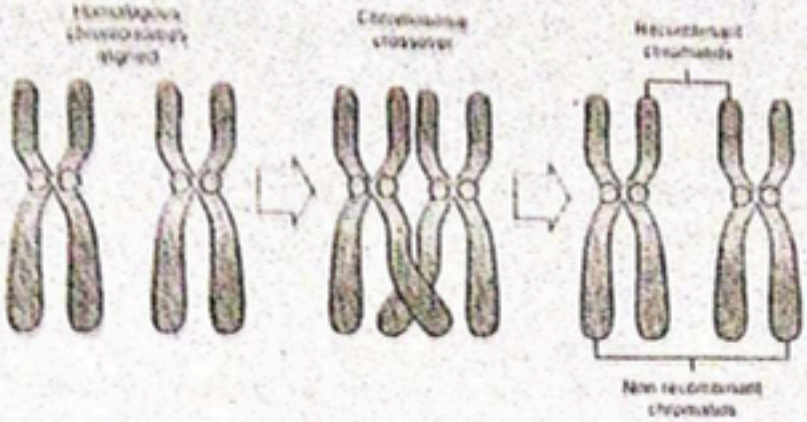
Gene linkage does not obey Mendel law of independent assortment. Genes are closed associated with each other and do not separate from each other.

During crossing over, segments are exchanged between non-sister chromatids of homologous chromosomes, which allows for genetic recombination and increases genetic diversity.



The white-eyed male (X^wY) mates with a red-eyed female ($X^{w+}X^{w+}$), resulting in red-eyed females ($X^{w+}X^w$) and red-eyed males ($X^{w+}Y$) due to X-linked inheritance.

P Generation

Phenotype	red-eyed (wild-type) female	×	white-eyed male
Genotype	$X^{w+}X^{w+}$		$X^{w+}Y$

F_1 Generation

Phenotype	red-eyed female	×	red-eyed male
Genotype	$X^{w+}X^{w+}$		$X^{w+}Y$

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Mutation is major source of all changes. Red eye is wild type while white eye is mutant type.

Haemophilia and colour blindness are X-linked recessive traits. Hypophosphatemia or vitamin -D resistant rickets, are X-linked recessive traits while diabetes mellitus is a autosomal trait.

Haemophilia and colour blindness are X-linked recessive traits. Male baldness, diabetes mellitus and erythroblastosis are autosomal traits.

The genes for red and green opsins are on X chromosome while the gene for blue opsin is present on autosome 7.

A carrier female (X^HX^h) and a haemophilic male (X^hY) will produce offspring with 25% chance of being a carrier female (X^HX^h), 25% haemophilic female (X^hX^h), 25% normal male (X^HY), and 25% haemophilic male (Xh^Y).

Gender	Genotype	Phenotype
Female	X^HX^H	Normal
	X^HX^h	Normal but Carrier
	X^hX^h	Haemophilic
Male	X^HY	Normal
	X^hY	Haemophilic

Haemophilia A and B, and color blindness are the example of X-Linked recessive traits.

94. X-Linked recessive traits affect male more as compared to female and vice versa for X-linked dominant traits.

95. Haemophilia, colour blindness are X-linked recessive. Hypertrichosis is a Y-linked trait. Hypophosphatemia is X-linked dominant disorder.

96. One of the most powerful tools in human genetic studies is pedigree analysis.
- A chi-square test is a statistical test used to compare observed results with expected results.
- Experimental mating: Genetically diverse lines of organisms can be crossed in such a way to produce different combinations of alleles in one line.

97. A normal man (X^HY) and a heterozygous female (X^HX^h) will produce daughters with the genotypes X^HX^h (carriers) or X^HX^H (normal). Since hemophilia is X-linked recessive, daughters cannot have hemophilia.

98. A selectively advantageous gene increases in frequency because it provides a survival or reproductive benefit, giving the carriers a better chance to pass it on.

99. A gene mutation refers to a change in the structure of a DNA molecule that produces a different allele of a gene.

100. Phenotype refers to the observable characteristics or traits of an organism resulting from the interaction of its genotype with the environment.

101. When both alleles of a gene pair are the same, the organism is said to be homozygous for that gene.

102. A karyotype is the particular array of chromosomes an individual possesses, showing the number and structure of chromosomes.

103. The locus of a gene on a chromosome refers to its specific position or location.

104. According to Mendel's Law of Segregation, one individual out of four in the F2 generation has a phenotype that failed to express in the F1 generation due to the segregation of alleles.

105. A test cross involves crossing an individual with an unknown genotype (for a dominant trait) with a homozygous recessive individual (tt) to determine the unknown genotype.

106. Genes on non-homologous chromosomes assort independently during meiosis, as they are located on different chromosomes.

107. In a heterozygous cross (Pp), the probability that the dominant allele (P) will be in the sperm and the recessive allele (p) in the egg is 0.5 (50%).

108. Mendel chose *Pisum sativum* (pea plant) for his experimental studies due to its clear traits and ease of cultivation.

109. In a dihybrid cross (RrYy) for round and yellow seeds, the expected number of plants with round and yellow seeds is 18 out of 32 plants.

110. Mendel's Law of Independent Assortment is explained by the behavior of chromosomes during meiosis, where different gene pairs segregate independently.

111. The ABO blood group system is controlled by more than two alleles (A, B, and O) in a population, which is an example of multiple alleles.

112. The ABO blood group system is controlled by multiple alleles (A, B, O) on an autosomal chromosome, illustrating inheritance by multiple alleles.

113. Erythroblastosis fetalis occurs when an Rh-negative mother carries an Rh-positive fetus, leading to the mother developing antibodies against the fetus's Rh-positive blood cells.

114. Rh antibodies are produced in an Rh-negative person only after exposure to Rh-positive blood, such as during childbirth or blood transfusion.

115. In Morgan's experiment, the white eye trait is X-linked and recessive. The male (white-eyed) has the genotype X^wY, and the female (red-eyed, wild type) has the genotype $X^{w+}X^{w+}$. When they mate, all offspring will inherit an X^{w+} from the mother and either X^w (for females) or Y (for males) from the father, resulting in all offspring having red eyes. Therefore, both males and females will have red eyes.

116. *Drosophila melanogaster* is the scientific name for the fruit fly, commonly used in genetic research due to its simple genetic structure and short life cycle.

117. Hypophosphatemic rickets is an X-linked dominant disorder where affected females and males have a 50% chance of passing it to their offspring.

118. Y-linked traits are passed directly from father to son since only males carry the Y chromosome.

119. In an X-linked recessive disorder, both male and female children of an affected mother have a 50% chance of inheriting the disorder, as the mother carries one affected X chromosome.

Sons inherit the Y chromosome from their father and one X from their mother, so half may inherit the X^h and be affected. Daughters inherit one X from each parent, so half may inherit the X^h from their mother and be carriers.

Hemophilia is a genetic condition that impairs the ability of blood to clot, leading to excessive bleeding.

Haemophilia A, caused by a deficiency of clotting factor VIII, is the most common type of hemophilia in the human population.

Genotype refers to the genetic makeup inherited from parents, which determines traits like hair color. It includes all genes, whether expressed or not.

A trait is a physical characteristic resulting from genetic expression, such as hair color or eye shape. It is part of the phenotype.

A dihybrid cross follows the 9:3:3:1 ratio. "Purple" is dominant over "white," and "axial" is dominant over "terminal." The probability of "purple and terminal" is 3/16.

In complete dominance, the phenotype follows Mendelian ratios (3:1), differing from genotypic ratios (1:2:1).

In over-dominance, heterozygotes show a stronger or superior trait than either homozygote, as seen in Drosophila eye pigments.

Blood group O lacks A and B antigens but has both anti-A and anti-B antibodies in serum. This makes it a universal donor but can only receive O blood.

Blood group AB has both A and B antigens but lacks anti-A or anti-B antibodies. This makes it a universal recipient in blood transfusion.

The ABO system determines blood group based on antigen presence. Since I^A and I^B code for A and B antigens, option C is incorrect.

Blood transfusion depends on the donor's antigens and recipient's antibodies to prevent immune reactions.

X-linked dominant traits are always passed from affected fathers to daughters since they inherit his only X chromosome.

Pattern baldness is a sex-influenced trait, meaning expression is affected by testosterone levels.

X-linked recessive traits, like hemophilia and color blindness, affect males more because they have only one X chromosome. Females need two affected X to express the trait.

Hemophilia is X-linked recessive, passing from an affected grandfather to his grandson through a carrier daughter. Males inherit it from their mothers.

A carrier mother (X^hX) and affected father (X^hY) have a 50% chance of passing hemophilia to sons.

If hemophilia affects both males and females equally, it must be autosomal rather than X-linked, as X-linked disorders predominantly affect males.

Homozygous means both alleles are identical (AA or aa), whereas heterozygous has different alleles (Aa).

Phenotype is the observable expression of a genotype or expression of genotype, such as eye color or height is termed as phenotype.

Turner's syndrome (XO) occurs due to the absence of one X chromosome, leading to sterility in human females and abnormalities in Drosophila males.

Tritanopia (blue color blindness) is caused by a defect in the short-wavelength cone cells. It affects the ability to distinguish blue and yellow shades.

In co-dominance, both alleles are fully expressed without blending. An example is AB blood group, where both A and B antigens are present.

Turner's syndrome (XO) occurs due to the absence of one X chromosome, leading to sterility in human females and abnormalities in Drosophila males.

Crossing over occurs during meiosis and shuffles alleles between homologous chromosomes, increasing genetic variation in offspring.

Homologous chromosomes exchange different parts leading to recombinant chromatids and increased genetic variation

Crossing over occurs in the pachytene stage of prophase-I, allowing homologous chromosomes to exchange genetic material and create recombinant DNA.

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1 UNIT CELL STRUCTURE AND FUNCTION

SELF ASSESSMENT TEST

Q.1 **The approximate thickness of cell membrane is:**

A. 0.07nm
B. 0.7nm
C. 7nm
D. 17nm

Q.2 **Keeping in view the fluid mosaic model for the structure of cell membrane, which one of the following statements is correct regarding the movement of lipids and proteins from one lipid monolayer to the other described as flip-flop movement?**

A. Both lipids and proteins can flip-flop
B. Lipid can rarely flip-flop, proteins cannot
C. Proteins can flip-flop, lipids cannot
D. Neither lipids nor proteins can flip-flop

Q.3 **Some cellular organelles are bounded by a single membrane, while others have two membranes around them. Which one of the following is correct?**

	Single Membranous		Two Membranous	
A.	Vacuole	Lysosome	Nucleus	Chloroplast
B.	Chloroplast	Lysosome	Nucleus	Vacuole
C.	Nucleus	Chloroplast	Lysosome	Vacuole
D.	Nucleus	Lysosome	Chloroplast	Vacuole

Q.4 **The diagram shows a model of the structure of a biological membrane:**



Which labeled part would restrict the movement of small, lipid-insoluble molecules?

A. A
B. B
C. C
D. D

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Q.5 **Cells without nucleoli die because they do not possess:**

A. Centrioles, and are unable to undergo cell division
B. Lysosomes, and are unable to destroy worn-out organelles
C. Mitochondria, and are unable to obtain energy
D. Ribosomes, and are unable to manufacture proteins

Q.6 **How many units occur in each stockpile of Golgi apparatus?**

A. 4 to 8.
B. 4 to 6
C. 2 to 6
D. 2 to 8

Q.7 **It is synthesized by free-floating ribosomes of cytoplasm in humans:**

A. Pancreatic lipase
B. Salivary amylase
C. Insulin
D. DNA helicase

Q.8 **These play a vital role in the defense activity of macrophages:**

A. Mitochondria
B. Lysosomes
C. Lysozymes
D. Ribosomes

Q.9 Damage to which one of the following part of a prokaryotic or eukaryotic cells cause their immediate death?
A. Mitochondria
B. Cell membrane
C. Cell wall
D. Golgi apparatus

Q.10 Movement of Na^+ across axon membrane via Na^+-K^+ pump is an example of:
A. Active transport
B. Diffusion
C. Passive transport
D. Osmosis

Q.11 Which one always passes through the nuclear membrane from nucleoplasm to the cytoplasm?
A. Proteins
B. DNA nucleotides
C. Enzymes
D. RNA

Q.12 Cytoplasmic streaming movement causes the flow of all except:
A. Endoplasmic reticulum
B. Lysosomes
C. Mitochondria
D. Glucose and salts

Q.13 They help to detoxify the harmful drugs:
A. Ribosomes
B. SER
C. RER
D. Golgi bodies

Q.14 It is mismatched concerning mitochondrial membrane:
A. Outer membrane-Smooth
B. Inner membrane-F_1 particles
C. Outer membrane-Chemiosmosis
D. Inner membrane-Increases surface area

Q.15 Types of ribosomes present in the cytosol and organelles of the eukaryotic cells are respectively:
A. The 60S and 40S
B. The 80S and 70S
C. The 70S and 80S
D. The 80S and 80S

Q.16 Which of the following cell types would you expect to be abundant with endoplasmic reticulum and Golgi bodies?
I. Plasma B cells (produce antibodies)
II. Adipose cells (store fats)
III. Islet of Langerhans cells (secrete insulin)
IV. Red blood cells (transport oxygen)
A. I and II only
B. I and III only
C. III and IV only
D. II and III only

Q.17 Which of the following is a protective structure in bacterial cells?
A. Cell wall
B. Protoplasm
C. Cellulose
D. Nuclei

Q.18 Which one of the following is always unicellular?
A. *Mycoplasma*
B. Protists
C. Virus
D. Algae

Q.19 Transport of glucose into the cell with the help of insulin is an example of:
A. Osmosis
B. Facilitated diffusion
C. Active transport
D. Endocytosis

Q.20 Select the incorrect pair from the following:
A. Leucoplast-Carotene
B. Elaioplast-Oils
C. Amyloplast-Starch
D. Aleuroplasts-Proteins

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Q.21 The functional units of Golgi apparatus are:
A. Thylakoids
B. Cristae
C. Oxysomes
D. Cisternae

Q.22 The outer and inner membranes of mitochondria are:
A. Structurally and functionally similar
B. Structurally similar but functionally different
C. Structurally and functionally different
D. Structurally different but functionally similar

Q.23 Which of the following substances can cross the plasma membrane more easily?
A. Ions
B. Lipid soluble
C. Proteins
D. Starch

Q.24 The ratio of RNA and protein in a ribosome is:
A. 1:1
B. 4:7
C. 2:3
D. 3:1

Q.25 Secretory granules budded off from:
A. Golgi bodies
B. Vacuoles
C. SER
D. Nucleus

Q.26 What is Polysome?
A. Group of mRNAs and one ribosome
B. Many ribosomes and many mRNAs
C. mRNA + rRNA + tRNA + ribosome
D. One mRNA and many ribosomes

Q.27 Which one is a self-replicating organelle?
A. Ribosome
B. Centriole
C. Lysosome
D. Mitochondrion

Q.28 The replica of the chromosome is:
A. Centromere
B. Chromatid
C. Kinetochore
D. Nucleosomes

