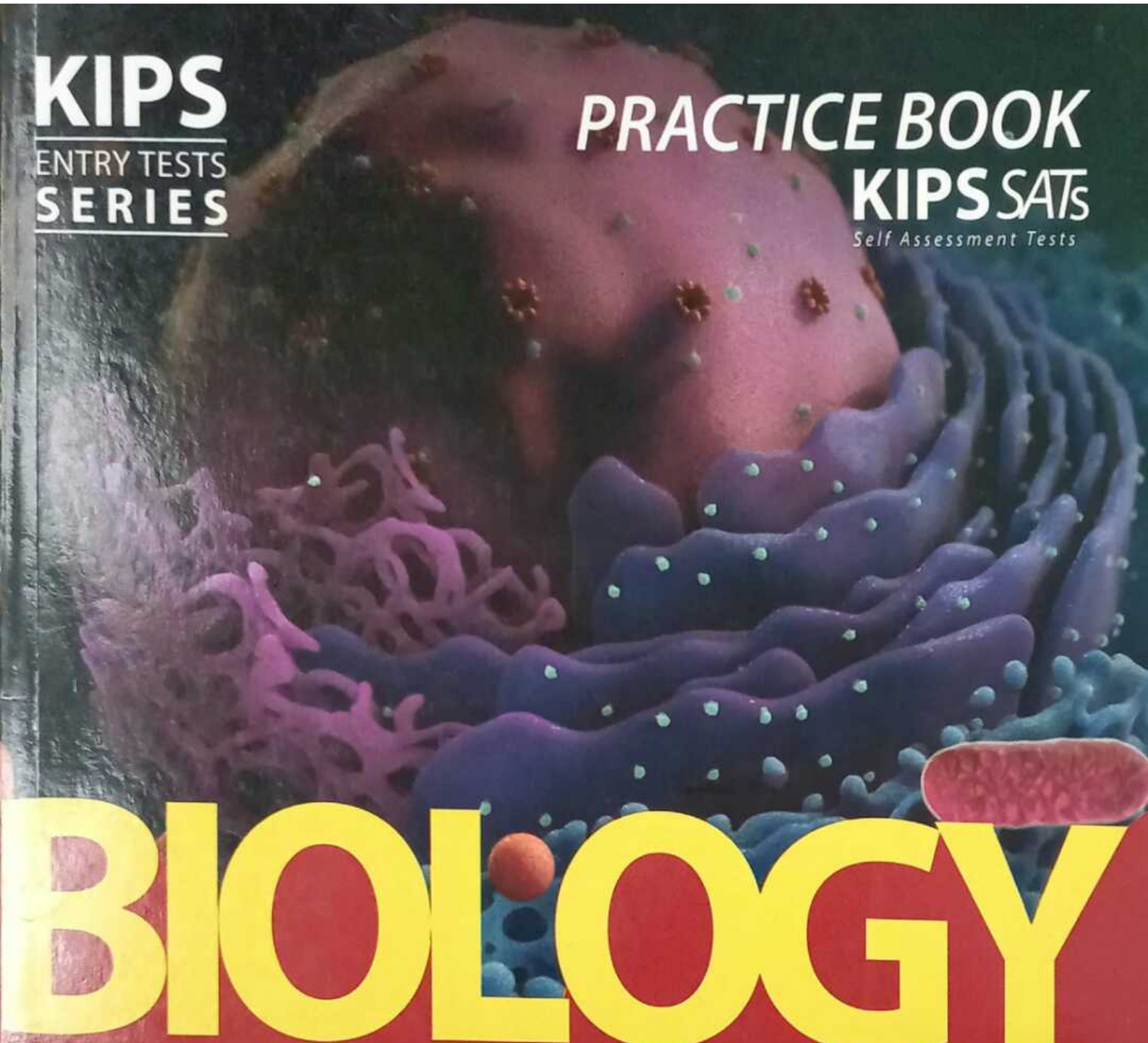
KIPS
ENTRY TESTS
SERIES

PRACTICE BOOK
KIPS SATs
Self Assessment Tests



BIOLOGY

MDCAT
AS PER UHS SYLLABUS

- 1898 Practice MCQs
- Questions from Past Papers
- Answer Keys with Explanatory Notes
- Topic-wise Practice Exercises
- Unit-wise Self Assessment Tests
- Pre-Assessment Test (Diagnostic Test)
- Post-Assessment Test
  (Sample Paper as per Original Format)

A Kitab Dost Publication

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KIPS UNITS

SELF ASSESSMENT TEST

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PRE-ASSESSMENT TEST

Q.1 The one which is present in all living things:
A) Nucleus
B) DNA
C) Cell wall
D) Vacuole

Q.2 Variety among amino acids is produced due to:
A) $-NH_2$ group
B) -COOH group
C) –R group
D) Alpha carbon

Q.3 Primary structure of proteins is determined by:
A) Number of polypeptide chains involved
B) Bending of polypeptide chains
C) Amino acid sequence
D) Coiling of polypeptide chains

Q.4 The one which is not a globular protein?
A) Anti Rh-antibody
B) Enzyme
C) Myosin tail
D) Haemoglobin

Q.5 An enzyme which converts a dipeptide into individual amino acids is an example of:
A) Decarboxylase
B) Hydrolase
C) Oxidoreductase
D) Transferase

Q.6 Cellular digestion is associated with which organelle?
A) Mitochondria
B) Golgi bodies
C) Plastids
D) Lysosomes

Q.7 The unicellular organisms ingest large molecules into their cytoplasm from the external environment without previously digesting them. This process is called:
A) Diffusion
B) Osmosis
C) Phagocytosis
D) Plasmolysis

Q.8 Membranes of the grana are sites where:
A) Oxygen is stored.
B) Food is stored
C) Sunlight is trapped
D) CO_2 is stored

Q.9 *Mycoplasmas* have been included in bacteria because they:
A) Do not have a cell wall
B) Are heterotrophic
C) Lack membrane bounded organelles
D) Reproduce by binary fission

Q.10 Which of these is not related with concentration of urine?
A) ADH
B) Concentrated medulla
C) Counter current multiplier
D) Proximal convoluted tubule

Q.11 Which of these is diploid?
A) Ovum
B) Primary oogonium
C) Sperm
D) Secondary oocyte

Q.12 Total number of peptide linkages in haemoglobin molecule is:
A) 574
B) 570
C) 573
D) 10,000

Q.13 The one which is incorrect pair:
A) R.E.R – protein formation
B) Nucleus – DNA
C) Chloroplast – Krebs cycle
D) Cytoplasm – Glycolysis

Q.14 Which of these makes third line of defense?
A) Neutrophils
B) Skin
C) Macrophages
D) Lymphocytes

Q.15 Which of the following does occur in anaerobic respiration but not in aerobic respiration?
A) Release of CO_2
B) Reduction of NAD^+
C) Formation of ATP
D) Production of ethanol from acetaldehyde

Q.16 Which of the following is the molecular formula of chlorophyll 'b'?
A) $C_{55}H_{70}O_5N_4Mg$
B) $C_{55}H_{72}O_6N_4Mg$
C) $C_{55}H_{70}O_6N_4Mg$
D) $C_{55}H_{72}O_5N_4Mg$

Q.17 How many moles of carbon dioxide are produced by complete oxidation of one mole of pyruvic acid?
A) 1
B) 2
C) 3
D) 6

Q.18 Uterus gains maximum thickness during:
A) Secretory phase
B) Menstrual phase
C) Proliferative phase
D) Ovulatory phase

Q.19 The major constituent of blood plasma is:
A) Protein
B) NaCl
C) Water
D) Organic molecules

Q.20 All of the following veins carry deoxygenated blood except:
A) Superior vena cava
B) Inferior vena cava
C) Hepatic vein
D) Pulmonary vein

Q.21 The windpipe or trachea lies:
A) Dorsal to oesophagus
B) Ventral to oesophagus
C) Lateral to oesophagus
D) Behind oesophagus

Q.22 The process that has transformed life on earth from its earliest forms to vast diversity is:
A) Mutation
B) Migration
C) Evolution
D) Genetic drift

Q.23 Antibodies are produced by:
A) B-lymphocytes
B) T lymphocytes
C) Helper T lymphocytes
D) Plasma clone cells

Q.24 Oogenesis in human female starts:
A) At puberty
B) Before birth
C) Before puberty
D) After puberty

Q.25 How many spermatozoa and ova are produced from 50 primary spermatocytes and 50 primary oocytes?
A) 200 spermatozoa and 100 ova
B) 100 spermatozoa and 50 ova
C) 200 spermatozoa and 50 ova
D) 100 spermatozoa and 100 ova

Q.26 Antibodies consist of:
A) One chain
B) Three chains
C) Two chains
D) Four chains

Q.27 The one which can break to open a plasmid ring is:
A) Ligase
B) Primase
C) Restriction endonuclease
D) ATPase

Q.28 A genome is:
A) Appearance of an individual
B) Genetic basis of few characters
C) Full set of genes of an individual
D) DNA present in one gene

Q.29 Genes will not be found in gene pairs in the:
A) Muscle cells of worm
B) Uterine cells of dog
C) Sperm cells of frog
D) Guard cells of leaf

Q.30 Name a self replicating organelle:
A) Mitochondria
B) Phagosomes
C) Peroxisomes
D) Golgi bodies

Q.31 Which one of the following stages precedes mitosis during cell cycle?
A) G_1 phase
B) S phase
C) G_2 phase
D) M phase

Q.32 Net production of ATP during glycolysis is:
A) 2 ATP
B) 4 ATP
C) 36 ATP
D) 38 ATP

Q.33 **In humans the number of tetrads formed during meiosis is:**
A) 23 C) 0
B) 46 D) 4

Q.34 **The sequence of 3 bases on tRNA which is complementary to codon of mRNA is called:**
A) Gene C) Code
B) Anticodon D) Codon

Q.35 **Which statement correctly describes the transcription of DNA?**
A) It produces another DNA molecule C) It is a semi conservation process
B) It produces mRNA D) It occurs at surface of ribosomes

Q.36 **The basic structural unit of a chromosome is:**
A) The centromere C) Telomere
B) Nucleosome D) Histone

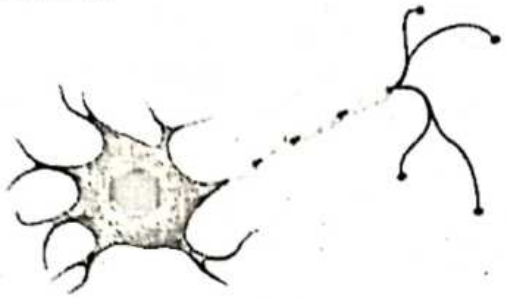
Q.37 **The cells present in testes and secrete testosterone are:**
A) Sertoli cells C) Interstitial cells
B) Germinal cell D) Spermatocyte

Q.38 **The one which causes contraction of wall of the uterus during and after birth:**
A) ADH C) Oxytocin
B) MSH D) Progesterone

Q.39 **The one that stores calcium:**
A) Sarcolemma C) Sarcoplasmic reticulum
B) Sarcoplasm D) Cytosol

Q.40 **Which of the following organisms are not composed of cells?**
A) Amoeba C) Euglena
B) Paramecium D) Virus

Q.41 **Identify the figure given below:**



A) Tracheid C) Gastric cell
B) Nerve Cell D) Squamous epithelial cell

Q.42 **Pancreatic enzymes are finally processed and secreted by:**
A) Ribosomes C) Endoplasmic reticulum
B) Mitochondria D) Golgi apparatus

Q.43 **Cyanides for enzymes act as:**
A) Substrate C) Cofactor
B) Prosthetic group D) Inhibitor

Q.44 **Chitin is a:**
A) Homopolysaccharide C) Oligosaccharide
B) Heteropolysaccharide D) Monosaccharide

Q.45 **The bond formed between two adjacent monosaccharide is:**
A) Peptide bond C) Glycosidic bond
B) Ester bond D) Ionic bond

Q.46 **Which of these is incorrect about HIV?**
A) Envelope is lipoprotein in nature C) Cone shaped capsid
B) Contains one molecule of RNA D) Two molecules of reverse transcriptase

Q.47 Taxonomy includes the arrangement of organisms into different taxa. Which of the following represents the correct hierarchy of various taxa of classification?