Q.29 All of the following are single membranous organelles except:
A. Mitochondria
B. Glyoxysomes
C. Lysosomes
D. Peroxisomes

Q.30 Lysosomes are most abundant in:
A. Plant cells having phagocytic activity
B. Protozoa
C. Bacteria with additional DNA plasmids
D. Animal cells having phagocytic activity

Q.31 The absence of an enzyme that is involved in the catabolism of lipids results in:
A. Tay-Sachs disease
B. Glycogenosis type II
C. Glycogenosis type I
D. Phenylketonuria

Q.32 The lysosomes which eat parts of their cells or cellular components during cellular starvation are called:
A. Primary lysosomes
B. Secondary lysosomes
C. Tertiary lysosomes
D. Autophagosome

Q.33 Interior of chloroplast is divided into the heterogeneous structure, embedded in the matrix known as:
A. Grana
B. Thylakoids
C. Stroma
D. Cisternae

Q.34 Plastids are only found in the:
A. Animals and Plants
B. Plants
C. Animals
D. Viruses

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Q.35 The enzymes of lysosomes are synthesized on:
A. RER
B. Chloroplast
C. SER
D. Golgi apparatus

Q.36 The process by which unwanted substances within the cell are engulfed and digested within the lysosome is known as:
A. Endocytosis
B. Hydrolysis
C. Exocytosis
D. Autophagy

Q.37 The main function of nucleolus is to make:
A. rDNA
B. Histone proteins
C. Ribosomes
D. Chromosomes

Q.38 The peptidoglycan cell wall is present in:
A. *Penicillium*
B. *Adiantum*
C. Bacterium
D. *Polytrichum*

Q.39 Which of the following function is not performed by the cell membrane of a plant cell?
A. Regulation of material
B. Active transport
C. Transport of material
D. Phagocytosis

Q.40 Which organelle in eukaryotic cells functionally resembles with mesosomes of prokaryotic cells?
A. Golgi apparatus
B. Cell membrane
C. Endoplasmic reticulum
D. Mitochondria

Q.41 Which type of molecule will make channels for the movement of neutral substances down the concentration gradient?
A. Phospholipids
B. Nucleic acid
C. Proteins
D. Carbohydrates

Q.42 Under which of the following conditions, would you expect to find a cell with a predominance of free ribosomes?
A. A cell that is secreting proteins
B. A cell that digests food particles
C. A cell producing cytoplasmic enzymes
D. A cell that enlarges its vacuole

Q.43 Mitochondria have enzymes for all of these processes except:
A. Replication of DNA
B. Fatty acid metabolism
C. Krebs cycle
D. Fermentation

Q.44 Which of the following feature is common between prokaryotes and eukaryotes?
A. A membrane-bounded nucleus
B. A cell wall made up of cellulose
C. Presence of ribosomes
D. Linear genome

Q.45 Water-soluble pigments found in plant cell vacuoles are:
A. Xanthophylls
B. Carotenoids
C. Chlorophylls
D. Anthocyanin

Q.46 Different cells have different sizes. Arrange the following cells in ascending order of their size. Choose the correct option among the followings:
(i) *Mycoplasma*
(ii) Ostrich eggs
(iii) Human RBCs
(iv) *E. coli*
A. (i), (iv), (iii) and (ii)
B. (ii), (i), (iii) and (iv)
C. (i), (ii), (iii) and (iv)
D. (iii), (ii), (i) and (iv)

Q.47 Which of the following is derived from the cell membrane?
A. Plasmid
B. Mesosome
C. Nucleosome
D. Cytoskeleton

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Q.48 Tonoplast is important for:

A. Oxidative phosphorylation
B. Transporting ions against concentration gradients
C. Chemiosmosis
D. Cell division

Q.49 Both cilium and flagellum emerge from centriole like structure which is called:

A. Basal granules
B. Basal lamina
C. Basal bodies
D. Basal ganglion

Q.50 Based on the position of the centromere, the chromosomes are classified into how many types?

A. 1
B. 2
C. 3
D. 4

ANSWER KEY

1	C	11	D	21	D	31	A	41	C
2	B	12	A	22	C	32	A	42	C
3	A	13	B	23	B	33	A	43	D
4	A	14	C	24	A	34	B	44	C
5	D	15	B	25	A	35	A	45	D
6	A	16	B	26	D	36	D	46	A
7	D	17	A	27	D	37	C	47	B
8	B	18	A	28	B	38	C	48	B
9	B	19	B	29	A	39	D	49	C
10	A	20	A	30	D	40	D	50	D

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UNIT 2 BIOLOGICAL MOLECULES & ENZYMES

SELF ASSESSMENT TEST

Q.1 **These are the most abundant organic compounds to be found in cells:**
A. Carbohydrates B. Lipids
C. Proteins D. Water

Q.2 **All of the following elements are present in all carbohydrates except:**
A. Carbon B. Hydrogen
C. Oxygen D. Nitrogen

Q.3 **Which term most appropriately describes catalase, collagen and haemoglobin?**
A. Enzymes B. Globular proteins
C. Fibrous proteins D. Polypeptides

Q.4 **Which property of proteins enables them to act as pH buffers?**
A. They are soluble
B. They contain carboxyl and amino groups
C. They have a high molecular mass
D. They possess both secondary and tertiary structure

Q.5 **The diagram shows a ring structure of glucose. Which form of glucose is shown and in which molecule is it present?**



	Form of Glucose	Where Present
A.	α	Cellulose
B.	α	Starch
C.	β	Cellulose
D.	β	Starch

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Q.6 **Silk protein is present in:**
A. Nail B. Hair
C. Plant cell wall D. Spider's web

Q.7 **All of the following are true about lipids except:**
A. They store a high amount of energy B. They are polymers of fatty acids
C. They play important role in insulation D. They are mostly hydrophobic

Q.8 **The cuticle is an example of:**
A. Acylglycerols B. Waxes
C. Phospholipids D. Terpenoids

Q.9 **Which of these is not constituent of waxes?**
A. Long-chain alkanes B. Alcohols
C. Aldehydes D. Ketones

Q.10 **All are true about ATP except:**
A. Energy currency of cell B. Contains ribose sugar
C. Contains three high energy bonds D. Contains three phosphate groups

Q.11 Which one of the following is an example of reducing sugar?
A. Sucrose B. Starch
C. Maltose D. Cellulose

Q.12 Adenine and guanine are:
A. Main nitrogenous bases of nucleic acids B. Main nitrogenous wastes of humans
C. Main nitrogenous bases of phospholipids D. Main types of amino acids in proteins

Q.13 Form of polysaccharides stored in bacteria and animals:
A. Starch B. Cellulose
C. Glycogen D. Chitin

Q.14 A structural protein is:
A. Pepsin B. Collagen
C. Haemoglobin D. Immunoglobulin

Q.15 Sugar found in genetic material is:
A. Hexose sugar B. Tetrose sugar
C. Pentose sugar D. Triose sugar

Q.16 The total number of amino acids in the alpha chain of insulin are:
A. 20 B. 21
C. 30 D. 51

Q.17 Which one is found only in RNA?
A. Cytosine B. Uracil
C. Adenine D. Guanine

Q.18 The most common carbohydrate monomer is:
A. Maltose B. Glucose
C. Lactose D. Galactose

Q.19 Which forms nails, hair and feathers?
A. Fibrin B. Collagen
C. Keratin D. Elastin

Q.20 The most important type of RNA in cells is:
A. rRNA B. tRNA
C. mRNA D. cRNA

Q.21 Most cellular secretions are:
A. Phospholipids B. Glycoproteins
C. Nucleoproteins D. Glycolipids

Q.22 Which of the following statement is not true for compounds like glycoproteins and glycolipids?
A. Both are conjugated molecules
B. Both are synthesized in the endoplasmic reticulum
C. Component of biological membrane
D. Both are components of the extracellular matrix of animal cell membrane

Q.23 The number of oxygen atoms in lipid molecules is always _____ as compared to several carbon atoms.
A. Less B. Equal
C. More D. Double

Q.24 Unsaturated fats are made saturated by:
A. Polymerization B. Dehydrogenation
C. Hydrogenation D. Hybridization

Q.25 A peptide chain attains secondary structure through the formation of:
A. Peptide bond B. Hydrogen bond
C. Ionic bond D. Disulphide bond

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Q.26 **Which one of the followings is the optimum pH of the pancreatic lipase enzyme?**
A. 7.60 B. 9.70
C. 8.00 D. 9.00

Q.27 **The optimum pH of salivary amylase is:**
A. Slightly acidic B. Highly acidic
C. Slightly basic D. Highly basic

Q.28 **Enzyme after catalysis detaches itself from the product:**
A. Denatured B. Changed
C. Incompletely D. Unchanged

Q.29 **Enzymes increase the rate of reaction by:**
A. Increasing Temperature B. Decreasing Activation Energy
C. Decreasing pH D. Increasing Activation Energy

Q.30 **Enzyme succinate dehydrogenase converts succinate into:**
A. Malate B. Citrate
C. Malonic acid D. Fumarate

Q.31 **The view that active site of an enzyme is flexible and when a substrate combines with it, cause changes in enzyme structure is known as:**
A. Lock & key model B. Sliding filament model
C. Induced fit model D. Specificity model

Q.32 **Regulatory sites other than active site, present over the enzymes are called:**
A. Active sites B. Binding sites
C. Catalytic groups D. Allosteric sites

Q.33 **An activated enzyme consisting of polypeptide chain and a cofactor is called:**
A. Apoenzyme B. Holoenzyme
C. Coenzyme D. Proenzyme

Q.34 **Activators are usually derived from:**
A. Vitamins B. Carbohydrates
C. Proteins D. Metal ions

Q.35 **Which step causes activation of catalytic site of an enzyme?**
A. Change in pH of enzyme B. Formation of ES complex
C. Change in the shape of substrate D. Change in temperature

Q.36 **In a naturally occurring chemical reaction, all active sites are occupied, the rate of reaction would be:**
A. Minimum and constant B. Zero and constant
C. Maximum and accelerating D. Constant and maximum

Q.37 **Excessive increase in temperature of medium causes the enzyme molecule to be:**
A. Activated B. Unaffected
C. Denatured D. Inactivated

Q.38 **Inhibitors can be:**
A. Metals B. Organic
C. Inorganic D. All A, B, C

Q.39 **Inhibitors which block the enzyme by forming weak bond are called:**
A. Competitive inhibitors B. Non- competitive inhibitors
C. Irreversible inhibitors D. Reversible inhibitors

Q.40 **Malonic acid is an example of:**
A. Irreversible inhibitor B. Reversible inhibitor
C. Competitive inhibitor D. Non-competitive inhibitor

Q.41 **The specificity of an enzyme is determined by:**
A. Primary structure of protein B. pH of the environment
C. Number of alpha helices in a protein D. Charge and shape of the active site

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Q.42 High specific heat capacity plays a key role in:

A. Maintaining the integrity of lipid bilayer membranes
B. Stabilizing temperature
C. Producing cooling effect
D. Bringing about chemical reactions

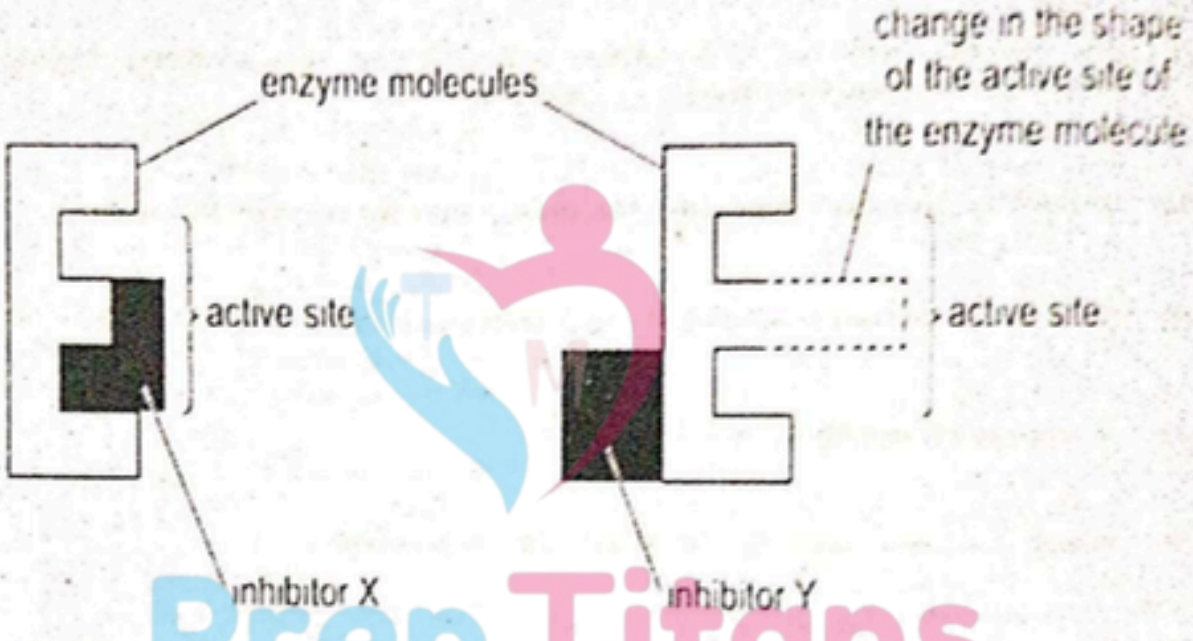
Q.43 It has a more liquid-like consistency than others:

A. Palmitic acid
B. Stearic acid
C. Linoleic acid
D. Oleic acid

Q.44 Catalytic type of RNA is:

A. tRNA
B. siRNA
C. mRNA
D. Ribozyme

Q.45 The diagram represents the reversible interaction between the active site of an enzyme and different inhibitors, X and Y.



Which row correctly identifies the type of inhibition shown by inhibitor 'X' and inhibitor 'Y'?

	X	Y
A.	Competitive	Competitive
B.	Competitive	Non-competitive
C.	Non-competitive	Competitive
D.	Non-competitive	Non-competitive

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Q.46 Vitamin 'A' is an example of:

A. Monoterpene
B. Diterpene
C. Triterpene
D. Polyterpene

Q.47 There are four test tubes with starch compounds. After sometimes substance 'Y' is added in all test tubes. The first 3 test tubes showed blue color but no change in color was shown in test tube 4. What would be the compound that was already present in test tube 4?