A) Species, genus, family, order, class, phylum
B) Order, family, class, phylum, kingdom
C) Species, genus, order, family, class, phylum
D) Species, genus, family, class, order, phylum

Q.48 The organism with ingestive mode of nutrition having eukaryotic multicellular body placed in kingdom:

A) Plantae
B) Fungi
C) Animalia
D) Protista

Q.49 The amount of CO_2 carried by pulmonary artery is:

A) 50ml/100 ml blood
B) 4ml/100 ml blood
C) 54ml/100 ml blood
D) 20 ml//100 ml blood

Q.50 In humans, the epithelium which separates air and blood is only:

A) 1 cell thick
B) 3 cell thick
C) 2 cell thick
D) 4 cell thick

Q.51 In humans, kidneys are specialized to reabsorb about _____% of water from glomerular filtrate:

A) 90
B) 99.5
C) 0.5
D) 20

Q.52 It is central requirement for survival of all organisms:

A) Reproduction
B) Photosynthesis
C) Homeostasis
D) Locomotion

Q.53 Podocytes are cells found in:

A) Glomerulus
B) Bowman's capsule
C) PCT
D) DCT

Q.54 It is a sequence that correctly traces the path of urine after it leaves the kidneys:

A) Ureters, urinary bladder, urethra
B) Urinary bladder, ureters, urethra
C) Urethra, urinary bladder, ureters
D) Urinary bladder, urethra, ureters

Q.55 Water will move from:

A) Higher pressure potential to lower
B) Higher solute potential to lower
C) Higher water potential to lower
D) Lower water potential to higher

Q.56 Wilting of a plant results from excessive:

A) Respiration
B) Photosynthesis
C) Absorption
D) Transpiration

Q.57 Which of the following is incorrect about symplastic pathway?

A) Movement of water is relatively slower
B) Movement is down the concentration gradient
C) It may be aided by cytoplasmic streaming
D) Most of the water flow in root occurs by this pathway

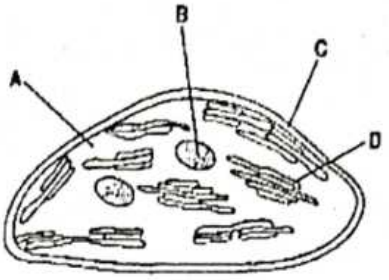
Q.58 Where is apoplastic movement shifted to symplastic pathway?

A)Cortex
B) Endodermis
C) Pericycle
D) Xylem

Q.59 The transpiration is regulated by the movement of:

A) Subsidiary cells of the leaves
B) Guard cells of the stomata
C) Mesophyll tissue cells
D) Epidermal cells of the leaves

Q.60 **The diagram shows a chloroplast. Which region is involved in the reduction of CO_2? (Ans: A)**



Q.61 **Uncoating of HIV virion occurs:**

A) Outside cell
B) In nucleus
C) In cytoplasm
D) In nucleolus

Q.62 **Blue light increases photosynthesis by opening of stomata. It allow the guard cells to pump out _____ and take in _____.**

A) Proton ions, potassium ions
B) Proton ions, proton ions
C) Potassium ions, proton ions
D) Potassium ions, potassium ions

Q.63 **Each neuron is separated from the next by a small gap called:**

A) Gap junction
B) Synaptic gutter
C) Synaptic cleft
D) Neural gap

Q.64 **Spiny look of neurons is due to their:**

A) Myelin sheath
B) Dendron
C) Axon
D) Dendrites

Q.65 **All are amino acid derivatives except:**

A) Thyroxin
B) Epinephrine
C) Aldosterone
D) Nor-adrenalin

Q.66 **To delay the aging of fresh leaf crops the functional hormone is:**

A) ABA
B) Ethane
C) Cytokinins
D) IAA

Q.67 **Site for attachment of calcium ions is present on:**

A) Actin
B) Troponin
C) Myosin
D) Tropomyosin

Q.68 **After death, body becomes stiff due to deficit of ATP, This condition is called:**

A) Spasm
B) Tetanus
C) Rigor mortis
D) Spastic paralysis

Q.69 **Menstrual cycle involves changes in:**

A) Structure of reproductive system
B) Functions of reproductive system
C) Hormonal responses
D) All A, B, C

Q.70 Lactic acid fermentation occurs in:

A) Smooth muscles
B) Cardiac muscles
C) Skeletal muscles
D) All A, B, C

Q.71 **During PCR, DNA strands are separated by using:**

A) Primase
B) DNA polymerase
C) Helicase
D) Heat

Q.72 **Plasmids are:**

A) Single stranded linear DNA
B) Double stranded linear DNA
C) Double stranded circular DNA
D) Single stranded circular DNA

Q.73 **An enzyme involved in maturation of B and T lymphocytes is:**

A) Endonuclease
B) Exonuclease
C) Adenosine deaminase
D) Reverse transcriptase

Q.74 **How many types of nucleic acids are found in living systems?**

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

Q.75 **In a nucleosome, histones are organized in which structure?**

A) Octamer
B) Hexamer
C) Decamer
D) Pentamer

Q.76 **Recombination is seen in:**

A) Diplotene
B) Zygotene or synaptotene
C) Pachytene
D) Diakinesis

Q.77 **Human skin color is a good example of:**

A) Sex linked inheritance
B) Polygenic inheritance
C) X-linked inheritance
D) Y-linked inheritance

Q.78 **The genotype of an individual is Rr Bb. How many different types of gametes will it produce based on the law of independent assortment?**

A) 16
B) 9
C) 8
D) 4

Q.79 **In dihybrid cross, out of 16 plants obtained, the number of genotypes will be:**

A) 4
B) 9
C) 16
D) 12

Q.80 **Sickle cell anaemia is a classic example of:**

A) Frame shift mutation
B) Point mutation
C) Deletion mutation
D) Duplication mutation

ANSWER KEY

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

EXPLANATORY NOTES

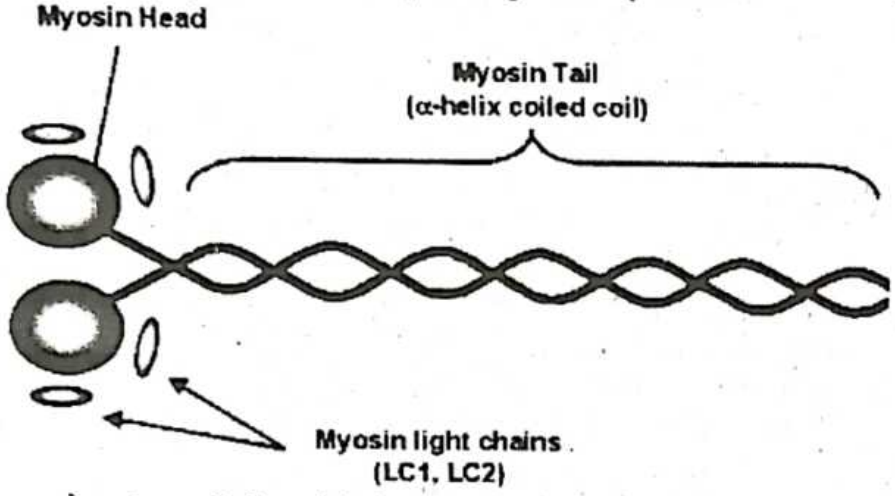
Q.1 DNA molecules are present in living things. Viruses are, however, at borderline of living and non-living things and some of them may contain DNA as their genome.

Q.2 The variety of amino acids is due to R-group, which impart specific characters to the amino acids.

Q.3

Primary Structure	Number and sequence of amino acids
Secondary Structure	Coiling or any other configuration
Tertiary Structure	Bending and folding of polypeptide chain
Quaternary Structure	Aggregate of polypeptide chains

Q.4 Head are showing globular structure while alpha helix in tail represents its fibrous structure. All other options are examples of globular proteins.



Q.5 During conversion of dipeptide into amino acids, one water molecule is added. This process is called hydrolysis and enzyme will be called as hydrolase.

Q.6 The primary sites of intracellular digestion are organelles known as the lysosomes, which are membrane-bounded compartments containing a variety of hydrolytic enzymes.

Q.7 This phagocytosis involves invagination by plasma membrane and digestion by lysosomes.

Q.8 Grana are the site of the light-dependent (trap sunlight) reactions of photosynthesis because these have chlorophyll molecules attached with their membranes.

Q.9 All are characters of Mycoplasma but these are included in prokaryotes due to absence of membrane bounded organelles.

Q.10 ADH, concentrated inner medulla and counter current multiplier mechanism are associated with the formation of concentrated urine. PCT in involved in the selective reabsorption.

Q.11 Ovum, sperms and secondary spermatocytes are the haploid cells while primary Oogonium is a diploid cell.

Q.12 Haemoglobin molecule has 574 amino acids arranged in four polypeptide chains. Each chain has peptide bonds one less than the number of amino acids. So total peptide bonds will be 570.

Q.13 Krebs cycle is completed in matrix of mitochondria rather than cytoplasm or chloroplast.

Q.14

1st Defense line	Physical (HCl) and chemical barriers (Lysozyme)
2nd Defense line	Phagocytes
3rd Defense line	Immune system (Lymphocytes)

Q.15 Production of ethanol from acetaldehyde only takes place during anaerobic respiration in yeast and bacteria.

Q.16 The formula of Chlorophyll 'a' is $C_{55}H_{70}O_5N_4Mg$ while for chlorophyll 'b' $C_{55}H_{72}O_6N_4Mg$

Q.17 Aerobic respiration involves complete breakdown of glucose. As pyruvate is 3C compound so upon complete oxidation, it gives rise to 3 moles of CO_2.

Q.18 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.

Q.19 Water constitutes about 90% of blood plasma.

Q.20 The pulmonary veins are the veins that transfer oxygenated blood from the lungs to the heart.

Q.21 Arrangement of structures from ventral to dorsal is:
Trachea → Oesophagus → Vertebral Column

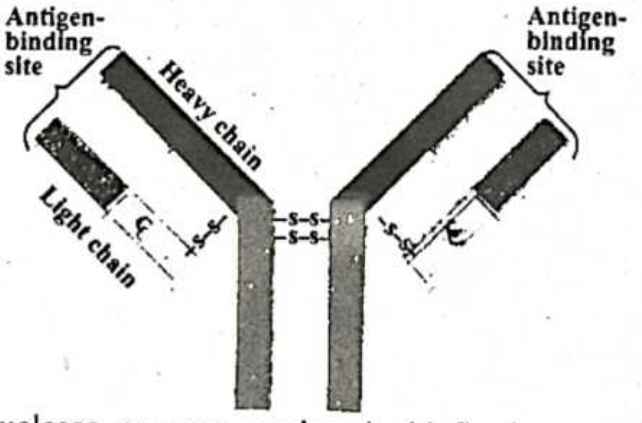
Q.22 Evolution is change in the heritable characteristics of biological populations over successive generations. All others are causes of evolution.

Q.23 Plasma cells originate in the bone marrow. B cells differentiate into plasma cells that produce antibody molecules.

Q.24 Oogenesis starts before birth while ovulation and menstrual cycle starts at puberty.

Q.25 Each primary spermatocyte produces four sperms while each primary oocyte gives rise to one ovum (secondary oocyte) and three polar bodies.

Q.26



Q.27 Restriction endonuclease enzyme produced chiefly by certain bacteria that has the property of cleaving DNA molecules at or near a specific sequence of bases.

Q.28 All the genes present in an individual constitutes its genome.

Q.29 Sperm is haploid, all other given options are diploid having two copies for each gene.

Q.30 As mitochondria have their own genome, so have ability show self-replication.

Q.31 Correct sequence is as under:
G1 Phase → S Phase → G2 Phase → M Phase

Q.32 Total production is 4 while net production of ATP during glycolysis is 2.

Q.33 Tetrads is another term used for homologous chromosome pairs. As there are 23 pairs so 23 tetrads.

Q.34 Triplet code on mRNA is called codon while that on tRNA is called anticodon. Both are complementary to each other.

Q.35 Transcription is the first step of gene expression, in which a particular segment of DNA is copied into RNA (especially mRNA) by the enzyme RNA polymerase.

Q.36 Nucleosome a structural unit of a eukaryotic chromosome, consisting of a length of DNA coiled around a core of histones.

Q.37 Leydig cells, also known as interstitial cells of Leydig, are found adjacent to the seminiferous tubules in the testicle. They produce testosterone in the presence of luteinizing hormone (LH).

Q.38 Oxytocin is responsible for uterine contraction as its receptors are mainly present in uterine wall.

Q.39 The sarcoplasmic reticulum (SR) constitutes the main intracellular calcium store in striated muscle and plays an important role in the regulation of excitation-contraction-coupling (ECC) and of intracellular calcium concentrations during contraction and relaxation.