A. Amylase
B. Iodine
C. Lipase
D. Glycogen

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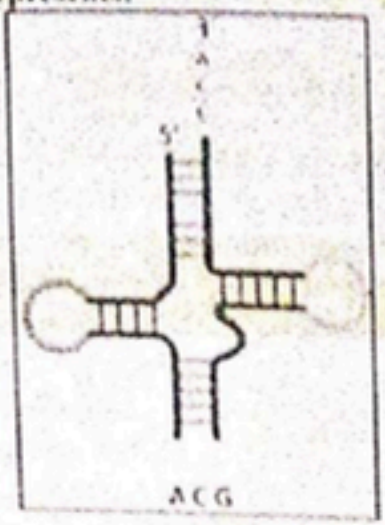
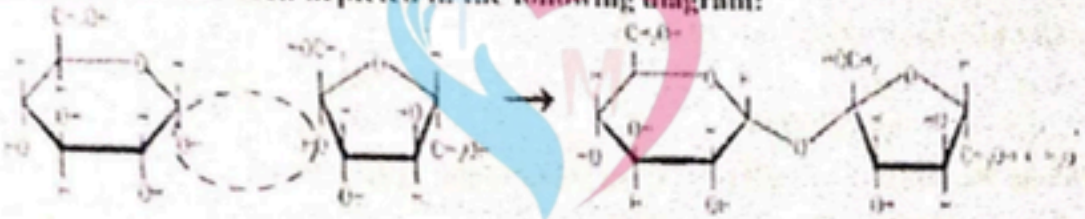
Q.48 The diagram represents:



A. mRNA
B. tRNA
C. rRNA
D. Ribozyme

Q.49 A few amino acids constitute an active site. Others play role in maintaining:
A. Fibrous shape
B. Spindle shape
C. Cylindrical shape
D. Ellipsoidal shape

Q.50 The formation has been depicted in the following diagram:



A. Maltose
B. Lactose
C. Raffinose
D. Sucrose

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ANSWER KEY

1	C	11	A	21	B	31	C	41	D
2	D	12	A	22	B	32	D	42	B
3	D	13	C	23	A	33	B	43	C
4	B	14	B	24	C	34	D	44	D
5	B	15	C	25	B	35	B	45	B
6	D	16	B	26	D	36	D	46	B
7	B	17	B	27	A	37	C	47	A
8	B	18	B	28	D	38	D	48	B
9	C	19	C	29	B	39	D	49	D
10	C	20	C	30	D	40	C	50	D

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3 UNIT BIOENERGETICS

SELF ASSESSMENT TEST

Q.1 Which of the following describes conditions in a photosynthesizing cell, exposed to high light intensity and low carbon dioxide concentration?

	Concentration of CO_2 Acceptor	Concentration of ATP	Concentration of GP (PGA)
A.	High	High	Low
B.	Low	High	High
C.	High	Low	Low
D.	Low	Low	High

Q.2 Z-scheme is another name used for:

A. Cyclic photophosphorylation
B. Calvin cycle
C. Non-cyclic photophosphorylation
D. Oxidative phosphorylation

Q.3 Which of the following is a molecule formed in a metabolic pathway by the equal splitting of a phosphorylated hexose into two halves?

A. Acetyl coenzyme A
B. Ribulose bisphosphate
C. Fructose 1, 6-bisphosphate
D. Triose phosphate

Q.4 What is the function of molecular oxygen in cellular respiration?

A. To cause the breakdown of citric acid
C. To combine with glucose to produce carbon dioxide
B. To combine with carbon from organic molecules to produce carbon dioxide
D. To combine with hydrogen from organic molecules to produce water

Q.5 The reaction which occurs in thylakoid interior space:

A. Photolysis
B. ATP synthesis
C. Transport of electrons
D. Dark reaction

Q.6 The wavelengths of light least absorbed by carotenes are:

A. Blue to green
B. Red to orange
C. Yellow to orange
D. Yellow to red

Q.7 In which of the following steps, NADH is formed without decarboxylation?

A. Isocitrate → α-ketoglutarate
B. Pyruvate → Acetyl CoA
C. α-ketoglutarate → succinate
D. Malate → oxaloacetate

Q.8 The oxidation of which of the following will produce $FADH_2$?

A. Malate
B. Fumarate
C. FAD
D. Succinate

Q.9 Light energy is converted into chemical energy through the formation of:

A. NADH
B. ATP and $NADPH_2$
C. ADP
D. RuBP

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Q.10 **Stroma is the ground matrix of:**
A. Lysosomes
B. Ribosomes
C. Oxysomes
D. Chloroplast

Q.11 **In which wavelength of light, photosynthesis is maximum?**
A. Blue light
B. Yellow light
C. Green light
D. Ultra-violet light

Q.12 **The source of protons within the chloroplasts is:**
A. Water
B. Carbon dioxide
C. Excited chlorophyll molecules
D. RuBisCO

Q.13 **Dark reactions of carbon assimilation occur in:**
A. Cytoplasmic matrix
B. Leucoplasts
C. Mitochondria
D. Chloroplasts

Q.14 **The number of carbon atoms present in ribulose:**
A. 6
B. 4
C. 5
D. 3

Q.15 **ATP molecules required for the synthesis of a glucose molecule in the Benson-Calvin cycle are:**
A. 36
B. 12
C. 38
D. 18

Q.16 **Photophosphorylation is a synthesis of:**
A. ADP from ATP
B. ATP from ADP
C. Glucose 6-phosphate from glucose
D. $NADP^+$ from NAD^+

Q.17 **Following is/are obtained during cyclic photophosphorylation:**
A. ATP
B. $NADPH_2$
C. O_2
D. All A, B, C

Q.18 **Before entering the Krebs cycle, the pyruvate is first decarboxylated and oxidized into:**
A. Alpha ketogluteric acid
B. Glyceric acid
C. Citric acid
D. Acetic acid

Q.19 **ATP formation occurs during all of the following steps of aerobic respiration except:**
A. Glycolysis
B. Krebs cycle
C. Pyruvic acid oxidation
D. Electron transport chain

Q.20 **The action spectrum of photosynthesis was described in 1883 by:**
A. Robert Hill
B. M. Calvin
C. T.W. Engelmann
D. Hatch and Slack

Q.21 **Conversion of NAD^+ into NADH requires:**
A. 2 Electrons 1 proton
B. 2 Electrons 2 protons
C. 1 Electron 2 protons
D. 1 Electrons 1 proton

Q.22 **Which of the following molecules is reduced by accepting hydrogen in the Calvin cycle?**
A. Glyceraldehyde-3-phosphate
B. 3-Phosphoglycerate
C. Ribulose bisphosphate
D. 1,3-Bisphosphoglycerate

Q.23 **Immediate source of energy for cellular metabolism is:**
A. Lipids
B. Carbohydrates
C. ATP
D. Proteins

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Q.24 Krebs cycle in mitochondria takes place in:
A. Cytosol
B. Outer Membrane
C. Matrix
D. Inner Membrane

Q.25 Chlorophyll 'a' is present in all except:
A. Kelps
B. *Spirogyra*
C. Wheat
D. Purple sulphur bacteria

Q.26 Energy transformation in biological systems is called:
A. Metabolism
B. Photosynthesis
C. Photorespiration
D. Bioenergetics

Q.27 The difference between non-cyclic and cyclic phosphorylation:
A. Types of photosystems involved
B. Product form
C. Time duration
D. All A, B, C

Q.28 The one which is not correct about chlorophyll 'b'?
A. Used in photosynthesis
B. Soluble in organic solvents
C. Present in plants
D. Have different forms

Q.29 Ribulose bisphosphate is a:
A. Protein
B. Nucleic acid
C. Lipid
D. Carbohydrate

Q.30 Pick the option that truly represents the net gain of glycolysis:
A. $2H_2O$, 4NADH, 4ATP, 2Pyruvates
B. $2H_2O$, 1NADH, 4ATP, 2Pyruvates
C. $2H_2O$, 2NADH, 2ATP, 2Pyruvates
D. $2H_2O$, 4ATP, 2Pyruvates

Q.31 It is a five-carbon compound of the Krebs cycle:
A. Oxaloacetate
B. Succinate
C. Alpha-ketoglutarate
D. Isocitrate

Q.32 The first stable compound formed during light-independent reactions contains:
A. 6 carbon atoms
B. 3 carbon atoms
C. 5 carbon atoms
D. 4 carbon atoms

Q.33 Enzymes required for respiratory chain are present on/in:
A. Cristae
B. Mitochondrial matrix
C. Inter-membrane space
D. Cytoplasm

Q.34 Net gain of ATP molecules produced in algae after the complete breakdown of one glucose molecule during aerobic respiration:
A. 28
B. 38
C. 36
D. 40

Q.35 During the Krebs cycle, carbon number is reduced by decarboxylation. It is repeated _____ time/s during one cycle.
A. One
B. Two
C. Four
D. Three

Q.36 Calvin cycle is also named as:
A. C_3 pathway
B. Sugar synthesis phase
C. Dark reactions
D. All A, B, C

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Q37 It is the most abundant and most important photosynthetic pigment:
A. Chlorophyll 'b'
B. Chlorophyll 'c'
C. Chlorophyll 'd'
D. Chlorophyll 'a'

Q38 At which stage of aerobic respiration, 2 carbon molecules are oxidized completely to carbon dioxide?
A. Glycolysis
B. Krebs cycle
C. ETC
D. Calvin cycle

Q39 Type of respiration which involves step by step breakdown of carbon chain molecules in the cell is called:
A. External respiration
B. Pulmonary respiration
C. Cellular respiration
D. Cutaneous respiration

Q40 End products of yeast fermentation, bacterial fermentation, and anaerobic respiration are:
A. Citric acid, lactic acid, carbon dioxide, and water
B. Ethyl alcohol, citric acid, and carbon dioxide
C. Ethyl alcohol, lactic acid, carbon dioxide
D. Methanol, lactic acid, and citric acid

Q41 Oxidative phosphorylation, synthesis of ATP in the presence of oxygen occurs in:
A. All type of cells
B. All primitive cells
C. All anaerobic cells
D. All aerobic cells

Q42 Which part of the chlorophyll molecule absorbs light?
A. Phytol
B. Pyrrole
C. Porphyrin ring
D. Thylakoid membrane

Q43 Identify the correct option concerning the absorption spectrum of photosynthesis:

	Peaks	Valley
A.	Broad and deep	Narrow
B.	Narrow	Broad and deep
C.	Broad and deep	Broad and deep
D.	Narrow	Narrow

Q44 The electrons excited from photo system-II pass directly to:
A. Ferredoxin
B. Plastocyanin
C. Plastoquinone
D. Carotenoids

Q45 Formation of acetyl CoA from pyruvic acid needs:
A. A single enzyme
B. Two enzymes
C. Multi-enzyme complex
D. No enzyme

Q46 All of the following membranes are involved in chemiosmosis except:
A. Tonoplast
B. Thylakoid
C. Cristae
D. Mesosome

Q47 How many ATP molecules should be produced from the complete oxidation of a molecule of active acetate or acetyl CoA?
A. 38ATP
B. 15ATP
C. 12ATP
D. 19ATP

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Q.48 The enzyme, which forms glucose -6- phosphate, is:

A. Phosphorylase
B. Phosphatase
C. Hexokinase
D. Gluco-synthetase

Q.49 Maximum number of ATP is obtained from:

A. Glucose
B. Palmitic acid
C. Malic acid
D. β-amino acid

Q.50 Which one of the following is Complex-V of the ETS on the inner membrane of mitochondria?

A. NADH dehydrogenase
B. Cytochrome oxidase
C. Ubiquinase
D. ATP synthase

ANSWER KEY

1	A	11	A	21	A	31	C	41	D
2	C	12	A	22	D	32	B	42	C
3	D	13	D	23	C	33	A	43	B
4	D	14	C	24	C	34	C	44	C
5	A	15	D	25	D	35	B	45	C
6	A	16	B	26	D	36	D	46	A
7	D	17	A	27	D	37	D	47	C
8	D	18	D	28	D	38	B	48	C
9	B	19	C	29	D	39	C	49	B
10	D	20	C	30	C	40	C	50	D

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4 UNIT BIO-DIVERSITY (ACELLULAR LIFE/VARIETY OF LIFE) + PROKARYOTES

SELF ASSESSMENT TEST

Q.1 **In which step of the life cycle of bacteriophage, tail releases lysozyme?**
A. Attachment
B. Adsorption
C. Penetration
D. Injection

Q.2 **Bacteriophage is an example of:**
A. Obligate intracellular parasite
B. Obligate ectoparasite
C. Facultative intracellular parasite
D. Facultative endoparasite

Q.3 **It is an RNA non-enveloped virus:**
A. Poliovirus
B. Poxvirus
C. Influenza virus
D. Herpes virus

Q.4 **The unifying character of all bacteria:**
A. Peptidoglycan
B. Conjugation
C. Haploid
D. Capsule

Q.5 **When cocci form a long chain of cells then the arrangement is called:**
A. Diplococci
B. Sarcina
C. Streptococci
D. Staphylococci

Q.6 **Which of the following is commonly present in all bacteria?**
A. Nucleoid
B. Pili
C. Plasmid
D. Cell wall

Q.7 **The type of glycocalyx that is loosely attached to the bacterial cell is called:**
A. Cell wall
B. Capsule
C. Slime
D. Cell membrane

Q.8 **The particles which don't have nucleic acid as their hereditary material:**
A. Virions
B. Prions
C. Viroids
D. Non-enveloped viruses

Q.9 **Pathogenicity of bacteriophage is mainly due to its:**
A. Envelope
B. Tail
C. Nucleic acid
D. Capsid

Q.10 **Antibiotics are mostly obtained from:**
A. Bacteria
B. Angiosperms
C. Viruses
D. Fungi

Q.11 **The uniqueness of bacterial photosynthesis is because it can occur:**
A. Without CO_2
B. Without chlorophyll 'a'
C. Without pigment
D. Without light

Q.12 **Gram-positive bacteria differ from Gram-negative bacteria in the structure of their:**
A. Nucleoid
B. Cell wall
C. Cytoplasm
D. Ribosomes

Q.13 **Bacteria that need oxygen but can also live in the absence of oxygen are:**
A. Obligate aerobes
B. Obligate anaerobes
C. Microaerophilic
D. Facultative anaerobes

Q.14 **The division of bacilli takes place only in _____ plane/planes.**
A. Three
B. Two
C. One
D. Four

Q.15 **Bacterial ribosomes lie in/on:**
A. Cytoplasm
B. Nuclear membrane
C. RER
D. Cell wall

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Q.16 Mouth, lips, and skin are affected due to the infection of:
A. Pox virus
B. Herpes virus
C. Paramyxovirus
D. Adenovirus

Q.17 Virus causing AIDS is:
A. DNA enveloped
B. DNA non-enveloped
C. RNA enveloped
D. RNA non-enveloped

Q.18 Which of the following are the smallest bacteria?
A. *E. coli*
B. *Mycoplasma*
C. Spirochete
D. *Streptococci*

Q.19 Plasma membrane and everything in it is called:
A. Leucoplast
B. Phragmoplast
C. Protoplast
D. Cytoplasm

Q.20 Hepatitis 'A' and 'E' are transmitted by contact with _____ from infected individuals.
A. Serum
B. Blood
C. Faeces
D. Saliva

Q.21 Viruses can infect and parasitize _____.
A. Mammals
B. Humans
C. Bacteria
D. All of these

Q.22 Which one is not a living character of the virus?
A. Mutation
B. Genome
C. Replication
D. Crystallization

Q.23 Stanley crystallized:
A. HIV
B. TMV
C. HBV
D. T_2

Q.24 Phage attaches to bacterial cell surface by its:
A. Sheath
B. Core
C. Head
D. Tail