Q.40 Amoeba, euglena and paramecium are the eukaryotic organism, and are composed of cells while viruses are said to be the acellular particles, and composed of proteins and nucleic acids.

Q.41 The cell in the given diagram is a nerve cell or a neuron which is specialized for the conduction of nerve impulse.

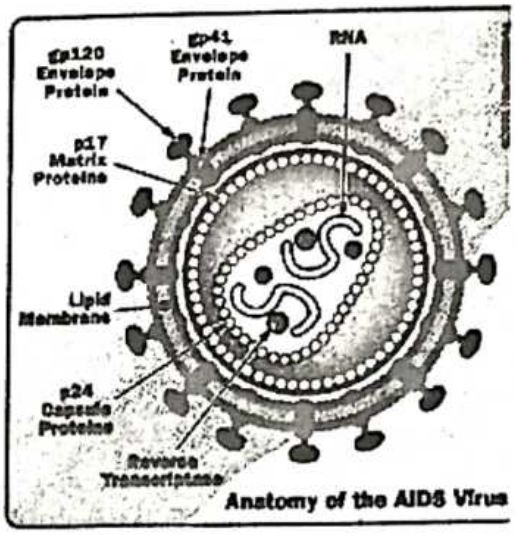
Q.42 Pancreatic enzymes are synthesized by the RER and processed by the enzymes found in Golgi apparatus.

Q.43 For enzymes, cyanide can act as irreversible inhibitor.

Q.44 Chitin is the best example of N_2-containing polysaccharides.

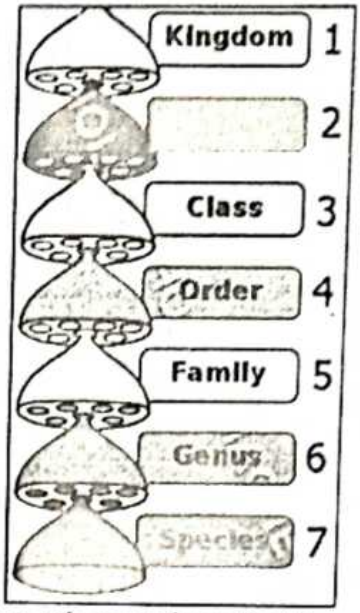
Q.45 A glycosidic bond or glycosidic linkage is a type of covalent bond that joins a carbohydrate molecule to another group, which may or may not be another carbohydrate.

Q.46



Anatomy of the AIDS Virus

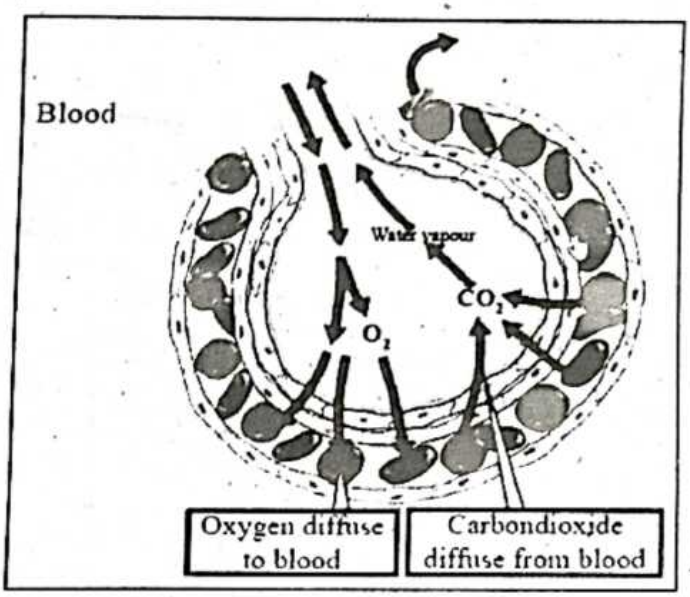
Q.47



Q.48 Animals are multicellular eukaryotic organisms that form the biological kingdom Animalia.

Q.49 The amount of CO_2 in pulmonary artery is 54ml/100 ml of blood as this vessel carries deoxygenated blood.

Q.50



Q.51 Human kidneys are specialized for the reabsorption of 99.5% of the water from the glomerular filtrate.

Q.52 Homeostasis is said to be the central requirement for the survival of all the living things because the living thing can maintain their equilibrium through homeostasis.

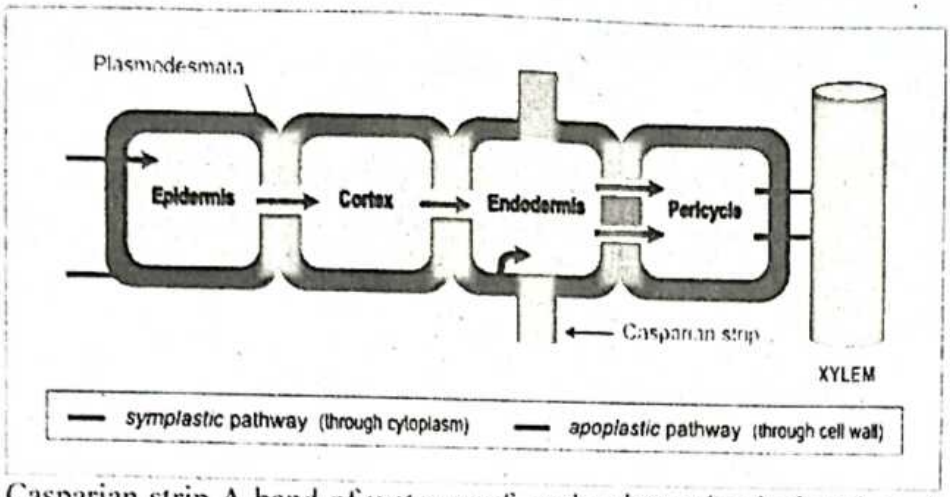
Q.53 Podocytes are cells in the Bowman's capsule in the kidneys that wrap around capillaries of the glomerulus.

Q.54 Urine is formed in the kidneys through a filtration of blood. The urine is then passed through the ureters to the bladder, where it is stored. During urination, the urine is passed from the bladder through the urethra to the outside of the body.

Q.55 Water molecules will always move from higher water potential to an area to lower water potential through semi-permeable membrane.

Q.56 Wilting of the plants is due the excessive transpiration.

Q.57



Q.58 Casparian strip A band of waterproof, corky tissue that is found on the side and walls of the endodermis of roots. The strip prevents water from entering the pericycle except through the cytoplasm of endodermal cells; this may be important in producing root pressure.

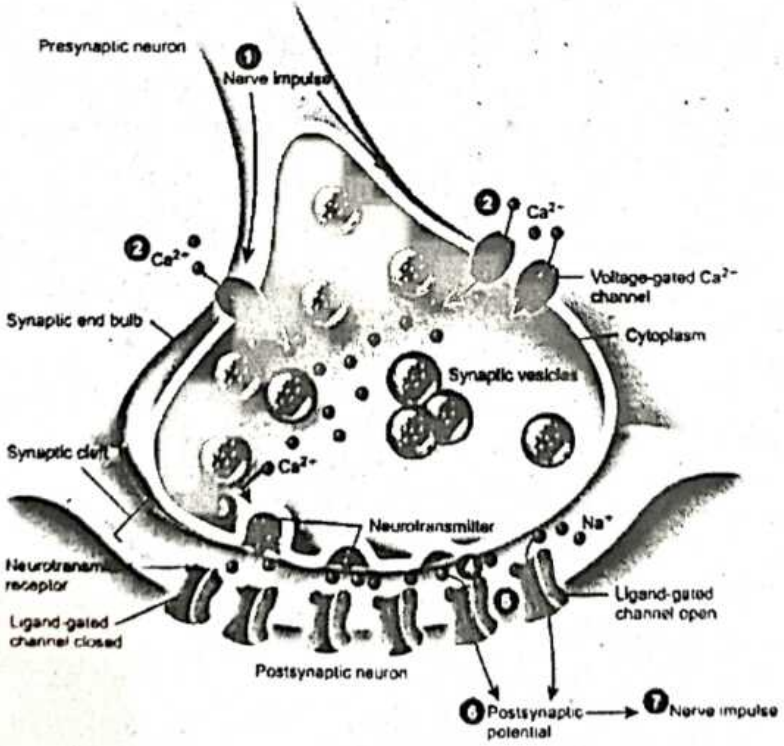
Q.59 Stomata are pores in the leaf that allow gas exchange where water vapor leaves the plant and carbon dioxide enters. Special cells called guard cells control each pore's opening or closing. When stomata are open, transpiration rates increase: when they are closed, transpiration rates decrease.

Q.60 During Calvin cycle, the reduction of CO_2 can take place in the stroma of chloroplast.

Q.61 The uncoating of HIV virion occur in cytoplasm of the helper T-cells

Q.62 Blue light increases the photosynthesis by opening of stomata, it allows the guard cells to pump out H^+ and take in K^+

Q.63



Q.64 The spiny look of the neurons is due to the dendrites.
Q.65 Thyroxin, epinephrine and nor-epinephrine are the amino acid derivative hormones while aldosterone is the steroid hormone.
Q.66 To delay the aging of fresh leaf crops, the functional hormone is cytokinins.
Q.67 Troponin is a component of thin filaments (along with actin and tropomyosin), and is the protein complex to which calcium binds to trigger the production of muscular force.
Q.68 Rigor Mortis is the stiffening of the body after death because of a loss of ATP from the body's muscles. ATP is the substance that allows energy to flow to the muscles and help them work and without this the muscles become stiff and inflexible.
Q.69 In human females, the menstrual cycle involve changes in structure and functions of reproductive system under the influence of hormonal responses.
Q.70 In humans, the lactic acid fermentation usually occurs in skeletal muscles.
Q.71 During PCR, DNA strands can be separated by using heat.
Q.72 A plasmid is a small, extrachromosomal DNA molecule within a cell that is physically separated from chromosomal DNA and can replicate independently. They are most commonly found as small circular, double-stranded DNA molecules in bacteria.
Q.73 Adenosine deaminase (ADA) is a purine-degrading enzyme, catalysing adenosine and deoxyadenosine to produce inosine and deoxyinosine in the process.
Q.74 In living organisms, two type of nucleic acids are found. For example DNA and RNA.
Q.75 Each **nucleosome** is composed of a little less than two turns of DNA wrapped around a set of eight proteins called histones, which are known as a histone octamer. Each histone octamer is composed of two copies each of the histone proteins H2A, H2B, H3, and H4.
Q.76 The third stage of the prophase of meiosis, following zygotene, during which the paired chromosomes shorten and thicken, the two chromatids of each separate, and exchange of segments between chromatids may occur.
Q.77 Human skin color is a good example of polygenic inheritance.
Q.78 If the genotype of an individual is RrBb, then the organism can produce 4 different type of gametes.
Q.79 In F_2 generation of Mendel's dihybrid cross, the total number of genotypes obtain will be 9.
Q.80 Sickle-cell anemia is caused by a point mutation in the β-globin chain of hemoglobin, causing the hydrophilic amino acid glutamic acid to be replaced with the hydrophobic amino acid valine at the sixth position.

Practice Exercises

TOPIC WISE

1 TOPIC THE CELL

PRACTICE EXERCISE

TOPIC-WISE MCQs

MICROCOPY

Q.1 In a typical compound microscope, the resolving power is _____, which is about that of naked eye, respectively.

A) 1.0mm, 250X
B) 2.0mm, 250X
C) 2.0µm, 500X
D) 1.0µm, 500X

Q.2 Which of the following type of microscope is used to study the internal structures of a cell?

A) Simple microscope
B) Compound microscope
C) Light microscope
D) Electron microscope

ANIMAL AND PLANT CELL

Q.3 It is an example of semiautonomous organelle found in both animal and plant cells:

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

Q.4 Which of the following is not present in plant cells?

A) Flagella
B) Cell wall
C) Central vacuole
D) Chloroplast

CELL MEMBRANE & TRANSPORT

Q.5 All of following are common molecules in membrane of all type of cells except:

A) Globular protein
B) Cholesterol
C) Traces of carbohydrates
D) Phospholipid

Q.6 Hydrophobic portion of plasma membrane is present in/at:

A) Towards extracellular matrix
B) Towards cytoplasm
C) Inner core of plasma membrane
D) Towards the cytoskeleton

Q.7 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.8 In plasma membrane, carbohydrates combine with the lipids and proteins to form glycolipids and glycoproteins and are oriented:

A) Towards inside
B) Towards outside
C) Towards inside and outside
D) Randomly distributed

Q.9 Which of the following is not a characteristic feature of animal cell membrane?

A) Provides mechanical shape
B) Maintain cellular homeostasis
C) Regulate passage of molecules
D) Prevent from osmotic lysis

Q.10 Which of the following acts as receptor site on plasma membrane?

A) Head of phospholipid molecules
B) Cholesterol molecules
C) Tail of phospholipid molecules
D) Glycoprotein

Q.11 Which structure is more important for cell life?

A) Nucleus
B) Chromosome
C) Cell membrane
D) Mitochondria

ENDOPLASMIC RETICULUM

Q.12 Which of the following best describes the function of RER in eukaryotic cells?

A) Glycosylation of proteins
B) Synthesis of lipids
C) Synthesis of proteins
D) Synthesis of ribosomes

Q.13 Which of the following statement is incorrect regarding endoplasmic reticulum?

A) Plasma cells have RER in abundance
B) RBCs lack both RER and SER
C) RER is more than SER in adipose tissue
D) Hepatocytes has both RER and SER

Q.14 A function that is not related to smooth endoplasmic reticulum:

A) Calcium storage
B) Steroid synthesis
C) Enzyme synthesis
D) Mechanical support

Q.15 Which of the following organelle is associated with the single membrane?

A) Mitochondria
B) Endoplasmic Reticulum
C) Nucleus
D) Chloroplast

Q.16 Which of the following function is performed by both types of endoplasmic reticulum?

A) Protein synthesis
B) Mechanical support
C) Muscle contraction
D) Detoxification of harmful drugs

Q.17 Which of the following organelle is responsible for the production of steroid hormones?

A) Mitochondria
B) Golgi bodies
C) Smooth endoplasmic reticulum
D) Rough endoplasmic reticulum

RIBOSOSMES

Q.18 All of the following organelles contain DNA except:

A) Ribosomes
B) Chloroplast
C) Nucleus
D) Mitochondria

Q.19 40S is the smaller ribosomal sub-unit associated with _____.

A) *E. coli*
B) *C. botulinum*
C) Yeast
D) *T. pallidum*

Q.20 Ribosomes are associated with all of the following organelles except:

A) Mitochondria
B) Nucleus
C) Golgi apparatus
D) Chloroplast

Q.21 Identify non-membranous organelle from the following:

A) Endoplasmic reticulum
B) Ribosome
C) Nucleus
D) Chloroplast

GOLGI APPARATUS

Q.22 Identify the correct pair from the following options:

A) DNA replication - Ribosome
B) Protein synthesis - SER
C) Anaerobic respiration - Cristae
D) Modification - Golgi apparatus

Q.23 Modification of proteins and lipids into glycoproteins and glycolipids is the function of:

A) Mitochondria
B) Rough endoplasmic reticulum
C) Smooth endoplasmic reticulum
D) Golgi apparatus

Q.24 Golgi complex is involved in the formation of _____.

A) Lysosomes
B) RER
C) Vacuoles
D) SER

Q.25 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

LYSOSOME

Q.26 Which of the following organelle is most abundant in those animal cells which exhibit phagocytic activity?

A) Glyoxisomes
B) Microbodies
C) Lysosomes
D) Peroxisomes

Q.27 Strictly speaking, autophagosomes are actually:

A) Primary lysosomes
B) Secondary lysosomes
C) Tertiary lysosomes
D) Quaternary lysosomes

Q.28 It is a disease characterized by the accumulation of lipids in the brain cells leading to mental retardation and even death:

A) Grave's disease
B) Addison's disease
C) Glycogenosis type II disease
D) Tay-Sach's disease

VACUOLES

Q.29 _____ provides support for the individual plant cell and contributes to the turgidity of the leaves and younger parts of plants.

A) Vacuole
B) Golgi apparatus
C) Endoplasmic reticulum
D) Cytoskeleton

Q.30 What is the specific name given to biological membrane that surrounds the vacuoles?

A) Plasma membrane
B) Endomembrane
C) Plasmalemma
D) Tonoplast

CENTRIOLES & MICROTUBULES

Q.31 Which of the following protein is present in microtubules?

A) Tubulin
B) Myosin
C) Actin
D) Tropomyosin

Q.32 All of the following proteins are present in microfilaments of skeletal muscle cell except:

A) Tubulin
B) Actin
C) Myosin
D) Tropomyosin

Q.33 Number of centrioles in a cell after completion of G_2 phase and during metaphase of mitosis is_____ and _____ respectively.

A) 2, 2
B) 2, 4
C) 4, 4
D) 4, 2

MITOCHONDRIA

Q.34 Which of the following cell organelle can be viewed with the help of high power light microscope?

A) Endoplasmic reticulum
B) Ribosomes
C) Mitochondria
D) Golgi apparatus

Q.35 It is the correct location of ATP synthase in mitochondria:

A) Mitochondrial matrix
B) Inner mitochondrial membrane
C) Outer mitochondrial membrane
D) Inter membrane space

Q.36 Which of the following structure is involved in oxidative phosphorylation?
A) Inner mitochondrial membrane
B) Mitochondrial matrix
C) Outer mitochondrial membrane
D) Thylakoid membrane

Q.37 Krebs cycle occurs in _____ of mitochondria.
A) Matrix
B) F_1 particles
C) Stroma
D) Cristae

Q.38 Which of the following cell type is more appropriate to study mitochondria?
A) RBC
B) Muscle cell
C) Mesophyll cell
D) *E. coli*

CHLOROPLAST

Q.39 Which of the following eukaryotic organelle has symbiotic origin with bacteria?
A) Endoplasmic reticulum
B) Chloroplast
C) Lysosomes
D) Golgi apparatus

Q.40 Chlorophyll molecule resembles with:
A) Carotenoids
B) Xanthophylls
C) Globin chains of hemoglobin
D) Haem part of hemoglobin

Q.41 Which of the following statement is incorrect?
A) CO_2 fixation occurs in stroma
B) Inter-granum is photosynthetic
C) Chloroplasts are self-replicating
D) Chloroplasts have 70S ribosomes

NUCLEUS

Q.42 Nucleolus is visible in:
A) Interphase
B) Mitotic phase
C) Metaphase
D) Anaphase

Q.43 Which of the following organelle have a continuous connection with nuclear membrane?
A) Golgi Apparatus
B) Lysosomes
C) RER
D) SER

Q.44 It precisely describe the function of nucleoli:
A) Formation and breakdown of nuclear envelope
B) Formation of centromere
C) Formation of ribosomes
D) Organization of spindle during nuclear division

Q.45 rRNA is actively synthesized in:
A) Lysosome
B) Nucleolus
C) Nucleoplasm
D) Ribosomes

Q.46 How many nuclear pores are present a typical differentiated cells such as RBCs?
A) About 30,00 per nucleus
B) About 30,000 per nucleus
C) About 1-2 per nucleus
D) About 3-4 per nucleus

PROKARYOTIC AND EUKARYOTIC CELL

Q.47 Which of the following statement is true?
A) Prokaryotic cells are bigger than eukaryotic cells
B) Prokaryotic cells came before eukaryotic cells
C) Eukaryotic cells do not have a nucleus, prokaryotic cell do
D) Eukaryotic cells are simple, prokaryotic cells are complex

Q.48 What is the main difference between prokaryotes and eukaryotes?
A) Prokaryotes cannot undergo cell division
B) Prokaryotes have no DNA
C) Prokaryotes do not have internal membranes
D) Prokaryotes have no cytosol

Q.49 Prokaryotic and eukaryotic cells generally have which of the following feature in common?
A) A membrane bounded nucleus
B) Presence of ribosomes
C) A cell wall made up cellulose
D) Linear genome

Q.50 The distinguishing feature of prokaryotic cell is its:
A) Chemical nature of DNA
B) Cell wall
C) Ribosomes
D) Cytoplasmic Streaming movement

PAST PAPER MCQs

2008

Q.1 Which of the following modifies proteins and lipids by adding carbohydrates?
A) Golgi Apparatus
B) Polysome
C) Plasma membrane
D) None of these

Q.2 Which one of the following is most slender in structure?
A) Microtubules
B) Microfilaments
C) Intermediate filaments
D) Both A and B

Q.3 Which of the following are colorless?
A) Chloroplasts
B) Chromoplasts
C) Leucoplasts
D) None of these

Q.4 Which of the following has 40 chromosomes?
A) Corn
B) Sugarcane
C) Frog
D) Mouse

2009

Q.5 Detoxification of harmful drugs within the cell is done by:
A) Nucleolus
B) Smooth surface endoplasmic reticulum
C) Ribosomes
D) Food vacuoles

Q.6 A group of ribosomes attached to messenger RNA is known as:
A) Ribosome
B) Lysosome
C) Nucleosome
D) Polysome

2010

Q.7 Microtubules of spindle fibers are composed of a protein called:
A) Tubulin
B) Actin
C) Myosin
D) Troponin

Q.8 In prokaryotic cell, wall strengthening material is:
A) Cellulose
B) Silica
C) Chitin
D) Peptidoglycan

Q.9 The entire cell wall of bacteria is often regarded as a single huge molecule or molecular complex called:
A) Capsule
B) Secondary wall
C) Slime capsule
D) Sacculus

2011

Q.10 Which of the following organelles is concerned with the cell secretion?
A) Ribosomes
B) Golgi apparatus
C) Lysosomes
D) Mitochondria

Q.11 The inner membrane of mitochondria is folded to form finger like structure called:
A) Cristae
B) Vesicle
C) Matrix
D) Cisternae

Q.12 Interior of chloroplast is divided into heterogeneous structure, embedded in the matrix known as:
A) Grana
B) Stroma
C) Thylakoids
D) Cisternae

Q.13 Which of the following contains peptidoglycan cell wall?
A) *Penicillium*
B) Bacterium
C) *Adiantum*
D) *Polytrichum*

2012

Q.14 Plastids are only found in the:
A) Animals and Plants
B) Animals
C) Plants
D) Viruses

Q.15 Plasma membrane is chemically composed of:
A) Phospholipids only
B) Lipids and proteins
C) Lipids and carbohydrates
D) Glycoproteins

Q.16 Endoplasmic reticulum contains a system of flattened membrane-bounded sacs which are named as:
A) Cristae
B) Marks
C) Cisternae
D) Tubules

Q.17 Lipid synthesis/metabolism takes place in which of the following organelle?
A) Mitochondria
B) Vacuole
C) Rough endoplasmic reticulum
D) Smooth endoplasmic reticulum

Q.18 Ribosomes exist in two forms, either attached with RER or freely dispersed in the:
A) Tonoplast
B) Golgi bodies
C) Cytoplasm
D) SER

Q.19 The ribosomal RNA is synthesized and stored in:
A) Endoplasmic reticulum
B) Nucleolus
C) Golgi complex
D) Chromosomes

2013

Q.20 The _____ model of plasma membrane suggests that proteins are embedded in lipid bilayer.
A) Unit membrane
B) Fluid mosaic
C) Permeable
D) Ultracentrifuge

Q.21 Lipid metabolism is the function of:
A) Mitochondria
B) Sarcoplasmic reticulum
C) RER
D) SER

Q.22 The enzymes of lysosomes are synthesized on:
A) RER
B) SER
C) Chloroplast
D) Golgi apparatus

Q.23 The process by which unwanted substances within the cell are engulfed and digested within the lysosome is known as:
A) Endocytosis
B) Exocytosis
C) Hydrolysis
D) Autophagy

Q.24 Centriole is made up of _____ microtubules:
A) 9
B) 27
C) 3
D) 12

Q.25 Which of the following structure is absent in higher plants and found in animal cells?
A) Centriole
B) Cytoskeleton
C) Mitochondria
D) Cytoplasm

Q.26 The outer membrane of the nuclear envelope is at places continuous with the:
A) Golgi apparatus
B) Endoplasmic Reticulum
C) Lysozymes
D) Peroxisomes

Q.27 The function of nucleolus is to make:
A) rDNA
B) Ribosomes
C) RNA
D) Chromosomes

2014

Q.28 The intake of liquid materials across the cell membrane is:

A) Phagocytosis
B) Endocytosis
C) Pinocytosis
D) Exocytosis

Q.29 Which component of the cell is concerned with cell secretions?