Q.25 Which process/es take/s place during the lytic cycle?
A. Replication
B. Transcription
C. Translation
D. All of these

Q.26 Pick the false statement about AIDS:
A. HIV infection
B. Reverse transcription in HIV particle
C. Destruction of T cells
D. Cure after proper medication

Q.27 Virus attacks and hijacks host's _____.
A. Mitochondria
B. Nucleus
C. Biosynthetic machinery
D. Endoplasmic reticulum

Q.28 It is an anti-viral protein:
A. Penicillin
B. Streptomycin
C. Tetracycline
D. Interferon

Q.29 _____ is the second major form of hepatitis:
A. Hepatitis A
B. Hepatitis B
C. Hepatitis C
D. Hepatitis D

Q.30 Bacteria and cyanobacteria very closely resemble in their:
A. Mode of nutrition
B. Mode of respiration
C. Pigment composition
D. Cell wall composition

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Q.31 **Which structure is involved in the transfer of genetic material from one bacterium to another?**
A. Flagella
B. Pilli
C. Cytoplasm
D. Mesosomes

Q.32 ***Salmonella typhi* exhibits which shape?**
A. Spherical
B. Spiral
C. Rod-shape
D. Comma-shape

Q.33 **All of the following bacteria have definite shapes except:**
A. *Clostridium tetani*
B. *Spirillum*
C. *Salmonella typhi*
D. *Mycoplasma*

Q.34 **The major cell infected by the HIV is:**
A. Leucocyte
B. Helper T-lymphocyte
C. Monocyte
D. B-lymphocyte

Q.35 **Chemically, viruses are made up of:**
A. Nucleic acid only
B. Nucleic acid and protein
C. Protein only
D. Core and coat

Q.36 **Reverse transcriptase is used to make DNA copies of:**
A. Host RNA
B. Host DNA
C. Viral RNA
D. Viral DNA

Q.37 **Which of the following contains peptidoglycan cell walls?**
A. *Penicillium*
B. *Adiantum*
C. Bacterium
D. *Polytrichum*

Q.38 **Antibiotics that kill microbes immediately are called _____.**
A. Microbistatic
B. Biostatic
C. Microbicidal
D. Chemotherapeutic

Q.39 **Mesosomes are infoldings of the cell membrane and are involved in:**
A. DNA replication
B. Protein synthesis
C. RNA synthesis
D. Metabolism

Q.40 **Which statement about bacteria is true:**
A. Gram-positive bacteria have more lipids in their cell wall
B. Gram-negative bacteria have more lipids in their cell wall
C. Lipids are absent in the cell wall of both gram-positive and negative bacteria
D. Both have an equal amount of lipids

Q.41 **RNA viruses appear to have higher rates of mutation because:**
A. RNA nucleotides are more unstable than DNA nucleotides
B. Their replication of nucleic acid does not involve proof-reading steps
C. RNA viruses replicate faster
D. RNA viruses respond more to mutagens

Q.42 **Reverse transcriptase is:**
A. RNA dependent RNA polymerase
B. DNA dependent RNA polymerase
C. DNA dependent DNA polymerase
D. RNA dependent DNA polymerase

Q.43 **A characteristic of viruses is:**
A. Without independent metabolism
B. Multiplication outside living cells
C. With independent metabolism
D. Can be cultured in cell-free medium

Q.44 **Which one of the following statements about viruses is correct?**
A. Viruses possess their own metabolic system
B. Viruses are obligate parasites
C. All viruses contain both RNA and DNA
D. Nucleic acid of viruses is known as capsid

Q.45 **Bacteria that convert nitrates into free nitrogen are:**
A. Ammonifying
B. Denitrifying
C. Nitrifying
D. Nitrogen-fixing bacteria

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Q.46 **All of the following refer to nucleoid in bacteria except:**
A. Nucleolus
B. Chromatin body
C. Nuclear region
D. Nuclear body

Q.47 **All are the characteristics of Gram-positive bacteria except:**
A. High content of peptidoglycan
B. High permeability
C. Teichoic acid is present
D. Stain pink with primary dye

Q.48 **Bacteria differ from viruses in:**
A. Pathogenic nature
B. Having well-defined cytoplasm
C. Genetic material
D. Lacking proper nucleus

Q.49 **A bacterium divides every 36 minutes. If a culture containing 10^5 cells/ml is grown for 180 minutes, what will be cell concentration after that period?**
A. 175×10^5
B. 5×10^5
C. 35×10^5
D. 32×10^5

Q.50 **Which vitamin is synthesized by bacteria in the human gut?**
A. Vitamin 'A'
B. Vitamin 'D'
C. Vitamin 'C'
D. Vitamin 'K'

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ANSWER KEY

1	C	11	B	21	D	31	B	41	B
2	A	12	B	22	D	32	C	42	D
3	A	13	D	23	B	33	D	43	A
4	C	14	C	24	D	34	B	44	B
5	C	15	A	25	D	35	B	45	B
6	A	16	B	26	D	36	C	46	A
7	C	17	C	27	C	37	C	47	D
8	B	18	B	28	D	38	C	48	B
9	C	19	C	29	B	39	A	49	D
10	A	20	C	30	D	40	B	50	D

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SELF ASSESSMENT TEST

Q.1 Direct ancestors of grade radiata are:
A. Parazoa
B. Porifera
C. Protozoa
D. Eumetazoa

Q.2 All are characteristics of molluscs except:
A. Soft-bodied
B. Triploblast
C. Bilateral symmetry
D. Pseudocoelomates

Q.3 The body cavity is truly divided in all of the following except:
A. Molluscs
B. Arthropods
C. Annelids
D. Roundworms

Q.4 Highly organized mesoderm represents:
A. Complex organ formation
B. Radial symmetry
C. Simple organ formation
D. Bilateral symmetry

Q.5 Which of the following is the outer layer of the mesoderm?
A. Parietal
B. Viseral
C. Intestinal
D. Muscular

Q.6 In animals, a reproductive system developed from:
A. Ectoderm
B. Blastoderm
C. Mesoderm
D. Endoderm

Q.7 Which one of the following is correct about parazoa?
A. Radial symmetry
B. Triploblastic organization
C. Indeterminate shape
D. Indeterminate cleavage

Q.8 During embryonic development, the mouth is formed at some distance anterior to the blastopore, and the blastopore forms the anus in:
A. Echinoderms
B. Mollusca
C. Nematoda
D. Aschelminthes

Q.9 Saclike digestive system is present in:
A. Cnidarian
B. Aschelminthes
C. Arthropoda
D. Chordates

Q.10 Which one of the following is an example of a radial organism?
A. Planaria
B. Human
C. Sea anemone
D. Insects

Q.11 Sharks and rays are included in class:
A. Cyclostomata
B. Osteichthyes
C. Chondrichthyes
D. Tetrapoda

Q.12 Which of the following does not have specialized respiratory organs?
A. *Hydra*
B. Cockroach
C. Birds
D. Both A and B

Q.13 The coelom is a cavity lined by:
A. Mesoderm
B. Epiderm
C. Endoderm
D. Ectoderm

Q.14 It is an endoparasite of humans, cattle, and pigs that completes its life cycle in two hosts:
A. Tapeworm
B. Liver fluke
C. Aurelia
D. Planaria

Q.15 Tse-Tse fly causes sleeping sickness and skin diseases by transmitting:
A. *Plasmodium*
B. *Anopheles*
C. *Trypanosoma*
D. Insects

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Q.16 Book lungs are present in arthropods for the exchange of gases in class:
A. Crustacea B. Myriapoda
C. Insecta D. Arachnida

Q.17 A parasite living inside the body of the host is called:
A. Ectoparasite B. Facultative parasite
C. Obligate parasite D. Endoparasite

Q.18 Which of the following is the exclusive character of mammals?
A. Homeothermic B. Poikilothermic
C. Hair D. Four chambered heart

Q.19 *Fasciola* is endoparasite of:
A. Colon B. Small Intestine
C. Liver D. Bile Duct

Q.20 Malaria is a human disease transmitted by parasites. Which of the following acts as the vector for the transmission of the malarial parasite?
A. *Plasmodium* B. House Fly
C. Tsetse Fly D. *Anopheles*

Q.21 During development, in an animal, the mesoderm layer gives rise to:
A. Nervous system B. Muscular and skeletal system
C. Alimentary canal lining D. Mouth

Q.22 Placental mammals belong to sub-class:
A. Prototheria B. Eutheria
C. Atheria D. Metatheria

Q.23 Polymorphism is a characteristic feature of:
A. Porifera B. Annelida
C. Cnidaria D. Nematodes

Q.24 The organ of voice in birds:
A. Syrinx B. Sphinx
C. Pharynx D. Larynx

Q.25 The cavity between the body wall and the alimentary canal is:
A. Coelom B. Endoderm
C. Mesoderm D. Mesoglea

Q.26 The excretory system in Platyhelminthes is in the form of:
A. Flame cells B. Metanephridium
C. Malpighian tubules D. Kidneys

Q.27 Amphibians evolved from:
A. Cartilaginous fishes B. Reptiles
C. Dipnoi D. Cyclostomata

Q.28 Amnion is not present around the embryo of:
A. Reptiles B. Amphibian
C. Birds D. Mammals

Q.29 In _____ both ovaries and oviducts are functional.
A. Robin B. Kestrel
C. Eagle D. Kingfisher

Q.30 *Archaeopteryx* is a connecting link between:
A. Reptiles & mammals B. Reptiles & birds
C. Birds & mammals D. amphibian and fishes

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Q.31 In some coelenterates there are special feeding zooids which are called _____ which perform only the function of nutrition for the whole colony.
A. Gonozooids B. Gastrozooids
C. Astrozoids D. Medusazoids

Q.32 *Ascaris* is the endoparasite of:
A. Small intestine B. Large intestine
C. Rectum D. Appendix

Q.33 One of the reasons for the success of phylum Arthropoda is its:
A. Large variety of organism B. Malpighian tubules
C. Chitinous exoskeleton D. Spiracles

Q.34 Pigment cells called chromatophores are present in:
A. Reptiles B. Amphibian
C. Chondrichthyes D. Mammals

Q.35 The mammal-like reptile that was found as a fossil in Texas:
A. *Archaeopteryx* B. *Duckbill platypus*
C. *Varanope* D. *Opossum*

Q.36 The most important function of suckers is:
A. Absorption of blood B. Attachment
C. Ingestion of food D. Excretion of waste

Q.37 The animals of the phylum _____ are known as schizocoelous.
A. Arthropoda B. Echinodermata
C. Porifera D. Chordata

Q.38 All of the following have no swim bladder except:
A. Cyclostomes B. Chondrichthyes
C. Osteichthyes D. Amphibians

Q.39 _____ is a common feature of all mammals.
A. Viviparous B. Have placenta
C. Right aortic arch D. Mammary glands

Q.40 Which phylum does not show tissue level of organization?
A. Nematoda B. Coelenterata
C. Porifera D. Echinodermata

Q.41 What is false about the closed circulatory system?
A. Blood pressure is high and regular
B. Amount of blood is limited
C. Blood circulates through arteries, veins, and capillaries
D. Blood pressure is low and irregular

Q.42 Water vascular system is found in:
A. Mollusca B. Annelida
C. Arthropoda D. Echinodermata

Q.43 1. Fertilization _____.
2. Digestive system _____.
3. Excretion by _____.



Fill in the blanks for the organism given in the above figure.
A. Internal, blind end, rennet cells B. External, tube-like, nephridia
C. Internal, saclike, flame cells D. External, saclike, protonephridia

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Q.44 **Match the following:**

Column I		Column II
A. *Ascaris*	-	1. Intestinal round worm
B. Octopus	-	2. Mollusca
C. *Ancylostoma*	-	3. Hook worm
D. *Pheretima*	-	4. Earth worm

A. A-2, B-4, C-3, D-1
B. A-4, B-3, C-1, D-2
C. A-1, B-2, C-3, D-4
D. A-2, B-1, C-4, D-3

Q.45 **From the following list, identify the total number of organisms that belongs to the phylum Arthropoda.**
Locust, Butterfly, Scorpion, Prawn, Crab, Lobster, Mosquitoes, Leech, Earthworm, Land snail, Wasp:
A. 3
B. 8
C. 5
D. 11

Q.46 **Which of the following characters do not belong to birds?**
A. Presence of feathers
B. Presence of gills
C. Beak
D. Sternum

Q.47 **Four chambered heart is present in:**
A. Frog
B. Crocodiles
C. Snake
D. Turtle

Q.48 **Saliva in leech contains as anti-coagulant called:**
A. Hirudin
B. Antihistamine
C. Heparin
D. Ptyalin

Q.49 **Kangaroo is a:**
A. Eutherian
B. Bird
C. Prototherian
D. Metatherian

Q.50 **Frogs differ from humans in possessing:**
A. Paired cerebral Hemispheres
B. Nucleated red blood cells
C. Hepatic portal system
D. Presence of endocrine tissues

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ANSWER KEY

1	D	11	C	21	B	31	B	41	D
2	D	12	A	22	B	32	A	42	D
3	D	13	A	23	C	33	C	43	C
4	A	14	A	24	A	34	B	44	C
5	A	15	C	25	A	35	C	45	B
6	C	16	D	26	A	36	B	46	B
7	C	17	D	27	C	37	A	47	B
8	A	18	C	28	B	38	A	48	A
9	A	19	D	29	C	39	D	49	D
10	C	20	D	30	B	40	C	50	B

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SELF ASSESSMENT TEST

Q.1 All insectivorous plants are:
A. Heterotrophs
B. Parasitic
C. Detritivores
D. Autotrophs

Q.2 Carnivorous plants use insects and other small organisms as their food for:
A. Nitrogen
B. Lipids
C. Carbohydrates
D. Zinc

Q.3 When an insect touches small sensitive hairs on the surface of the leaf of _____ plant, the lobes quickly come together with their bristles interlocked.
A. *Sarracenia pupurea*
B. *Drosera intermedia*
C. *Brassica campestris*
D. *Dionaea muscipula*

Q.4 Which of the following is not a part of the digestive system of humans?
A. Liver
B. Salivary glands
C. Spleen
D. Colon

Q.5 Cardiac sphincter prevents the transfer of food from:
A. Pharynx to trachea
B. Esophagus to stomach
C. Stomach to esophagus
D. Duodenum to stomach

Q.6 Stimulation of the parasympathetic nervous system increases:
A. Peristalsis
B. Rate of blood flow
C. Heart rate
D. Breathing rate

Q.7 In which part of alimentary canal, protein digestion is completed?
A. Stomach
B. Rectum
C. Ileum
D. Duodenum

Q.8 Defecation reflex can be consciously inhibited by:
A. Outer anal sphincter
B. Both outer and inner anal sphincters
C. Inner anal sphincter
D. Cannot be inhibited

Q.9 Digestion can be defined as the conversion of:
A. Soluble food into protoplasm
B. Non-diffusible food into diffusible particles
C. Starch into maltose
D. Small food particles into large particles

Q.10 It is common for the digestive system and respiratory system:
A. Nostrils
B. Pharynx
C. Nasal cavities
D. Buccal cavity