A) Plasma membrane
B) Golgi complex
C) Cytoskeleton
D) Mitochondria

Q.30 During animal cell division, the spindle fibers are formed from:

A) Mitochondria
B) Centrioles
C) Ribosomes
D) Lysosomes

Q.31 In mitochondria, small knob-like structures called F_1 particles are found in:

A) Outer membrane
B) Outer compartment
C) Inner membrane
D) Inner compartment

Q.32 Organelle involved in the synthesis of ATP is:

A) Ribosome
B) Mitochondria
C) Nucleus
D) Centriole

Q.33 Peptidoglycan or murein is a special or distinctive feature of cell wall in:

A) Algae
B) Fungi
C) Bacteria
D) Plants

Q.34 How many triplets of microtubules are present in centriole?

A) Ten
B) Eight
C) Nine
D) Seven

2015

Q.35 Fluid mosaic model of plasma membrane states that protein molecules float in a fluid like _____ layer.

A) Galactose
B) Phospholipids
C) Glucose
D) Carbohydrate

Q.36 Ribosomes are tiny organelles, which are involved in the synthesis of:

A) Protein
B) RNA
C) Nucleus
D) Nucleosome

Q.37 Which one of the following cell structure is involved in the synthesis of lipids?

A) Endoplasmic reticulum
B) Golgi complex
C) Centriole
D) Mitochondria

Q.38 Which organelle is bounded by two membranes?

A) Ribosome
B) Mitochondria
C) Lysosome
D) Nucleolus

2016

Q.39 The inner membrane of mitochondria form extensive infoldings called:

A) Cristae
B) Cisternae
C) Lamella
D) Bifidae

Q.40 The rapid exchange of materials through carrier proteins across the plasma membrane is called:

A) Passive Diffusion
B) Active Transport
C) Endocytosis
D) Facilitated Diffusion

Q.41 The basic structure of plasma membrane is provided by:

A) Proteins
B) Cholesterols
C) Cytoskeleton
D) Phospholipids

Q.42 **Out of the given options, choose the one which shows the structures found only in plants?**

A) Vacuole, Chloroplast, Ribosomes
B) Chloroplast, Microtubules, Peroxisomes
C) Chloroplast, Cell Wall, Vacuole
D) Chloroplast, Cell Wall, Mitochondria

Q.43 **Presence of large central vacuole is the characteristic of:**

A) Prokaryotes
B) Protists
C) Fungi
D) Plants

Q.44 **The organelle involved in detoxification of drugs and poisons in the liver cells:**

A) Smooth Endoplasmic Reticulum
B) Rough Endoplasmic Reticulum
C) Golgi apparatus
D) Lysosomes

Q.45 **Which one of the following organelle is found in both prokaryotic and eukaryotic cells?**

A) Centriole
B) Endoplasmic Reticulum
C) Nucleus
D) Ribosome

2017

Q.46 **Select the organelle which is only present in animal cells:**

A) Centrioles
B) R.E.R
C) Microtubules
D) Ribosomes

Q.47 **Ribosomes present in prokaryotes are:**

A) 80S
B) 60S
C) 50S
D) 70S

Q.48 **Functionally, mesosomes can be compared with:**

A) Ribosomes
B) Mitochondria
C) Polysomes
D) Golgi bodies

Q.49 **Which of the following structure is present in both plant and animal cells but is absent in prokaryotic cells?**

A) Centrioles
B) Microtubule
C) Plastids
D) Sieve tubes

Q.50 **DNA molecule in prokaryotes is:**

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

2017-Retake

Q.51 **Organelle involved in aerobic respiration:**

A) Mitochondria
B) Lysosome
C) Plastids
D) Ribosome

Q.52 **Inner membrane of mitochondria is called:**

A) Cisternae
B) Cristae
C) Lemma
D) Tonoplast

Q.53 **Group of ribosomes attached to mRNA is called:**

A) Polyploid
B) Polysome
C) Polynucleotide
D) Polysaccharide

Q.54 **Which of the following organelle consist of two subunits?**

A) Golgi body
B) Mitochondria
C) Ribosome
D) Plastid

Q.55 Ribosome present in prokaryotes are of:
A) 70S C) 60S
B) 80S D) 40S

Q.56 Taking in of solid particle by cell is called:
A) Phagocytosis C) Exocytosis
B) Pinocytosis D) Endocytosis

Q.57 Self eating of lysosomes is called:
A) Phagocytosis C) Autophagy
B) Pinocytosis D) Exocytosis

Q.58 Nuclear membrane is continuous with:
A) E.R C) Lysosome
B) Golgi Body D) Peroxisome

Q.59 Ribosomal RNA is synthesized in:
A) Nucleolus C) Golgi body
B) Peroxisome D) Nucleoplasm

2018

Q.60 The ability to distinguish between two separate points/objects is:
A) Magnification C) Centrifugation
B) Fractionation D) Resolution

Q.61 Lipid synthesis or lipid metabolism is the function of:
A) Smooth endoplasmic reticulum C) Mitochondria
B) Rough endoplasmic reticulum D) Golgi complex

Q.62 Site of protein synthesis in cell is:
A) Ribosome C) Nucleolus
B) Endoplasmic reticulum D) Smooth endoplasmic reticulum

Q.63 Ribosomes are made up of _____ and _____.
A) RNA and proteins C) RNA and carbohydrates
B) RNA and lipids D) Proteins and carbohydrates

Q.64 Tonoplast bounds which organelle:
A) Golgi complex C) Endoplasmic reticulum
B) Nucleus D) Vacuoles

Q.65 These structures are involved in the breakdown of old organelles:
A) Leucoplasts C) Glyoxysomes
B) Lysosomes D) Peroxisomes

Q.66 In cross section, each centriole consist of nine (each in triplets) of:
A) Microfilaments C) Microtubules
B) Microvilli D) Intermediate filaments

Q.67 The cisternae break up into vesicles from _____ and _____ of Golgi complex.
A) Convex, forming face C) Convex, maturing face
B) Concave, forming face D) Concave, maturing face

Q.68 Which statement is correct about mitochondria and chloroplast?
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

2019

Q.69 **If 15 μm size object is observed under light microscope using 5X eyepieces and 10X objective, its magnified image size will be:**

A) 250 μm
B) 50 μm
C) 750 μm
D) 500 μm

Q.70 **Passive processes for the movement of molecules across cell surface membrane are:**

A) Facilitated diffusion and osmosis
B) Pinocytosis and facilitated diffusion
C) Diffusion and exocytosis
D) Osmosis and phagocytosis

Q.71 **Smooth endoplasmic reticulum is responsible for the metabolism of:**

A) Carbohydrates
B) Proteins
C) Nucleic acids
D) Lipids

Q.72 **Site of protein synthesis is:**

A) Ribosomes
B) Lysosomes
C) Golgi body
D) Cisternae

Q.73 **Which cell organelle is responsible for cell secretion?**

A) Mitochondrion
B) Chloroplast
C) Ribosomes
D) Golgi body

Q.74 **The finger like infoldings which are formed by inner membrane of mitochondria are called:**

A) Matrix
B) Porin
C) Cristae
D) Ribosomes

Q.75 **Among followings which cellular organelle contains circular DNA similar to those found in bacteria?**

A) Ribosome
B) Lysosome
C) Chloroplast
D) Nucleus

Q.76 **The structure present in a eukaryotic cell but absent in prokaryotic cells is:**

A) Nucleus
B) DNA
C) Ribosomes
D) Cell surface membrane

Q.77 **The prokaryotes possess small ribosomes of size:**

A) 40S
B) 70S
C) 65S
D) 60S

ANSWER KEY

TOPIC-WISE MCQs

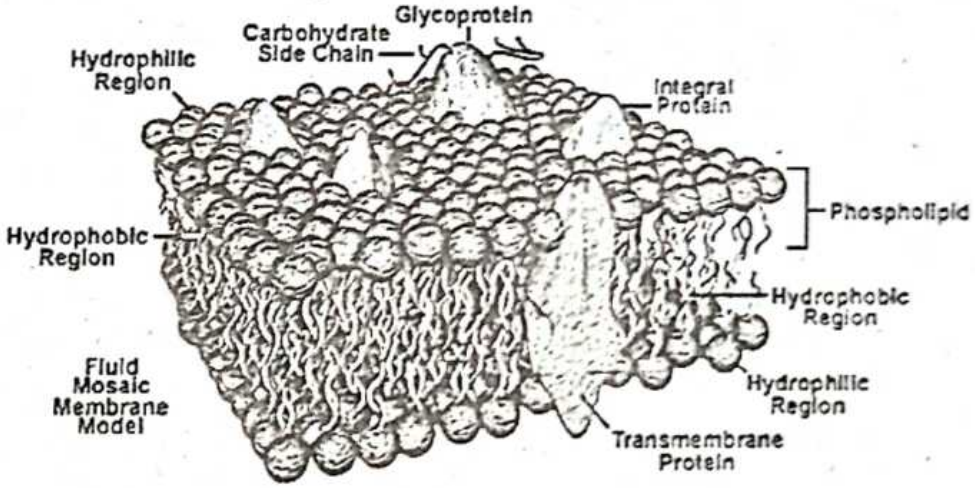
1	C	11	C	21	B	31	A	41	B
2	D	12	C	22	D	32	A	42	A
3	D	13	C	23	D	33	C	43	C
4	A	14	C	24	A	34	C	44	C
5	B	15	B	25	A	35	B	45	B
6	C	16	B	26	C	36	A	46	D
7	B	17	C	27	B	37	A	47	B
8	B	18	A	28	D	38	B	48	C
9	D	19	C	29	A	39	B	49	B
10	D	20	C	30	D	40	D	50	B

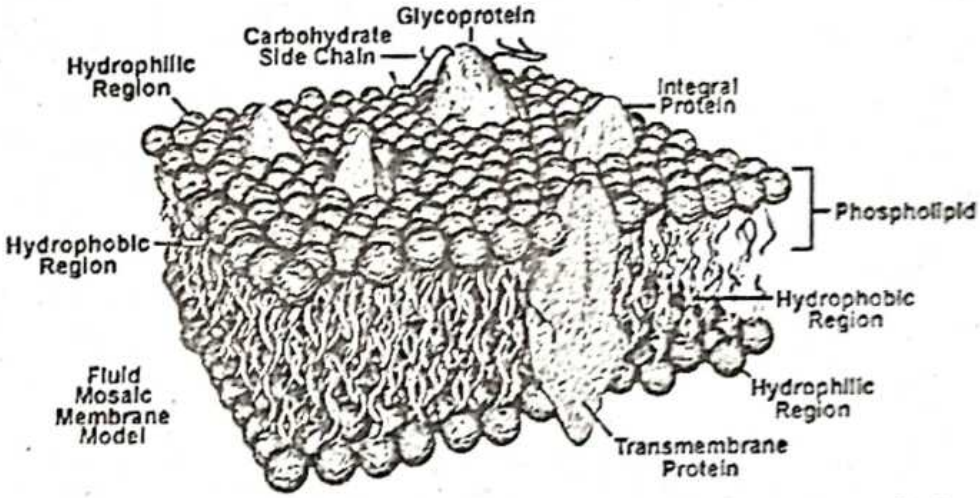
PAST PAPERS MCQs

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

EXPLANATORY NOTES

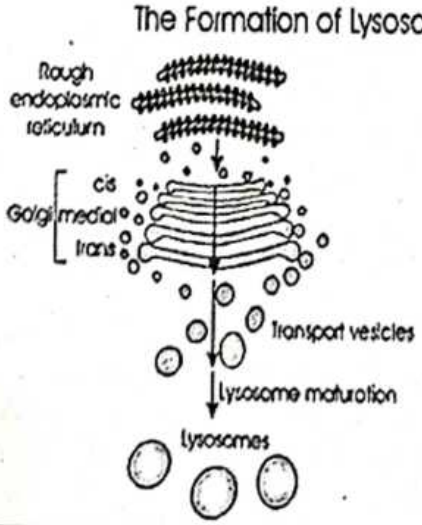
TOPIC-WISE MCQs

1. Resolution of human eye is 1.0mm. Resolution of compound microscope is 2.0μm that is 500X of human eye. Resolution of electron microscope is 2-4 Angstrom that is 500X of compound microscope.
2. Internal cell structure can be studied by using simple compound microscope i.e. mitochondria. Electron microscope, however, provide us better details of cell organelles.
3. 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.
4. Plants cells are generally equipped with cell wall, central large vacuole and chloroplast while it generally lacks flagella.
5. Globular proteins, polysaccharides and phospholipids are present in both prokaryotic and eukaryotic cell membranes while cholesterol is present only in eukaryotic cell membrane.
6. 

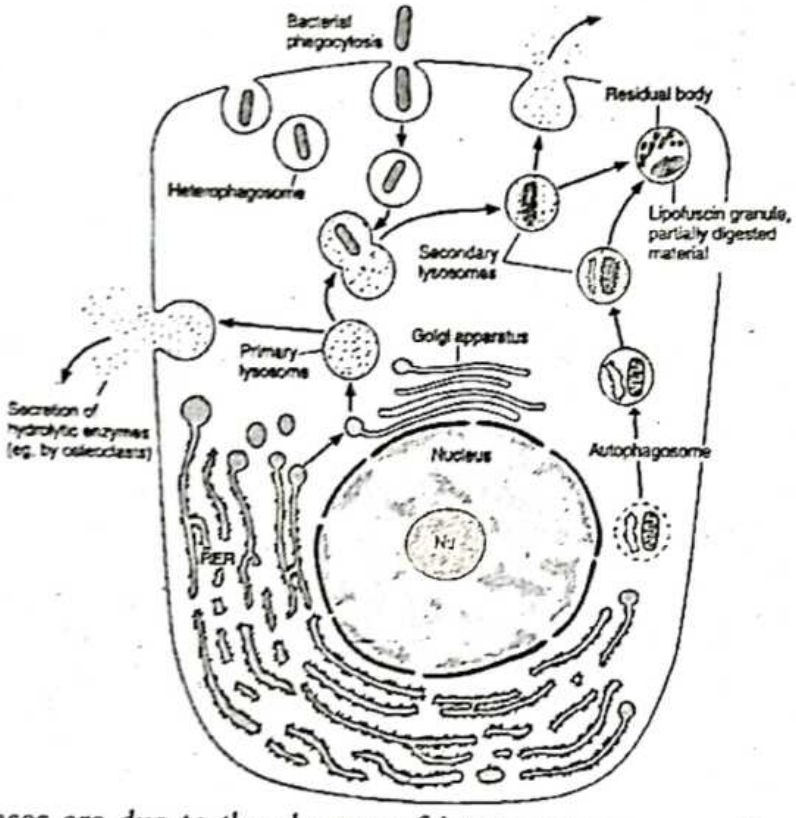
7. 

8. Glycolipids and glycoproteins are oriented towards outer surface of plasma membrane and form glycocalyx and act as receptors.

9. 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.
10. Glycoproteins which are present on plasma membrane can act as receptors for hormones and various other molecules.
11. Cell membrane is the most important structure because it is responsible for identity and integrity of the cell.
12. Secretory proteins are synthesized on RER, then transferred to Golgi apparatus through SER for final processing and packaging and finally released as secretory vesicles via cell membrane.
13. Adipose tissue is concerned with conversion, synthesis and storage of lipids that is why it contains more SER than RER.
14. 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.
15. Nucleus, chloroplast and mitochondria are double membranous organelles while endoplasmic reticulum is single membranous.
16. Role in 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.
17. Mitochondria are responsible for fatty acid metabolism while steroid biosynthesis takes place in SER.
18. Nucleus contains genomic DNA, chloroplast and mitochondria have their own circular genomic DNA while ribosomes are made up of rRNA and protein.
19. *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.
20. Mitochondria and chloroplast have 70S ribosomes while nucleus has subunits of ribosomes synthesized in the darkly stained area, called nucleolus. Golgi apparatus, however, does not have any ribosome.
21. Endoplasmic reticulum is a single membranous organelle while nucleus and chloroplast are bounded by the double membrane. Ribosomes, however, are membrane-less organelles found in both prokaryotic and eukaryotic cells.
22. 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.
23. The enzymes required for proteins glycosylation are solely found in lumen of rough endoplasmic reticulum and Golgi complex. Hence, the more appropriate answer is "D". Golgi bodies are center for modifications and packaging.
24.



25. Proteins are synthesized on RER, and then they are transported in with the help of SER. The modification of these proteins is done in Golgi complex. Modified proteins are transported out of the cell in the form of secretory vesicles.
26. Lysosomes are most abundant in those cells which are specialized for phagocytic activities, for example WBCs.
27.



28. 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.
29. Vacuoles provide support for the individual plant cell and contribute to the turgidity of the leaves and younger parts of the plants.
30. Vacuole is single membrane bounded organelle. This single membrane around vacuole is known as tonoplast.
31. Tubulin is the most abundant protein found in microtubules while myosin, actin and tropomyosin are found in microfilaments.
32. Actin, myosin and tropomyosin are found in microfilaments of muscle cells while tubulin is found in microtubules.
33. A typical non-dividing animal cell has 2 centrioles. Duplication of centrioles occurs during G_2 phase so after G_2 it becomes 4. During metaphase, each pole of the cell has a pair of centrioles, i.e. 4 as total.
34. 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.
35. F_1 particles are located on cristae, the infoldings of the inner mitochondrial membrane. F_1 particle is actually ATP synthase which plays important role in synthesis of ATP through chemiosmosis.

36. ETC occurs in inner mitochondrial membrane which provides the site for pumping of protons across it. Oxidative phosphorylation is associated with ETC.

37. All the enzymes which are involved in Krebs cycle are present in matrix of mitochondria. It is the most important biochemical pathway of cellular respiration. The enzymes involved in dark reactions of photosynthesis are found in stroma of chloroplasts.

38. Mitochondria are most abundant in muscle cells because of the strenuous metabolic activities. *E. coli* is a prokaryotic organism and lack mitochondria. RBC's also lack mitochondria.

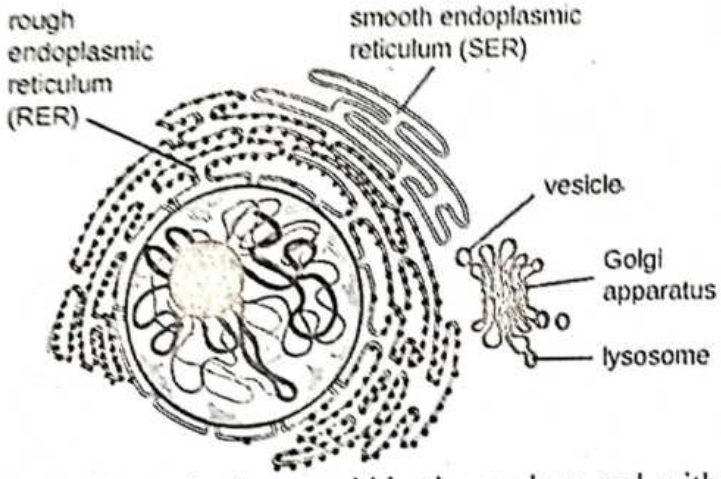
39. Two most important organelles e.g. chloroplast and mitochondria, are thought to be originated from prokaryotes and are explain with the help of endosymbiont hypothesis.

40. The only difference between chlorophyll and haemoglobin is that chlorophyll has Mg^{++} while haem has Fe^{++} as the central atom.

41. 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.

42. Nucleus and nucleolus is visible during interphase only because in mitotic phase, nuclear envelope disintegrates and mixing of nuclear contents with cytoplasm does occur.

43.



44. 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.

45. The rRNA is synthesized and stored in nucleolus. Central fibril area of nucleolus has large molecular weight RNA and rDNA.

46. 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.

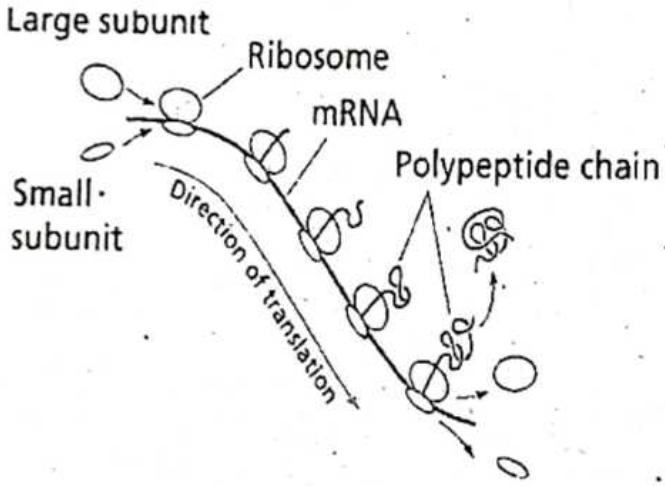
47. Prokaryotic cells may have arisen more than 3.5 billion years ago while eukaryotes are thought to have first appeared about 1.5 billion years ago.

48. Besides nuclear envelope, the main difference between prokaryotic and eukaryotic cell is the absence of membrane bounded organelles.

49. Both prokaryotic and eukaryotic cells have ribosomes while membrane bound nucleus, cellulosic cell wall and linear chromosomes are found only in eukaryotic cells.

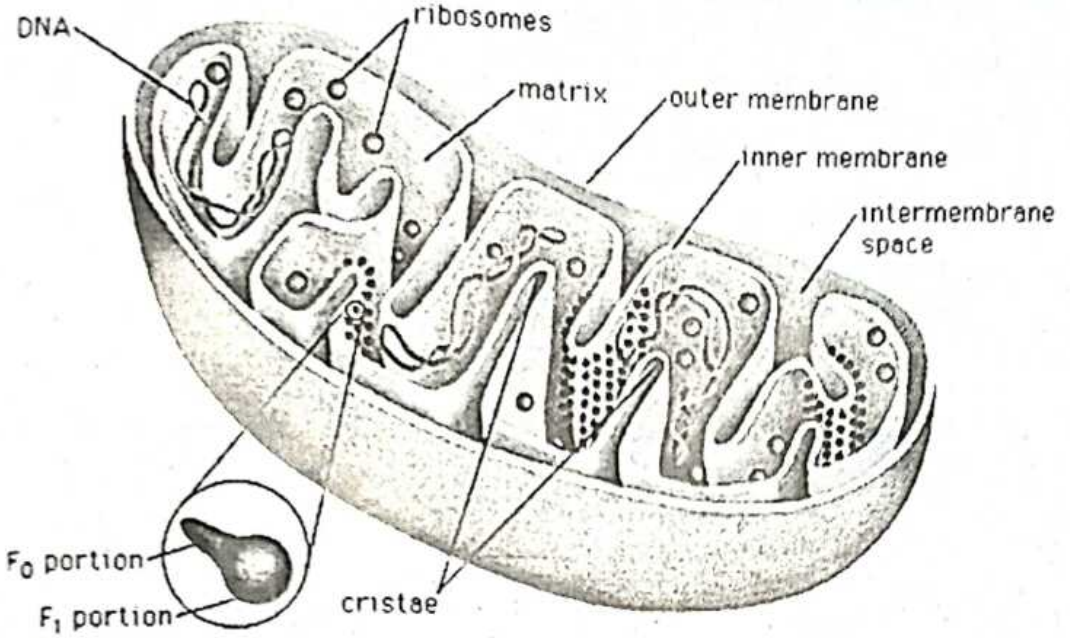
50. The most distinguished feature of a prokaryotic cell is its cell wall and chemically, it is composed of carbohydrates and short peptides. This complex molecule is called peptidoglycan/murein.

PAST PAPER MCQs

1. The enzymes required for proteins glycosylation are solely found in lumen of rough endoplasmic reticulum and Golgi complex. Hence, the more appropriate answer is "D". Golgi bodies are center for modifications and packaging.
2. Microfilaments are considerably more slender cylinders made up of contractile actin protein, linked to the inner face of plasma membrane.
3. Chloroplasts are green in colour due to the presence of green pigment 'chlorophyll'. Chromoplasts are colored and help for pollination and seed dispersal. Leucoplasts are colorless and are found in underground parts of the plant and store food.
4. Mouse has 40, corn has 20, sugarcane has 80, and frog has 26 chromosomes in their diploid cells.
5. The 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.
6. 