Q.11 The total number of salivary glands present in the oral cavity which secrete/s only mucus is/are:
A. 1
B. 2
C. 4
D. 6

Q.12 Type of digestion that is not helpful in direct absorption of food:
A. Mechanical
B. Biochemical
C. Chemical
D. Enzymatic

Q.13 Pyrosis or heart burning is due to the inefficiency of:
A. Cardiac sphincter
B. Pyloric sphincter
C. Esophageal sphincter
D. Colic sphincter

Q.14 In normal conditions, mastication and peristalsis are under_____ respectively.
A. Voluntary control
B. Voluntary and involuntary control
C. Involuntary control
D. Involuntary and voluntary control

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Q.15 The liver performs the function of:
A. Conversion of glucose into glycogen
B. Deamination
C. Conversion of glycogen into glucose
D. All A, B, C

Q.16 The main function of intestinal villi is to:
A. Stimulate peristalsis
B. Provide a large surface area for absorption
C. Prevent antiperistalsis
D. Distribute digestive enzymes uniformly

Q.17 Saliva helps to convert:
A. Proteins into amino acids
B. Starch into maltose
C. Glycogen into glucose
D. Fats into vitamins

Q.18 The lacteals are central lymph vessels that are found in:
A. Liver
B. Villi
C. Pancreas
D. Spleen

Q.19 Bile aids in the digestion and absorption of fats because it contains:
A. Lipase
B. Bile pigments
C. Salts D. Necessary enzymes

Q.20 An enzyme of the intestinal lining that converts polypeptides into dipeptides:
A. Trypsin
B. Maltase
C. Lipase
D. Amino peptidase

Q.21 The innermost layer of the stomach is also named as:
A. Mucosa
B. Muscularis
C. Serosa
D. Adventitia

Q.22 The tongue is made up of:
A. Cartilage and muscles
B. Skeletal muscles
C. Muscles and bones
D. Smooth muscles

Q.23 Which of the following is not a function of the large intestine?
A. Absorption of food
B. Feces formation
C. Storage
D. Water absorption

Q.24 In terrestrial mammals, the movements for ventilation are governed by:
A. Abdominal muscles
B. Diaphragm
C. Skeletal muscles
D. Diaphragm and intercostal muscles

Q.25 In human beings, CO_2 concentration in the inspired and expired air is respectively:
A. 0.01% and 5.3%
B. 0.04% and 4.0%
C. 0.4% and 5.0%
D. 0.04% and 5.0%

Q.26 Vocal cords are _____ bands stretched across the mucous membrane in the glottis.
A. Two thick edge cartilaginous
B. Two thin edge fibrous
C. Two thin edge muscular
D. Two pairs of thick edge fibrous

Q.27 Air is warmed as it passes through:
A. Nasal cavities
B. Bronchi
C. Trachea
D. Alveoli

Q.28 Which of the following diverts food mass away from the opening of the larynx?
A. Esophageal sphincter
B. Epiglottis
C. Respiratory Valve
D. Soft palate

Q.29 Surfactant is present in:
A. Alveoli
B. Bronchioles
C. Bronchi
D. Trachea

Q.30 The decrease in pH of blood has _____ effect on the oxygen-carrying capacity of hemoglobin.
A. Positive
B. No effect
C. Negative
D. First negative then positive

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Q.31 **Structure/s that does/do not contain cartilage:**
A. Alveolar duct
B. Alveolar sacs
C. Alveoli
D. All A, B, C

Q.32 **Smooth muscles are present in all except:**
A. Trachea
B. Bronchi
C. Bronchioles
D. Alveoli

Q.33 **The nasal cavity is lined with:**
A. Columnar epithelium
B. Squamous epithelium
C. Ciliated epithelium
D. Cuboidal epithelium

Q.34 **The pigment present in muscles has all characteristics except:**
A. Can bind with four O_2 molecules
B. Single Haem group
C. Composed of one polypeptide chain
D. Iron is present

Q.35 **Pleura is a thin membranous sac that covers the lungs with:**
A. Single layer
B. Triple layer
C. Double layer
D. Pair of double layers

Q.36 **Which of the following is not carried by hemoglobin?**
A. Oxygen
B. Bicarbonate
C. Carbon dioxide
D. Carbon monoxide

Q.37 **Percentage of O_2 transported through blood plasma:**
A. 3%
B. 97%
C. 70%
D. 30%

Q.38 **The process of bringing oxygenated air into contact with a gas exchange surface is:**
A. Ventilation
B. Gas transport
C. Photorespiration
D. Cellular respiration

Q.39 **The mode of respiration in a mammal is:**
A. Mucosal
B. Cutaneous
C. Tracheal
D. Pulmonary

Q.40 **Which is the correct sequence of the air passageway in a man?**
A. Nasal cavity → Pharynx → Trachea → Larynx → Bronchi → Bronchioles → Alveoli
B. Nasal Cavity → Pharynx → Larynx → Trachea → Bronchi → Bronchioles → Alveoli
C. Nasal cavity → Larynx → Pharynx → Trachea → Bronchi → Bronchioles → Alveoli
D. Nasal cavity → Larynx → Bronchi → Pharynx → Trachea → Bronchioles → Alveoli

Q.41 **Which of the following statement is correct?**
A. Inspiration is an active process
B. Expiration is an active process
C. Inspiration is a passive process
D. Both expiration and inspiration are passive processes

Q.42 **The maximum amount of air that our lung can normally hold is:**
A. Vital capacity
B. Total lung capacity
C. Tidal capacity
D. Pulmonary capacity

Q.43 **An adult human has 32 permanent teeth, which are of four different types and are called:**
A. Thecodont
B. Diphyodont
C. Heterodont
D. Lophodont

Q.44 **The dental formula of a human being is:**
A. I_2, C_2, P_1, M_3
B. I_3, C_1, P_2, M_2
C. I_2, C_1, P_2, M_3
D. I_2, C_2, P_3, M_1

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Q.45 The bile duct and pancreatic duct open together into the duodenum as a hepato-pancreatic duct which is guarded by a sphincter called:
A. Sphincter of Boyden
B. Sphincter of Oddi
C. Hepato pancreatic ampulla
D. Cardiac sphincter

Q.46 Select from the following the total number of enzymes secreted by the pancreas: *Trypsinogen, Amylase, Lipase, Pepsinogen, Prorennin, Maltase, Sucrase, Chymotrypsinogen, Procarboxypeptidase, Nucleases*
A .4
B. 6
C. 5
D. 7

Q.47 Swelling of the gut is the most common ailment due to:
A. Bacterial infections
B. Viral infections
C. Infection of intestinal parasites
D. All A, B, C

Q.48 What is the length of the windpipe?
A. 12cm
B. 20cm
C. 25cm
D. 30cm

Q.49 The inflammation of bronchi or bronchioles is known as:
A. Emphysema
B. Pneumonia
C. Asthma
D. Bronchitis

Q.50 In Asthma, _____ compound is released by blood cells.
A. Histamine
B. Heparin
C. Epinephrine
D. Antibodies

ANSWER KEY

1	D	11	B	21	A	31	D	41	A
2	A	12	A	22	B	32	D	42	B
3	D	13	A	23	A	33	C	43	C
4	C	14	B	24	D	34	A	44	C
5	C	15	D	25	B	35	C	45	B
6	A	16	B	26	B	36	B	46	B
7	C	17	B	27	A	37	A	47	D
8	A	18	B	28	B	38	D	48	A
9	B	19	C	29	A	39	D	49	D
10	B	20	D	30	C	40	B	50	A

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UNIT 7 LIFE PROCESSES (TRANSPORT + Immunity)

SELF ASSESSMENT TEST

Q.1 **Root hairs are the extensions of:**
A. Pericycle
B. Epidermis
C. Pith
D. Parenchyma

Q.2 **It separates extracellular space in root into two compartments:**
A. Cortex
B. Plasmodesmata
C. Pericycle
D. Casparian strips

Q.3 **During the rainy season, wooden doors are difficult to open and close due to:**
A. Transpiration
B. Imbibition
C. Guttation
D. Diffusion

Q.4 **Plasmolysis occurs due to:**
A. Absorption
B. Endosmosis
C. Exosmosis
D. Osmosis

Q.5 **The cytoplasmic strands that extend through pores in adjacent cell walls are particularly called:**
A. Porins
B. Transporter
C. Channels
D. Plasmodesmata

Q.6 **According to the mass flow hypothesis, the mass flow of solutes from source to sink is due to:**
A. Concentration gradient
B. Turgor pressure gradient
C. Osmosis and diffusion
D. Osmosis

Q.7 **The rupture and fractionation do not usually occur in the water column in vessel/tracheids during the ascent of sap because of:**
A. Cohesion and adhesion
B. Transpiration pull
C. Lignified thick wall
D. Weak gravitational pull

Q.8 **The amount of blood pumped by the heart into the body per minute is called:**
A. Atrial output
B. Cardiac output
C. Ventricular output
D. Stroke volume

Q.9 **At the time of diastole, the heart is filled with:**
A. Mixed blood
B. Oxygenated blood
C. Venous blood
D. Deoxygenated blood

Q.10 **Blood passes from the right ventricle to the lungs. It is called:**
A. Systemic circulation
B. Coronary circulation
C. Pulmonary circulation
D. Atrio-venous circulation

Q.11 **How many valves are present in the human heart?**
A. 4
B. 3
C. 2
D. 6

Q.12 **ECG is a diagnostic test for abnormality in:**
A. Rhythmicity
B. Pressure
C. Valves
D. Mixing

Q.13 **Which of the following is correctly matched?**

	Arteries	Veins	Capillaries
A.	Blood pressure	Intermediate	Low
B.	Blood flow	Intermediate	Slow
C.	Endothelial cells	No	Yes
D.	Elasticity	Less elastic	No

Q.14 **Carotid artery carries:**
A. Deoxygenated blood to brain
B. Oxygenated blood to the heart
C. Oxygenated blood to brain
D. Deoxygenated blood to the heart

Q.15 **The tricuspid valve is found in between:**
A. Sinus venous and right atrium
B. Left ventricle and left atrium
C. Right atrium and right ventricle
D. Right ventricle and aorta

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Q.16 Contraction of right ventricle pumps blood into:
A. Aorta
B. Pulmonary vein
C. Pulmonary trunk
D. Coronary artery

Q.17 Cardiac muscles differ from skeletal muscles in their:
A. Control
B. Function
C. Structure
D. All A, B, C

Q.18 A blood vessel that has maximum surface area is:
A. Arteries
B. Vena cava
C. Veins
D. Capillaries

Q.19 The first pair of arteries arise from _____ of heart.
A. Ascending aorta
B. Descending aorta
C. Abdominal aorta
D. Base of the aorta

Q.20 During each cardiac cycle "Lubb" sound is produced when:
A. AV valves open
B. AV valves close
C. SL valves close
D. Both AV & SL valves close

Q.21 Which of the following is not a common component of interstitial fluid?
A. WBCs
B. Water
C. Dissolved gases
D. Platelets

Q.22 Blood flow through capillaries is less than:
A. 400-450 mm/s
B. 1 m/s
C. 1 mm/s
D. 2 mm/s

Q.23 The least blood pressure can be observed in:
A. Arteries
B. Capillaries
C. Veins
D. Vena cava

Q.24 The diameter of a blood capillary can be altered by:
A. Materials passing through it
B. Greater pressure generating by ventricular systole
C. Direct nervous stimulation or by endogenous chemicals
D. Contraction of muscles

Q.25 The right atrium of the heart usually receives the:
A. Deoxygenated Blood
B. Filtered Blood
C. Oxygenated Blood
D. Non-Filtered Blood

Q.26 Baroreceptors are located in/at:
A. Wall of aorta
B. Endothelium of capillary
C. Wall of each artery
D. At the base of pulmonary vein

Q.27 S.A node is located at:
A. Upper end of right atrium
B. Inter-ventricle septum
C. Inter-atrial septum
D. Atrio-ventricle septum

Q.28 Lymph is a fluid in transient between:
A. Lungs and blood
B. Blood and blood
C. Interstitial fluid and blood
D. Blood cell and interstitial fluid

Q.29 All of the followings are components of the lymphatic system except:
A. Liver
B. Spleen
C. Adenoid
D. Tonsils

Q.30 A first artery that arises from the base of the aorta:
A. Pulmonary artery
B. Renal artery
C. Coronary artery
D. Iliac artery

Q.31 The ultimate destination of lymph is:
A. Lymph node
B. Lymphoid organs
C. Lymph capillaries
D. Sub-clavian vein

Q.32 The flow of lymph in lymphatic vessels is maintained by:
A. Heart, the activity of smooth muscles and valves
B. Activity of skeletal muscles, heart, and breathing movements
C. Breathing movements, the activity of skeletal muscles and valves
D. Exercise, breathing movements, and heart

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Q.33 **The thymus gland is involved in the maturation of:**
A. Platelets
B. Eosinophils
C. B-lymphocytes
D. T-lymphocytes

Q.34 **In passive immunity, which of the following components are injected into blood?**
A. Antigens
B. Serum
C. Immunogens
D. Immunoglobulins

Q.35 **The antigen is a foreign protein or any other molecule which stimulates the formation of:**
A. MC complex
B. Mucus
C. Immunogen
D. Antibodies

Q.36 **Skin and mucous membranes are part of the body defense system and they form the:**
A. Physical barriers
B. Chemical barriers
C. Mechanical barriers
D. Biological barriers

Q.37 **Which part of the antibody recognizes the antigen during the immune response?**
A. Heavy part
B. Light part
C. Variable part
D. Consonant part

Q.38 **The study of mechanisms of body defense is called:**
A. Immunology
B. Teratology
C. Serology
D. Microbiology

Q.39 **The immune system is an example of:**
A. 1st line of defense
B. 3rd line of defense
C. 2nd line of defense
D. 4th line of defense

Q.40 **The color of plasma is:**
A. Straw color
B. Colorless
C. Red color
D. Blue color

Q.41 **Which of the following is associated with allergic reactions?**
A. Neutrophils
B. Eosinophils
C. Monocytes
D. Lymphocyte

Q.42 **Which of the following statements is not true?**
A. Heart is ectodermal in origin
B. The heart is situated in the thoracic cavity
C. Human heart has the size of a clenched fist
D. Heart is protected by the pericardium

Q.43 **Which of the following artery supplies blood to myocardial muscles?**
A. Coronary
B. Renal
C. Iliac
D. Gastric

Q.44 **During the cardiac cycle, each ventricle pumps out about 70 ml of blood which is called:**
A. Stroke volume
B. Heart Rate
C. Cardiac output
D. Residual volume

Q.45 **Which of the following correctly explains a phase/event in the cardiac cycle in a standard electrocardiogram?**
A. The QRS complex indicates atrial contraction
B. The QRS complex indicates ventricles contraction
C. The time between S and T represents atrial systole
D. The P-wave indicates the beginning of ventricular contraction

Q.46 **Phloem sap is mainly composed of:**
A. Water + Glucose
B. Water + Cellulose
C. Water + Fructose
D. Water + Sucrose

Q.47 **An antiserum against snake toxin can be obtained by injecting the toxin into a horse. The antiserum is made from plasma taken from the horse a few weeks later. The antiserum is used to treat a person who has been bitten by the same species of snake. What does the person's treatment bring about?**
A. Artificial active immunity
B. Natural active immunity
C. Artificial passive immunity
D. Natural passive immunity

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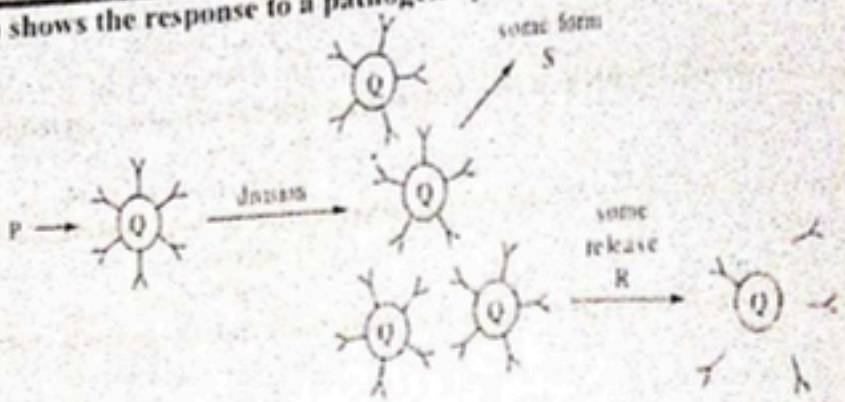
Q.48 The diagram shows the response to a pathogen by the immune system.