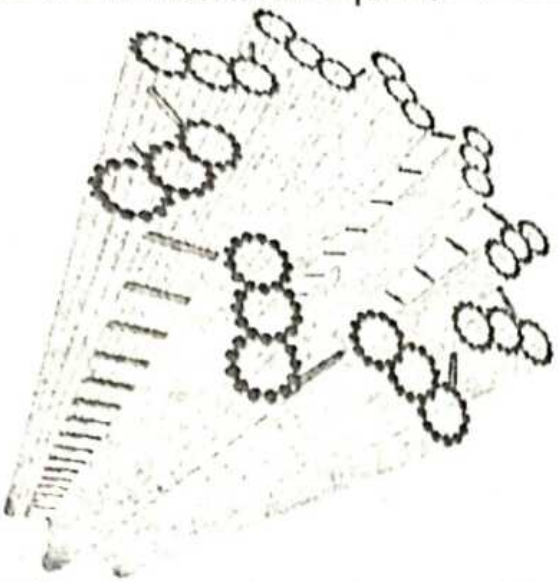
7. Tubulin is the most abundant protein found in microtubules while myosin, actin and tropomyosin are found in microfilaments.
8. Bacterial cell wall is composed of peptidoglycan also called murein, which is made from polysaccharide chains cross-linked by short peptides. Bacterial cell walls are different from the cell walls of plants and fungi which are made of cellulose and chitin, respectively.
9. In case of bacterial cell, the entire cell wall is often regarded as a single huge molecule or molecular complex known as sacculus. Capsule and smile are outer covering to cell wall in some bacteria.
10. 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.

11.



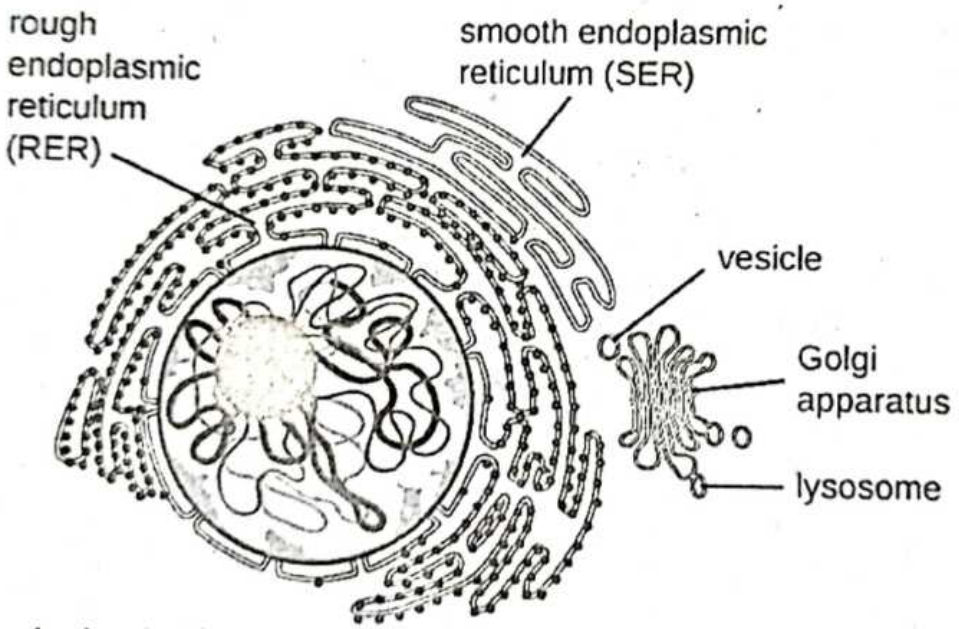
12. Thylakoids are flattened vesicles which arrange themselves in the form of grana and inter-granum. Grana are piled up in the form of coins.
13. Bacterial cell walls are made of peptidoglycan also called murein, which is made from polysaccharide chains cross-linked by short peptides. Bacterial cell walls are different from the cell walls of plants and fungi which are made of cellulose and chitin, respectively.
14. Plastids are present in autotrophic eukaryotes and multicellular organisms such as plants and algae. Animals are heterotrophs and viruses are not considered as living organisms.
15. Plasma membrane is made up 60-80% of proteins, 20-40% of lipids and very small amount of carbohydrates.
16. Material in Endoplasmic reticulum is separated from the cytoplasmic materials by the spherical or tubular membranes, called cisternae.
17. Mitochondria are responsible for fatty acid catabolism while lipid synthesis takes place in SER.
18. Ribosomes are factory of protein synthesis. The attached ribosomes are associated with RER and nuclear membrane but the free ribosomes are suspended in the cytoplasm.
19. The rRNA is synthesized and stored in nucleolus. Central fibril area of nucleolus has large molecular weight RNA and rDNA.
20. Fluid mosaic model of the plasma membrane described the arrangement of phospholipids in two layers, stabilized interiorly by the hydrophobic interactions while hydrophilic interactions at intracellular and extracellular faces with embedded proteins randomly.
21. Mitochondria are responsible for fatty acid catabolism while lipid synthesis takes place in SER.
22. All enzymes are proteins in nature. Lysosomal enzymes are synthesized on RER then transported with the help of SER towards Golgi complex from where they bud off in the form of primary lysosomes.
23. Autophagy is the natural, regulated mechanism of the cell that removes unnecessary or dysfunctional component of the cell. It allows the orderly degradation and recycling of cellular components.

24. Each centriole is made of nine microtubule triplets (9×3=27).



25. Flagella are absent in plants because plants are non-motile. As flagella are formed from centrioles so centrioles are absent in most of the plants. In case of plants, spindle fibers arise from analogous region due to the absence of centrioles.

26.



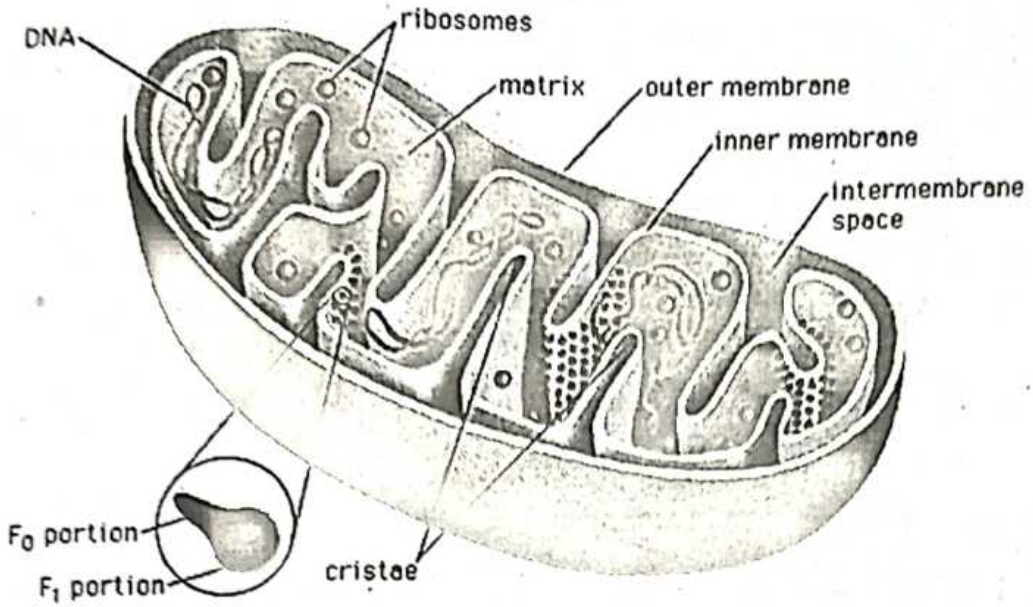
27. Nucleolus is the darkly stained area within the nucleus and without any membranous boundary to separate it from the rest of the nuclear material. These are said to be the factory of ribosomes while ribosomes are said to be the factory of protein synthesis.

28. 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.

29. 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.

30. Spindle fibers are made up of microtubules. There are two centrioles in non-dividing stage of a cell. Each centriole has nine microtubule triplets. During dividing stage of cell, spindle fibers arise from these centrioles.

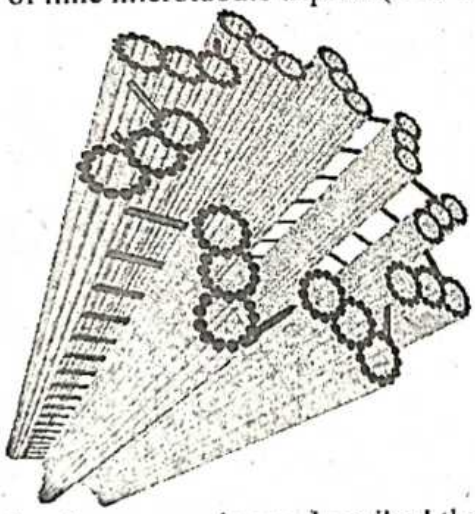
31.



32. F_1 particles are located on cristae, the infoldings of inner mitochondrial membrane. F_1 particle is actually ATP synthase which plays role in synthesis of ATP through chemiosmosis.

33. Bacteria cell wall is made up of peptidoglycan which has glycan with short chain of amino acids.

34. Each centriole is made of nine microtubule triplets (9×3=27).



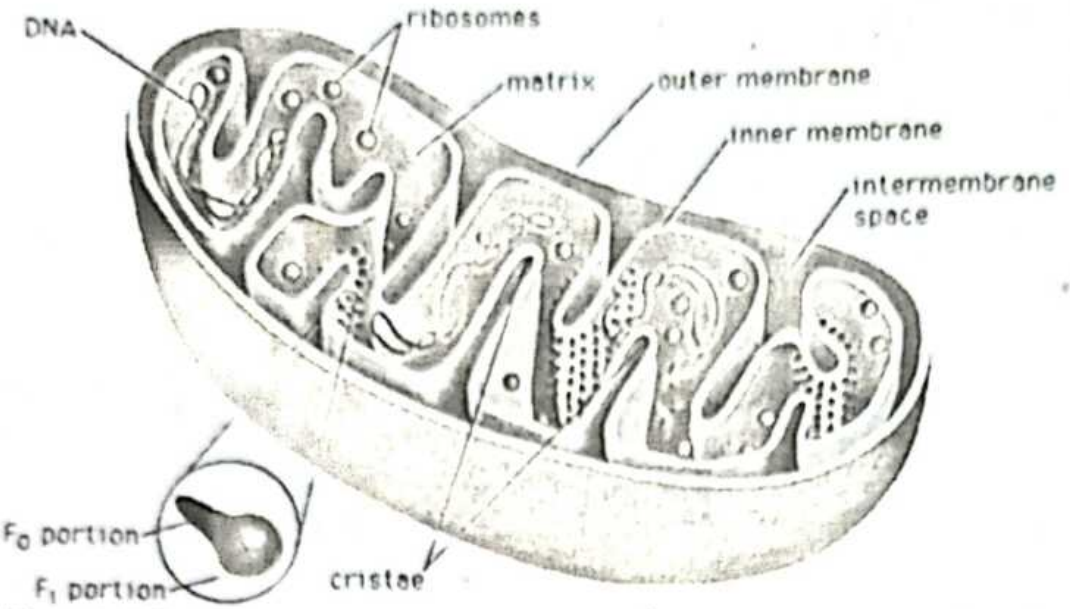
35. Fluid mosaic model of the plasma membrane described the arrangement of phospholipids in two layers, stabilized interiorly by the hydrophobic interactions while hydrophilic interactions at intracellular and extracellular faces with embedded proteins randomly.

36. Ribosomes are factory of protein synthesis. The attached ribosomes are associated with RER and nuclear membrane but the free ribosomes are suspended in the cytoplasm.

37. Mitochondria are responsible for fatty acid catabolism while lipid synthesis takes place in SER.

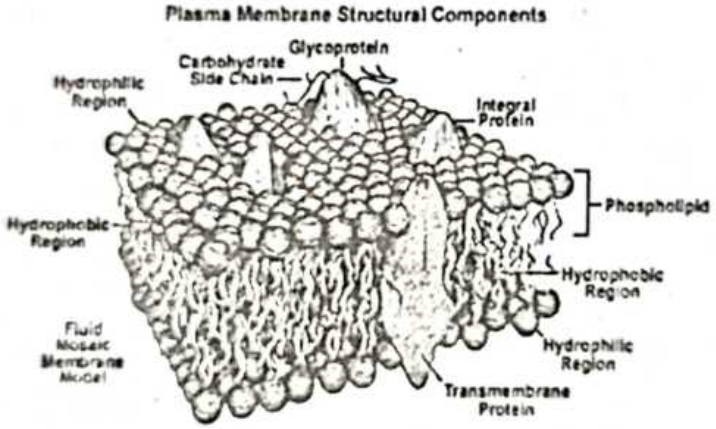
38. Mitochondria, chloroplast and nucleus are double membrane bounded organelles. Lysosomes, Golgi complex, endoplasmic reticulum and micro-bodies are single membranous organelles while ribosomes lack membrane.

39.