Which row correctly identifies P, Q, R, and S?

	P	Q	R	S
A.	Antibody	T-lymphocyte	Antigen	Plasma Cell
B.	Antigen	B-lymphocyte	Antibody	Memory Cell
C.	Antigen	T-lymphocyte	Antitoxin	B-lymphocyte
D.	Bacteria	B-lymphocyte	Antibody	T-lymphocyte

Q.49 Which of these is a lymphoid organ that is active in young children, but decreases in size and is important in adulthood?

A. Adenoids
B. Spleen
C. Thymus
D. Tonsils

Q.50 Which enzyme causes the conversion of prothrombin into thrombin?

A. Carbonic anhydrase
B. Thrombokinase
C. Cytochrome oxidase
D. Rennin

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ANSWER KEY

1	B	11	A	21	D	31	D	41	B
2	D	12	A	22	C	32	C	42	A
3	B	13	D	23	D	33	D	43	A
4	C	14	C	24	C	34	D	44	A
5	D	15	C	25	A	35	D	45	B
6	B	16	C	26	A	36	A	46	D
7	A	17	D	27	A	37	C	47	C
8	B	18	D	28	C	38	A	48	B
9	C	19	D	29	A	39	B	49	C
10	C	20	B	30	C	40	A	50	B

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Q.1 **Dwarfism is a hormonal disorder due to:**
A. Deficiency of thyroxin
B. Deficiency of STH
C. Excess of thyroxin
D. Deficiency of insulin

Q.2 **The function of ACTH is to:**
A. Stimulate pituitary gland
B. Stimulate adrenal medulla
C. Stimulate adrenal cortex
D. Stimulate thyroid gland

Q.3 **Corpus luteum produces:**
A. Progesterone
B. Estrogen
C. Cortisol
D. Testosterone

Q.4 **Hormones can regulate other hormones through:**
A. Competition
B. Feedback mechanism
C. Inhibition
D. Antagonizing

Q.5 **A patient who excretes a large quantity of sodium in urine has:**
A. Diseased adrenal medulla
B. Diseased pancreas
C. Diseased adrenal cortex
D. Diseased thymus

Q.6 **A chorionic gonadotropic hormone is secreted by:**
A. Ovary
B. Uterus
C. Pituitary
D. Placenta

Q.7 **Besides testes, androgens are also produced by:**
A. Thyroid
B. Adrenal medulla
C. Thymus
D. Adrenal cortex

Q.8 **Which is not a ductless gland?**
A. Testis
B. Sub-maxillary
C. Ovary
D. Parathyroid

Q.9 **Secretion of estrogen is under the control of:**
A. FSH
B. LH
C. Progesterone
D. STH

Q.10 **It is secreted as a result of distension of the cervix:**
A. ADH
B. Oxytocin
C. Thyroxin
D. MSH

Q.11 **Diabetes insipidus is due to less secretion of:**
A. Vasopressin
B. Thyroxine
C. Insulin
D. Progesterone

Q.12 **The chemical nature of LH and ICSH is:**
A. Steroids
B. Tyrosine derivatives
C. Polypeptides
D. Amino acids

Q.13 **Addison's disease can be due to all reasons except:**
A. Hypothalamus
B. Pituitary gland
C. Adrenal cortex
D. Adrenal medulla

Q.14 **Which one causes the release of pancreatic exocrine secretion?**
A. Glucose
B. Secretin
C. Gastrin
D. Bile

Q.15 **Vasodilation in skeletal muscles is caused by the action of:**
A. Norepinephrine
B. Cortisol
C. Epinephrine
D. Glucagon

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Q.16 **Which part of a neuron may act as a receptor as well?**
A. Dendrite
B. Myelin sheath
C. Axon
D. Ganglion

Q.17 **It acts as a relay neuron:**
A. Sensory neuron
B. Associative neuron
C. Motor neuron
D. Efferent neuron

Q.18 **White matter in the central nervous system is composed of:**
A. Nerve cells
B. Non-myelinated nerve fibers
C. Myelinated nerve fibers
D. Connective

Q.19 **The chemical nature of myelin sheath is:**
A. Proteins
B. Lipids
C. N_2-containing polysaccharides
D. Vitamin derivatives

Q.20 **Thermoregulatory center in the body is found in:**
A. Skin
B. Hypothalamus
C. Adrenal gland
D. Pituitary

Q.21 **Motor neurons carry messages from associative neurons to:**
A. Skeletal muscles
B. Cardiac muscles
C. Smooth muscles
D. All A, B, C

Q.22 **The type of receptors present in the hypothalamus are:**
A. Mechanoreceptors
B. Chemoreceptors
C. Photoreceptors
D. Pressure receptors

Q.23 **The groups of ribosomes associated with RER in a neuron:**
A. Meissner's corpuscles
B. Nissl's granules
C. Pacinian corpuscles
D. Dorsal root ganglion

Q.24 **Part of motor neuron which makes a synapse with sarcolemma is:**
A. Motor unit
B. Axon
C. Dendron
D. Dendron and axon

Q.25 **How many sensations are detected by the skin?**
A. 5
B. 4
C. 3
D. 2

Q.26 **Which of the following membrane potential depicts hyperpolarization?**
A. -50mV
B. -90mV
C. +50mV
D. -70mV

Q.27 **The spiny look of neurons is due to their:**
A. Myelin sheath
B. Axon
C. Dendron
D. Dendrites

Q.28 **These are the structures that respond when they are stimulated by an impulse coming through motor neuron:**
A. Glands
B. Thermo-receptors
C. Sensory neurons
D. Pacinian corpuscles

Q.29 **The detection of vibrations of the ground by terrestrial vertebrates is achieved by:**
A. Receptors in skin
B. Receptors in joints
C. Receptors in fingers
D. Receptors in ears

Q.30 **Which of the following is not the part of the forebrain?**
A. Reticular formation
B. Amygdala
C. Hippocampus
D. Thalamus

Q.31 **Our most unconscious behaviors are controlled by:**
A. Thalamus
B. Limbic system
C. Cranial nerves
D. Cerebral cortex

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Q.32 **One that connects both cerebral hemispheres is called:**
A. Corpus luteum
B. Corpus striatum
C. Corpus callosum
D. Tracts

Q.33 **Stimulation of the vagus nerve will cause:**
A. Increase blood pressure
B. Decreased heart rate
C. Increased blood flow to limbs
D. Dilation of the pupil of the eye

Q.34 **During Addison's disease:**
A. MSH and cortical hormones increases
B. MSH increases, cortical hormones decreases
C. MSH and cortical hormones decreases
D. MSH decreases. cortical hormones increases

Q.35 **The pineal gland is located in/at:**
A. Spinal canal
B. Brain
C. Neck
D. Stomach mucosa

Q.36 **An effect of progesterone on the ovary is to:**
A. Thicken and vascularize it
B. Prevent ripening of follicles
C. Ovulation
D. Placenta formation

Q.37 **A male body tends more towards the form of immature female after:**
A. Spermiogenesis
B. Castration
C. Deficiency of dopamine
D. Hypergonadism

Q.38 **Rickets will be caused due to which hormonal abnormality:**
A. No exposure to sunlight
B. PTH excess
C. Vitamin D excess
D. LTH absence

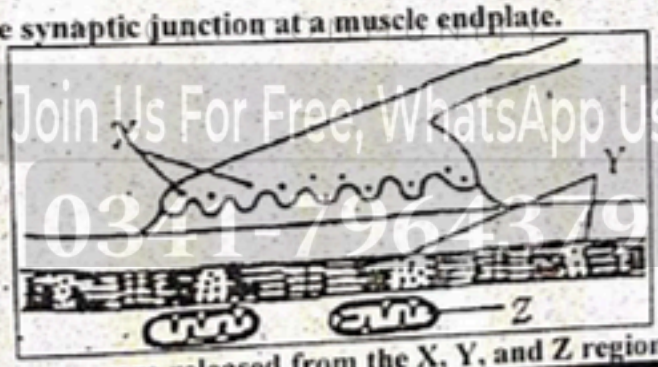
Q.39 **All are amino acid derivatives except:**
A. Thyroxin
B. Aldosterone
C. Epinephrine
D. Nor-adrenalin

Q.40 **These contain cell bodies of neurons:**
A. Gray and white matter
B. Ganglia and gray matter
C. Nerve and ganglia
D. Nerve and white matter

Q.41 **The outermost of the three cranial meninges is:**
A. Arachnoid mater
B. Pia mater
C. Dura mater
D. Sclera

Q.42 **The dorsal nerve root ganglion is:**
A. Bipolar
B. Pseudounipolar
C. Unipolar
D. Multipolar

Q.43 **The diagram shows the synaptic junction at a muscle endplate.**



Which chemical substances were released from the X, Y, and Z regions?

	X	Y	Z
A.	Acetylcholine	Calcium ions	ATP
B.	Acetylcholine	Sodium ions	Pyruvate
C.	Adrenaline	Potassium ions	Pyruvate
D.	Calcium ions	Sodium ions	Pyruvate

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Q.44 **Hypothalamus does not control:**
A. Hunger and satiety
B. Osmo-regulation
C. Thermoregulation
D. Creative thinking and consciousness

Q.45 **Hypothalamus contains several groups of neurosecretory cells called _____ which produce hormones.**
A. Ganglion
B. Nuclei
C. Plexus
D. Astrocytes

Q.46 **Diuresis is reduced by:**
A. Oxytocin
B. Luteinizing hormone
C. Prolactin
D. Vasopressin

Q.47 **Aldosterone helps in the maintenance of all except:**
A. Electrolyte and body fluid volume
B. Blood pressure
C. Osmotic pressure
D. Smooth muscles contraction

Q.48 **Diabetes mellitus is characterized by all except:**
A. Ketonuria
B. Prolonged hyperglycemia
C. Glycosuria
D. No effect on vision

Q.49 **Insufficient thyroxine in adults leads to:**
A. Dwarfism
B. Myxedema
C. Cretinism
D. Grave's disease

Q.50 **The diurnal rhythm of our body such as the sleep-wake cycle is regulated by the hormone:**
A. Calcitonin
B. Adrenaline
C. Prolactin
D. Melatonin

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ANSWER KEY

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8	B	18	C	28	A	38	B	48	D
9	A	19	B	29	B	39	B	49	B
10	B	20	B	30	A	40	B	50	D

SELF ASSESSMENT TEST

Q.1 Each myosin molecule has one tail and:
A. 3 globular heads
B. 2 globular heads
C. 1 globular head
D. No globular head

Q.2 The protein filament which binds to the calcium:
A. Actin
B. Myosin
C. Troponin
D. Tropomyosin

Q.3 The majority of muscles of our body are:
A. Smooth
B. Cardiac
C. Skeletal
D. None of these

Q.4 Each muscle fiber is surrounded by a membrane which is called:
A. Sarcomere
B. Twitch fiber
C. Sarcolemma
D. Capsule

Q.5 During muscle contraction:
A. I-band shortens
B. Actin filaments shorten
C. Myosin filaments shorten
D. Z-line disappears

Q.6 The sliding protein of muscle is:
A. Tubulin
B. Myoglobin
C. Myosin
D. Actin

Q.7 The pigment which stores oxygen in muscles is:
A. Hemoglobin
B. Myosin
C. Myoglobin
D. Actinomyosin

Q.8 The length of myofibril from one Z-band to the next Z-band is known as:
A. Sarcomere
B. Sarcoplasm
C. Sarcolemma
D. Muscle Fiber

Q.9 Calcium ions released during a muscle fiber contraction attach with:
A. Myosin
B. Tropomyosin
C. Actin
D. Troponin

Q.10 Regarding skeletal muscle structure, the area which contains only thick filaments:
A. A-band
B. I-band
C. H-zone
D. Z-line

Q.11 For muscle contraction, calcium ions in sarcoplasm are released from:
A. T-tubule
B. Mitochondria
C. Sarcoplasmic reticulum
D. Myosin filament

Q.12 Which of the following is a structural unit of skeletal muscles?
A. Myofilament
B. Muscle fiber
C. Myofibril
D. Sarcomere

Q.13 The calcium source in smooth muscles is:
A. Intracellular
B. Extracellular
C. Stored in SR
D. Stored in ER

Q.14 The smallest contractile part of a skeletal muscle is:
A. Myofilament
B. Myofibre
C. Microfilament
D. Sarcomere

Q.15 Which band does not change its length during muscle contraction?
A. I-band
B. Two Z-lines
C. A-band
D. A and I-bands

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Q.16 T-tubules in skeletal muscles are formed by:
A. SER
B. Sarcolemma
C. RER and SER
D. Cytoplasm

Q.17 Bones protect critical internal organs like:
A. Brain, spinal cord, heart
B. Brain, all nerves, spinal cord
C. Heart, stomach, eyes
D. Spinal cord, pinna of ears, lungs

Q.18 A statement not true about bones and cartilages:
A. Both contain living cells
B. Both contain the same type of living cells
C. Both have a ground matrix of collagen
D. Both are part of the endoskeleton

Q.19 The total number of "Free Ribs" in the human body is:
A. 1
B. 4
C. 2
D. 8

Q.20 Knee and elbow joints are examples of:
A. Ball and socket joint
B. Cartilagiinous joints
C. Hinge joint
D. Fibrous joint

Q.21 All of the followings are characteristics of Visceral muscles except:
A. Contain muscle proteins
B. Have multiple nuclei
C. Have no striations
D. Help in peristalsis

Q.22 Sertoli cells are under the control of:
A. LH
B. FSH
C. ICSH
D. Testosterone

Q.23 It is the correct passage of sperms from testes to outside:
A. Seminiferous tubules → Sperm duct → Epididymis → Urethra
B. Sperm duct → Seminiferous tubule → Epididymis → Urethra
C. Epididymis → Seminiferous tubule → Sperm duct → Urethra
D. Seminiferous tubules → Epididymis → Sperm duct → Urethra

Q.24 Glands of the male reproductive system are:
A. Prostate and seminal vesicle
B. Seminal vesicles and Corpus luteum
C. Prostate and Corpus luteum
D. Prostate and Placenta

Q.25 The highly convoluted duct is:
A. Vas deference
B. Sperm duct
C. Epididymis
D. Urinogenital duct

Q.26 Newborn does not acquire eye infection in:
A. Syphilis
B. Genital herpes
C. AIDS
D. Gonorrhea

Q.27 The bacteria that infect the mucous membranes of the urinogenital tract is:
A. *Clostridium tetani*
B. *Treponema pallidum*
C. *Neisseria gonorrhea*
D. *Staphylococcus aureus*

Q.28 Ulcers in reproductive tracts are formed in:
A. Gonorrhea
B. Syphilis
C. AIDS
D. Genital herpes

Q.29 In a menstrual cycle of 24 days, which of the following will be the day of ovulation?
A. 14th day
B. 7th day
C. 10th day
D. 6th day

Q.30 The end or complete stop of the menstrual cycle is called:
A. Andropause
B. Menopause
C. Menstruation
D. Menarche

Q.31 Follicular atresia is the degeneration of:
A. Primary oocyte
B. 1st polar body
C. Primary follicles
D. 2nd polar body

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Q.32 FSH in males acts on:
A. Germinal epithelium
B. Simple epithelium
C. Interstitial cells
D. Germinal endothelium

Q.33 Progesterone level is increased in all conditions except:
A. Gestation
B. Luteal phase
C. Pregnancy
D. Menstruation

Q.34 The structure that is formed at the site of ovulation:
A. Placenta
B. Graffian follicle
C. Corpus luteum
D. Primary Oocyte

Q.35 The oocyte released during ovulation is in:
A. Anaphase I
B. Metaphase I
C. Prophase I
D. Metaphase II

Q.36 Fertilization in humans occurs in:
A. Uterus
B. Fallopian tube
C. Vagina
D. Urethra

Q.37 A primary oocyte is:
A. Diploid
B. Polyploid
C. Haploid
D. Monoploid

Q.38 Implantation of zygote occurs at:
A. Oviduct
B. Uterine tube
C. Uterus
D. Cervix

Q.39 Oogenesis in human females starts:
A. At puberty
B. Before birth
C. Before puberty
D. After puberty

Q.40 Pre-fertilization events among the following are:
A. Syngamy
B. Formation of zygote
C. Gametogenesis and gamete transfer
D. Embryogenesis

Q.41 The scrotum is responsible for which of the following in the male reproductive system?
A. Formation of sperm
B. Lubrication
C. Nourishment of sperm
D. Temperature regulation

Q.42 Once a sperm fuses with an ovum, the remaining sperm cannot fertilize the ovum. What changes are responsible for such a phenomenon?
A. Selective permeation through ovum
B. Specific spatial arrangement of corona radiata cells
C. Change in the membrane zona pellucida
D. Ovum releases toxic substances thereby killing other sperms

Q.43 Muscle is derived from:
A. Mesoderm
B. Endoderm
C. Ectoderm
D. All of these

Q.44 The dark bands or A-bands of a skeletal muscle are known as:
A. Isotropic bands
B. Intercalated disc
C. Anisotropic bands
D. Cross bridges

Q.45 The motor unit is best described as:
A. All the nerve fibers and muscle fibers in a single muscle bundle
B. One muscle fiber and its single nerve fiber
C. A single motor neuron and all the muscle fibers that it innervates
D. As the neuron which carries the message from muscles to CNS

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Q.46 The joint between carpals and metacarpals of thumb is:
A. Planer joint B. Saddle joint
C. Hinge joint D. Condyloid joint

Q.47 Which of the following pairs is correctly matched?
A. Hinge joint Between vertebrae
B. Gliding joint Between carpal and metacarpal of the thumb
C. Cartilaginous joint Between carpels
D. Fibrous joint Flat skull bones

Q.48 ATPase activity is associated with:
A. Actin B. Myosin
C. Troponin D. Actin

Q.49 It allows rotatory movement:
A. Pivot joint B. Synovial joint
C. Hinge joint D. Fibrous joint

Q.50 Which hormone regulates spermatogenesis:
A. T_3 B. Estrogen
C. Inhibin D. Progesterone

ANSWER KEY

1	B	11	C	21	B	31	C	41	D
2	C	12	B	22	B	32	A	42	C
3	C	13	B	23	D	33	D	43	A
4	C	14	D	24	A	34	C	44	C
5	A	15	C	25	C	35	D	45	C
6	D	16	B	26	C	36	B	46	D
7	C	17	A	27	B	37	A	47	D
8	A	18	B	28	D	38	C	48	B
9	D	19	B	29	C	39	B	49	A
10	C	20	C	30	B	40	C	50	C

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SELF ASSESSMENT TEST

Q.1 All the alleles present in the gametes of a sexually reproducing population are known as the population's _____.
A. Gene frequency
B. Genome
C. Gene pool
D. Genotype

Q.2 An interaction between two alleles having a single locus for a single trait can be labeled as:
A. Pleiotropy
B. Dominance
C. Epistasis
D. Polygene

Q.3 The majority of hemophilic patients suffer from deficiency of:
A. Factor VII
B. Factor IX
C. Factor VIII
D. Factor XI

Q.4 XXY in humans is a:
A. Sterile male
B. Fertile male
C. Sterile female
D. Fertile female

Q.5 Alleles in an individual for a particular trait are called its:
A. Phenotype
B. Gene pool
C. Genotype
D. Karyotype

Q.6 Keeping in view the Mendel's law of Segregation, if tall plants were crossed with short heighted plants, then which of the following best describes the F_1 Progeny?
A. Homozygous and tall heightened
B. Heterozygous and tall heighted
C. Homozygous and short heightened
D. Heterozygous and short heighted

Q.7 Which one might be the blood group of an individual with the following genetic makeup, "$I^M i$, Dd, hh"?
A. Phenotypically MN, O, and positive
B. Phenotypically MN, A, and negative
C. Phenotypically MN, A and positive
D. Phenotypically MN, O and negative

Q.8 Hemophilia is a sex-linked _____ trait.
A. Recessive
B. Dominant
C. Codominant
D. Pleiotropic

Q.9 All altered alternative forms of a gene, whose number is more than two are called:
A. Co-dominant alleles
B. Jumping genes
C. Multiple alleles
D. Homozygous

Q.10 The haploid chromosome number in garden pea is:
A. 8
B. 10
C. 7
D. 14

Q.11 A test cross distinguishes between:
A. 2 homozygous forms
B. Homozygous recessive and heterozygous form
C. 2 heterozygous forms
D. A homozygous dominant and heterozygous form

Q.12 Which traits are more likely to affect men than women?
A. Autosomal dominant
B. X-linked dominant
C. X-linked recessive
D. Autosomal recessive

Q.13 A girl has blood group "A" and her brother has blood group "B". Which combination of genotypes cannot belong to their parents?

	Mother	Father
A.	I^Ai	I^Bi
B.	I^AI^B	I^AI^B
C.	ii	I^AI^B
D.	ii	I^Ai

Q.14 The basic unit of biological information is:
A. Gene
B. Locus
C. Chromosome
D. Allele

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Q.15 A true-breeding variety upon self-fertilization always produces:
A. Only dominant offspring
B. Only recessive offspring
C. Both with ratio 3:1
D. Offspring identical to the parents

Q.16 Gene linkage is:
A. Physical relation of genes
B. Physiological relation
C. Both of these
D. None of these

Q.17 Which of the following trait is not X-linked?
A. Colour blindness
B. Diabetes insipidus
C. Haemophilia
D. Leukemia

Q.18 In *Drosophila*, male determining genes are located on:
A. X chromosome
B. Y chromosome
C. Autosomal chromosomes
D. Both on X and Y chromosomes

Q.19 Which one of the traits zigzags from maternal grandfather through a carrier daughter to a grandson?
A. Autosomal
B. X-linked recessive
C. Y-linked dominant
D. X-linked dominant

Q.20 What are the chances of a hemophilic son, whose mother is a carrier but father is normal?
A. 0%
B. 75%
C. 25%
D. 50%

Q.21 A trait that passes directly from father to son:
A. Colour blindness
B. Maleness
C. Ichthyosis
D. Hemophilia

Q.22 Origin of life is explained by all except:
A. Endosymbiont hypothesis
B. Creationism
C. Hydrothermal vent hypothesis
D. Chemical evolution

Q.23 Scientists who first time presented the concept of evolution with evidence:
A. Aristotle
B. Lamarck
C. Linnaeus
D. Darwin

Q.24 In different species, analogous organs evolve to adapt:
A. Same habitat
B. Same nutrition
C. Different habitat
D. Different ecosystem

Q.25 According to Lamarck, evolution is a cumulative product of:
A. Somatic changes
B. Heritable variations
C. Genetic changes
D. Natural selection

Q.26 The one who believed in the theory of special creation is:
A. C. Linnaeus
B. Mendel
C. Lamarck
D. Lyell

Q.27 The present giraffe has a long neck as compared to its ancestors. Darwin believed it could be due to:
A. Natural selection
B. Isolation
C. Inheritance of acquired characters
D. Migration

Q.28 For evolutionary success, mutations must occur in:
A. Somatic RNA
B. Somatic DNA
C. Germ cell DNA
D. Germplasm RNA

Q.29 Which of the following concept is attributed to Charles Darwin?
A. Use and disuse of organs is of great importance in the evolution
B. Every cell must come from a pre-existing cell
C. In the struggle for existence, the fittest would survive
D. The gametes will carry only one of a pair of contrasting characters.

Q.30 In which rocks, most fossils are found?
A. Metamorphic
B. Sedimentary
C. Igneous
D. All A, B, C

Q.31 Which of the following is not examples of analogous structure?
A. Wings of bats and butterfly
B. Thorn and spine
C. Wings of bats and forelimb of cattle
D. Wings of bats and sparrow

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Q.32 There is _____ number of linkage groups in humans.
A. 22 B. 23
C. 80 D. 80

Q.33 Product of evolution is:
A. Ecosystem B. Species
C. Community D. Biome

Q.34 According to Darwin, finches found on Galapagos island had distinct characteristics due to:
A. Geographical isolation B. Special creation
C. Developmental anomaly D. Inheritance of acquired characteristics

Q.35 Neo Darwinism is the result of the reconciliation of Darwin's theory with:
A. Lamarck's work B. Lyell's work
C. Cuvier's work D. Mendel's work

Q.36 Which of the following branch first suggested the idea of evolution to Darwin?
A. Zoogeography B. Phytogeography
C. Biogeography D. Geography

Q.37 Which of the following animal lives only in America?
A. Kangaroo B. White rat
C. Armadillos D. American python

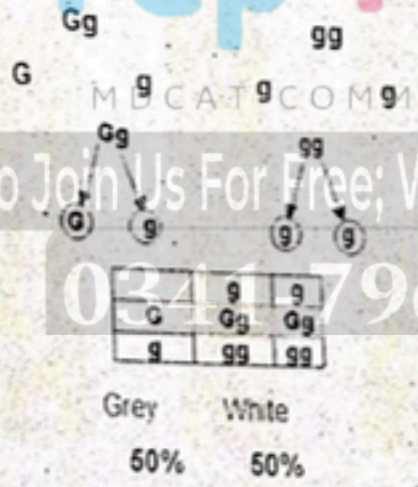
Q.38 The similarity between the forelimbs of cats, whales, bats, and other mammals show that they are:
A. Monophyletic B. Polyphyletic
C. Paraphyletic D. Diphyletic

Q.39 Which of the following is not the vestigial structure?
A. Ear of humans B. Goosebumps
C. 3rd molar of humans D. Vermiform appendix

Q.40 This structure is common in all vertebrates at embryonic stages:
A. Gill pouches B. 4 chambered heart
C. Teeth D. Gills

Q.41 When a true-breeding pea plant that has yellow seeds is pollinated by a plant that has green seeds, then all the F_1 plants have yellow seeds. This means that the allele for yellow is:
A. Heterozygous B. Recessive
C. Dominant D. Lethal

Q.42 The below diagram represents:



A. Back cross B. Test cross
C. Outcross D. Dihybrid cross

Q.43 Probability of which of the following is extremely rare?
A. Carrier female in hemophilia B. Affected male in hemophilia
C. Carrier male in hemophilia D. Affected female in hemophilia

Q.44 The wings of bats and wings of birds are example of:
A. Homologous organs B. Non-functional organs
C. Analogous organs D. Vestigial organs

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Q.45 **Variation may be due to:**
A. Mutation
B. Genetic recombinant during gametogenesis
C. Gene flow or genetic drift
D. All A, B, C

Q.46 **The basic idea of evolution is:**
A. Cosmic evolution
B. Spontaneous generation
C. Special creation
D. Descent with modification

Q.47 **Survival of the fittest is possible due to:**
A. Overproduction
B. Environmental changes
C. Favorable variations
D. Inheritance of acquired characters

Q.48 **The processes of _____, _____ generate variation and _____ produce adaption to the environment.**
A. Sexual selection, natural selection, mutation
B. Mutation, sexual recombination, genetic drift
C. Genetic drift, mutation, sexual recombination
D. Mutation, sexual recombination, natural selection

Q.49 **Which type of evolution is shown by the wings of bats, mosquitoes, and pigeons?**
A. Divergent
B. Convergent
C. Atavism
D. Vestigial organs

Q.50 **The genotype of an individual is RrAa. How many different types of gametes will it produce based on the law of independent assortment?**
A. 16
B. 8
C. 9
D. 4

ANSWER KEY

1	C	11	D	21	B	31	C	41	C
2	B	12	C	22	A	32	B	42	B
3	C	13	D	23	D	33	B	43	D
4	A	14	A	24	A	34	A	44	C
5	C	15	D	25	A	35	D	45	D
6	B	16	A	26	A	36	C	46	D
7	A	17	D	27	A	37	C	47	C
8	A	18	C	28	C	38	A	48	D
9	C	19	B	29	C	39	A	49	B
10	C	20	D	30	B	40	A	50	D

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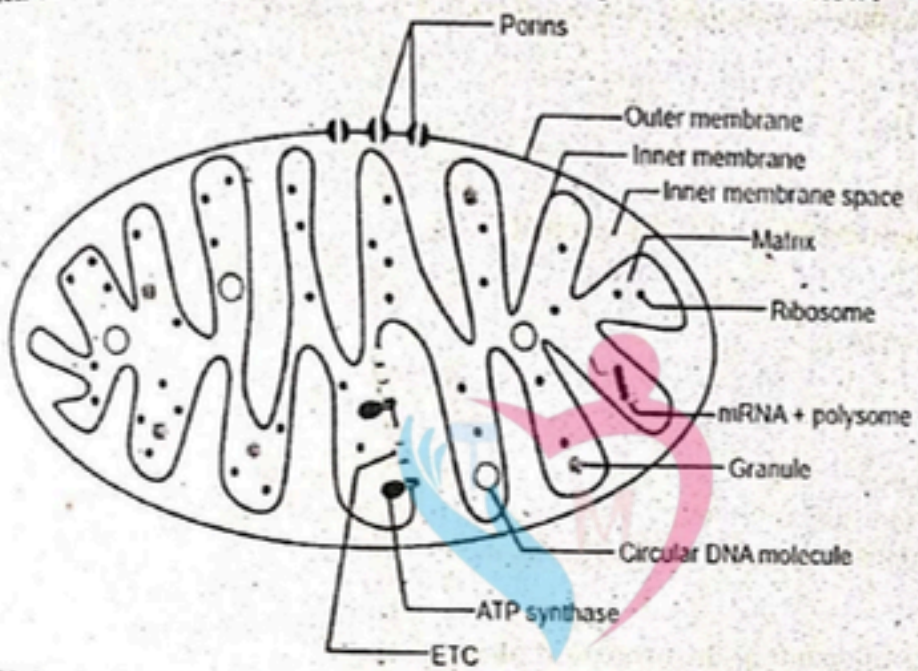
POST-PREP TEST

Q1 **For the synthesis of hexokinase, it binds with mRNA first:**
A. 60S
B. 50S
C. 40S
D. 80S

Q2 **Contractile vacuoles are present in:**
A. Freshwater protists
B. Marine water protists
C. Land protists
D. Aerial protists

Q3 **Which of the following statement is true for an organelle shown below?**



A. Helps in the transportation of material across cell
B. Regenerates ATP by chemiosmosis
C. Performs glycosylation
D. Is involved in autophagy

Q4 **Nucleoplasm does not contain:**
A. Histones
B. Lactate dehydrogenase
C. RNA polymerase
D. Magnesium ions

Q5 **In Golgi apparatus, cisternae are thought to be moving from _____ to _____ face.**
A. Inner, outer
B. Medial, lateral
C. Concave, convex
D. Convex, concave

Q6 **Photophosphorylation occurs in:**
A. Chloroplast
B. Ribosome
C. Mitochondria
D. Both A and B

Q7 **CO_2 fixation occurs at/in:**
A. Thylakoid
B. F_1-particles
C. Matrix
D. Stroma

Q8 **A bacterial cell swells and bursts during the lytic cycle because it:**
A. No longer can synthesize proteins
B. No longer has an intact chromosome
C. No longer has an intact cell wall to counter osmosis
D. Has greater osmotic pressure due to catabolism of glycogen

Q9 **The most abundant organic molecule on the planet earth is:**
A. Starch
B. Glucose
C. Glycogen
D. Cellulose

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Q.10 Which of these types of carbohydrates are rare in nature?
A. Monosaccharides B. Tetroses
C. Polysaccharides D. Pentoses

Q.11 Which of the following has the lowest melting point?
A. A fatty acid of 16 carbons with no double bond
B. A fatty acid of 18 carbons with no double bond
C. A fatty acid of 18 carbons with 2 double bonds
D. A fatty acid of 18 carbons with 1 double bond

Q.12 How many peptide bonds are present in an insulin molecule?
A. 51 B. 50
C. 49 D. 48

Q.13 Cellulase is a cellulose digesting enzyme secreted by certain:
A. Herbivores B. Animals
C. Bacteria D. Plants

Q.14 Ribonuclease is a:
A. Protein B. Nucleic acid
C. Carbohydrate D. Lipid

Q.15 Peptidyl transferase helps in the formation of:
A. Peptide bond B. Hydrogen bond
C. Ionic bond D. Hydrophobic interactions

Q.16 An RNA nucleotide is:
A. dGTP B. AMP
C. Uridine D. Cytosine

Q.17 All enzymes are _____.
A. Fibrous proteins B. Lipoproteins
C. Low molecular weight protein D. Globular Proteins

Q.18 Which is not required for the tricarboxylic acid cycle?
A. NAD^+ B. FAD^+
C. $NADPH_2$ D. GDP

Q.19 Why is RuBP important in the process of photosynthesis?
A. It is an acceptor molecule for CO_2 B. It is an acceptor for H^+
C. It is a source of H^+ ions D. It is an intermediate in sucrose formation

Q.20 Which one of the following mammalian cells is not capable of metabolizing glucose to carbon dioxide aerobically?
A. White blood cells B. Unstriated muscle cells
C. Liver cells D. Red blood cells

Q.21 Which type of parasite a bacteriophage is?
A. Obligate intracellular parasite B. Intercellular parasite
C. Facultative parasite D. Cellular parasite

Q.22 Lysozyme is used to dissolve:
A. Viral capsid B. Bacterial cell membrane
C. Bacterial cell wall D. Bacterial envelope

Q.23 The first simplest oxygen producing organism was:
A. Methanogens B. Euglena
C. Cyanobacteria D. Spirogyra

Q.24 The bacterial chromosome is composed of:
A. DNA only B. Proteins only
C. DNA and histone D. RNA and histone

Q.25 Which of the following bacteria are without cell wall?
A. *Mycoplasma* B. Gram negative bacteria
C. Gram-positive bacteria D. Archaeobacteria

Q.26 Which one of the following is similar to fungi and certain animals?
A. Presence of chitin B. Presence of centrioles
C. Nuclear mitosis D. Absence of cell wall

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Q.27 **Which among the following lacks the nervous system?**
A. Flat worms B. Annelids
C. Cnidarians D. Sponges

Q.28 ***Ascaris lumbricoides* is a:**
A. Intestinal parasite B. Blood parasite
C. Gastric parasite D. Ureteral parasite

Q.29 **Water vascular system is present in coelom in which phylum:**
A. Echinodermata B. Annelida
C. Arthropoda D. Cnidaria

Q.30 **Gall bladder is involved in:**
A. Synthesis of bile B. Concentration of bile
C. Digestion of carbohydrates D. Hematopoiesis

Q.31 **Secretion that digests carbohydrates, lipids and proteins is:**
A. Saliva B. Pancreatic juice
C. Gastric juice D. Bile

Q.32 **Maximum absorption of food occurs in:**
A. Buccal cavity B. duodenum
C. Jejunum D. Ileum

Q.33 **Cartilage plates are present in:**
A. Trachea B. Bronchioles
C. Bronchi D. Air sacs

Q.34 **Outward movement of bicarbonate ions across RBC is balanced by inward movement of _____ ions.**
A. Sodium B. Potassium
C. Chloride D. Magnesium

Q.35 **Movement of sucrose from companion cells to sieve tube cells is by:**
A. Osmosis B. Diffusion
C. Active transport D. Facilitated diffusion

Q.36 **Most important pathway for transport of water and minerals from soil to xylem vessels is:**
A. Apoplast pathway B. Symplast pathway
C. Vacuolar pathway D. Imbibition

Q.37 **T-wave shows:**
A. Atrial depolarization B. Ventricular repolarization
C. Atrial repolarization D. Ventricular depolarization

Q.38 **One complete heart beat consists of one systole and one diastole and lasts for about:**
A. 0.8 sec B. 0.4 sec
C. 0.3 sec D. 0.1 sec

Q.39 **A test to diagnose abnormalities in rhythmicity and conduction system of the heart is:**
A. ECG B. EMG
C. EEG D. EGG

Q.40 **Arteries that supply oxygenated blood to heart are;**
A. Iliac arteries B. Carotid arteries
C. Brachial arteries D. Coronary arteries

Q.41 **All of the following arteries carry oxygenated blood except:**
A. Hepatic artery B. Coronary artery
C. Umbilical artery D. Carotid artery

Q.42 **Transfer of immunity by anti-tetanus injection is an example of:**
A. Natural active immunity B. Artificial active immunity
C. Natural passive immunity D. Artificial passive immunity

Q.43 **Antibodies are produced by:**
A. B-cells B. Plasma clone cells
C. Dendritic cells D. T-cells

Q.44 **An example of spinal reflex actions is:**
A. Salivation B. Sneezing
C. Knee jerk D. Blinking

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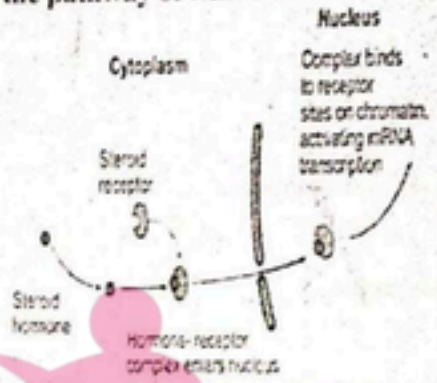
Q.45 **It is an example of excitatory neurotransmitter:**
A. Acetylcholine B. GABA
C. Glycine D. Endorphins

Q.46 **Body temperature is basically under the control of:**
A. Cerebrum B. Pons
C. Cerebellum D. Hypothalamus

Q.47 **Which part of brain maintains equilibrium?**
A. Cerebrum B. Cerebellum
C. Hypothalamus D. Pons

Q.48 **The following diagram depicts the pathway of which hormone:**



A. Growth hormone B. Epinephrine
C. Oxytocin D. Estrogen

Q.49 **Activation of parasympathetic nervous system leads to:**
A. Bladder contraction B. Pupil dilation
C. Heartbeat acceleration D. Peristalsis inhibition

Q.50 **During spermatogenesis in humans, _____ undergo meiosis I.**
A. Spermatogonia B. Primary spermatocytes
C. Secondary spermatocytes D. Spermatids

Q.51 **Menstruation is triggered by an abrupt decline in the levels of:**
A. Estrogen B. FSH
C. Progesterone D. LH

Q.52 **The fertilization of ovum takes place in the proximal part of the:**
A. Uterus B. Placenta
C. Oviduct D. Vagina

Q.53 **Type of STD in which causative agent attacks on immune system cells is:**
A. Gonorrhea B. AIDS
C. Herpes simplex D. Syphilis

Q.54 **A similarity between cartilage and bone:**
A. Presence of collagen B. Mineral deposition
C. Presence of blood vessels D. Types of cells

Q.55 **Ball and socket joint involves:**
A. Distal end of humerus B. Proximal end of the femur
C. Proximal end of tibia D. Distal end of the fibula

Q.56 **Among the following, identify an example of autoimmune disorder:**
A. Osteoarthritis B. Gouty arthritis
C. Rheumatoid arthritis D. Spondylitis

Q.57 **Which of the following is not related to cardiac muscles?**
A. Branching appearance B. Pumps blood
C. Irregular stripes D. Location is visceral

Q.58 **It is not present in the sarcoplasm of skeletal myocytes:**
A. Creatine phosphate B. Hemoglobin
C. Myoglobin D. Glycogen

Q.59 **During contraction of skeletal muscle, movement of calcium ions is from:**
A. SR to sarcoplasm B. Sarcoplasm to SR
C. ECF to sarcoplasm D. SR to ECF

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Q.60 **The degree of muscle contraction depends upon a number of:**
A. Muscle fibers B. Myofilaments
C. Myofibrils D. Muscle bundle

Q.61 **Which of the following traits pass in zigzag fashion from parents to offsprings?**
A. X-linked traits B. Y-linked traits
C. Sex influenced traits D. Sex limited traits

Q.62 **Haemophilia can be result of:**
A. Reduction of blood clotting factors B. Malfunctioning of blood clotting factors
C. Complete absence of blood clotting factors D. All A, B, C

Q.63 **If a carrier woman for haemophilia is married to a normal man, then all of the following combinations can exist except:**
A. X^HX^H B. X^hY
C. X^HY D. X^hX^h

Q.64 **_____ are more common in human males than females.**
A. X-linked dominant traits B. Y-linked dominant traits
C. X-linked recessive traits D. Autosomal linked recessive traits

Q.65 **Progesterone is secreted by:**
A. Corpus luteum B. Ripening follicles
C. Uterine epithelium D. Fertilized egg

Q.66 **The wings of a bird and the fore–legs of a horse are _____ structures.**
A. Analogous B. Vestigial
C. Homologous D. Evolutionary convergent

Q.67 **Ear muscles in man and goat are examples of:**
A. Divergent evolution B. Convergent evolution
C. Line evolution D. Web evolution

Q.68 **During evolution, humans have developed a unique antigen-antibody system in ABO blood group system. Keeping that in view, a person having blood group B can donate blood to:**
A. Persons having blood groups 'A' and 'B' B. Persons having blood groups 'A' and 'O'
C. Persons having blood group 'B' and 'AB' D. Persons having blood groups 'O' and 'B'

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ANSWER KEY

1	C	11	C	21	A	31	B	41	C	51	C	61	A
2	A	12	C	22	C	32	D	42	D	52	C	62	D
3	B	13	C	23	C	33	C	43	B	53	B	63	D
4	B	14	A	24	A	34	C	44	C	54	A	64	C
5	D	15	A	25	A	35	B	45	A	55	B	65	A
6	A	16	C	26	A	36	A	46	D	56	C	66	C
7	D	17	D	27	D	37	B	47	B	57	D	67	B
8	C	18	C	28	A	38	A	48	D	58	B	68	C
9	D	19	A	29	A	39	A	49	A	59	A		
10	B	20	D	30	B	40	D	50	B	60	C		

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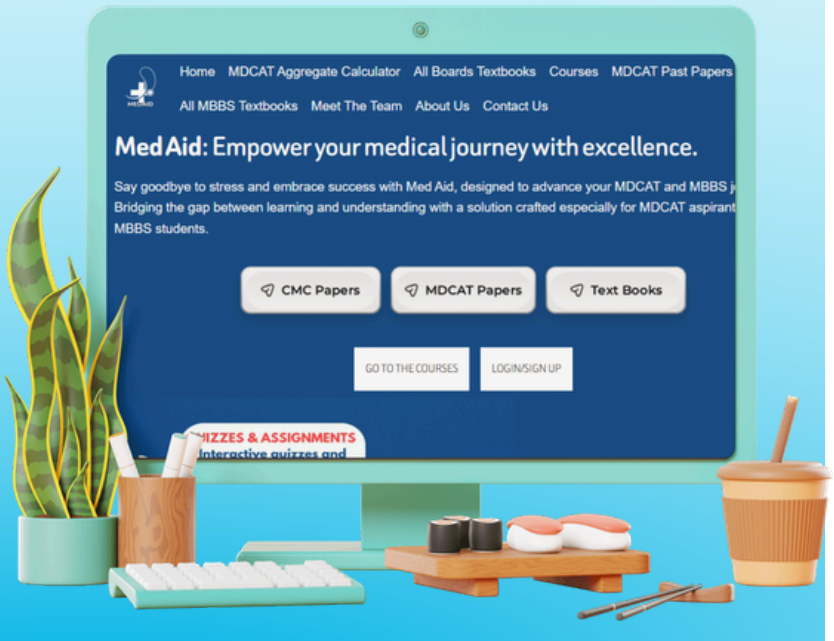

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