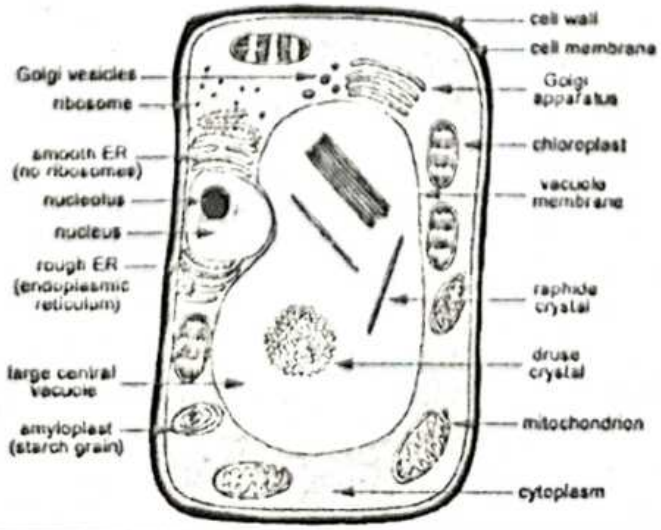
40. Facilitated diffusion also known as facilitated transport or passive-mediated transport, is the process of spontaneous passive transport of molecules or ions across a biological membrane via specific trans-membrane integral proteins.

41.



42. Chloroplast, cell wall and large central vacuole are the organelles which are absent in an animal cells but present in plant cells.

43.



44. The 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.

45. 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.

46. Centrioles are present only in animal cell but RER, microtubules and ribosomes are present in both animal and plant cells.

47. 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.

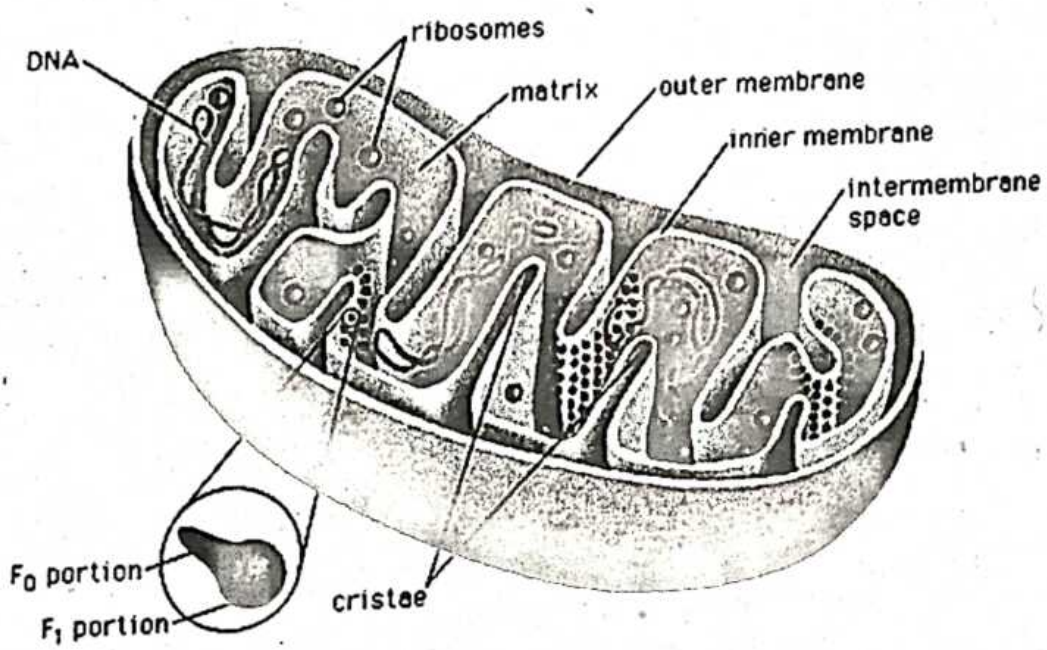
48. Mesosomes are membrane infoldings in bacterial cell and are more prominent in Gram negative bacteria. Mesosomes are the sites of cellular respiration. Electron transport chain occurs in mesosomes as mitochondria is absent in bacteria.

49. Mitotic and meiotic cell divisions are absent in bacterial cells instead bacterial cells divide through binary fission. Microtubules are responsible for spindle formation and these ensure mitosis and meiosis in eukaryotic cells.

50. Genomic DNA molecules in prokaryotes is single, circular, double stranded and not bounded by any membrane and it is freely dispersed in cytoplasm.

51. Mitochondria are power house of a cell. Aerobic cellular respiration takes place in mitochondria.

52.



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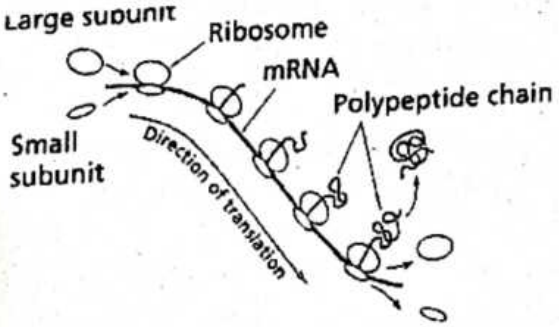


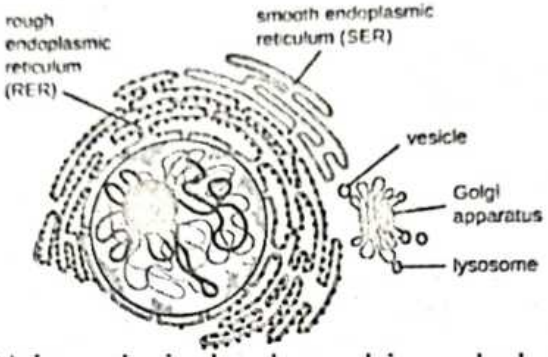
54. A ribosome is made up of two sub-units, larger and smaller subunits. In case of eukaryotic cell, larger subunit is 60S and smaller subunit is 40S while prokaryotic cell has 50S and 30S larger and smaller sub-units, respectively.

55. Smaller ribosomes (70S) are present in prokaryotic cell but larger ribosomes (80S) are present in eukaryotic cells.

56. 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.

57. Autophagy is the natural, regulated 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.

58.



59. Ribosomal RNA (rRNA) is synthesized and stored in nucleolus. Central fibril area of nucleolus has large molecular weight RNA and rDNA.

60. Resolution is the shortest distance between two points that a user can still see as separate images under the microscope.

61. SER is responsible for lipid metabolism, detoxification, nerve impulse conduction and transport of material in the cell.

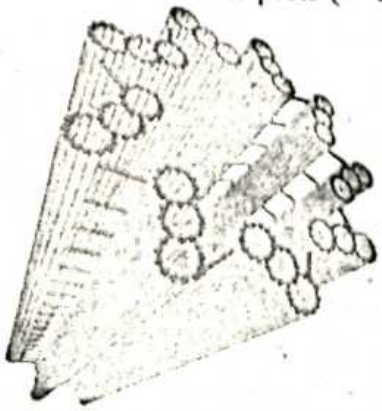
62. Ribosome is the factory of protein synthesis. But the factory of ribosomes synthesis is nucleolus.

63. Chemically ribosomes are composed of an almost equal amount of RNA and proteins; hence they are ribonucleo-protein particles.

64. Vacuole is single membrane bounded organelle. This single membrane bounding vacuole is known as tonoplast.

65. Lysosomes are membrane bound, dense granular structures containing hydrolytic enzymes responsible mainly for intracellular and extracellular digestion.

66. Each centriole is made of nine microtubule triplets (9×3=27).



67. Maturing, concave and inner face of the Golgi complex is the site from where Golgi vesicles after processing are budded off.

68. 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.

69. Magnification of a microscope is the combine effect of lenses. For a compound microscope the total magnification will be M = mo x me, where 'mo' is the magnification due to objective and 'me" is that due to eyepiece.

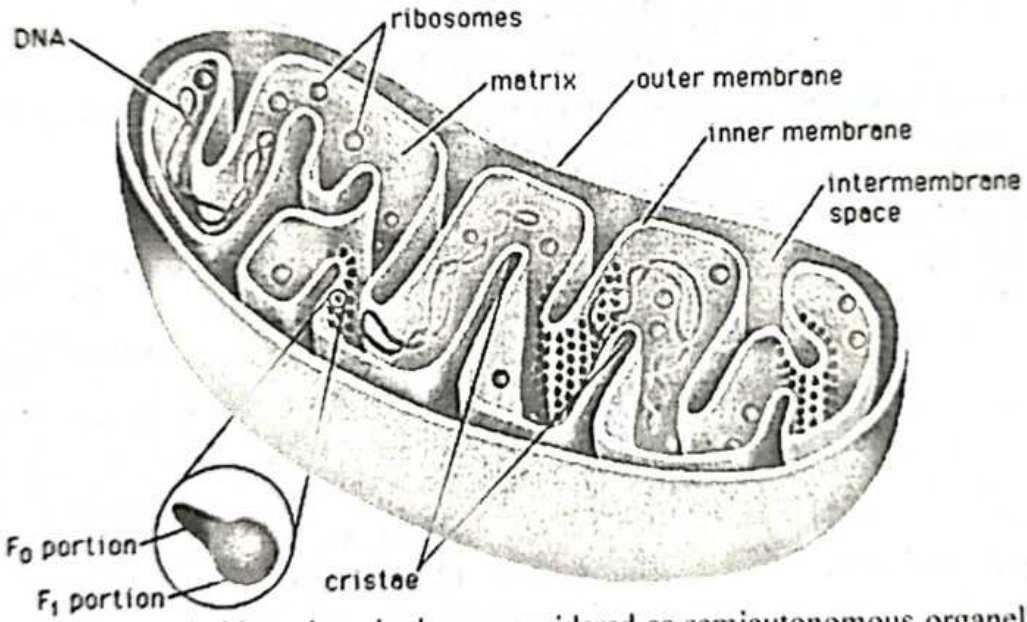
70. Osmosis, diffusion and facilitated diffusion are passive processes of passage of molecules across the cell membrane but exocytosis and endocytosis are active processes of molecules across the cell.

71. SER is responsible for lipid metabolism, detoxification, nerve impulse conduction and transport of material in the cell.

72. Ribosome is the factory of protein synthesis. But the factory of ribosomes synthesis is nucleolus.

73. 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.

74.



75. 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.

76. 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.

77. Smaller ribosomes (70S) are present in prokaryotic cell but larger ribosomes (80S) are present in eukaryotic cells.

2 TOPIC BIOLOGICAL MOLECULES

PRACTICE EXERCISE

TOPIC-WISE MCQs

CARBOHYDRATES

Q.1 Most abundant carbohydrate in nature is:
A) Cellulose
B) Starch
C) Polysaccharides
D) Glycogen

Q.2 All of the following yield glucose on complete hydrolysis except:
A) Starch
B) Glycogen
C) Cellulose
D) Chitin

Q.3 Glucose combines with _____ to form milk sugar.
A) Glucose
B) Fructose
C) Galactose
D) Mannose

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

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

Q.6 Which of the following polysaccharide is present in human muscles abundantly?
A) Myoglobin
B) Collagen
C) Actin and myosin
D) Glycogen

Q.7 Pick out the odd one:
A) Cellulose
B) Galactose
C) Agar
D) Pectin

Q.8 Which of the following carbons are present outside the ring of fructose?
A) 1st carbon & 2nd carbon
B) 1st carbon and 5th carbon
C) Only 1st carbon
D) 1st carbon and 6th carbon

Q.9 Which of the following sugar is most sweet?
A) Glucose
B) Sucrose
C) Fructose
D) Maltose

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

Q.11 Which of the following is non-reducing disaccharide sugar?
A) Mannose
B) Maltose
C) Sucrose
D) Lactose

Q.12 Which of the following sugar is mainly present in human blood?
A) Glucose
C) Sucrose
B) Fructose
D) Mannose

LIPIDS

Q.13 It is an amino acid and also a part of phospholipid:
A) Serine
B) Choline
C) Ethanolamine
D) Aspartic acid

Q.14 Myelin sheath of neuron is composed of:
A) Sphingolipids
B) Choline
C) Ethanolamine
D) Waxes

Q.15 How many double bond are present in R group of oleic acid?
A) 4
B) 6
C) 2
D) 1

Q.16 Which of following fatty acid is least likely to be found in waxes?
A) Steric acid
B) Acetic acid
C) Oleic acid
D) Palmitic acid

Q.17 Which of following not form a biopolymer?
A) Amino acid
B) Fatty acid
C) Nucleotides
D) Monosaccharides

PROTEINS

Q.18 Haemoglobin carries _____ oxygen Atoms.
A) 4
B) 8
C) 2
D) 1

Q.19 How many kinds of amino acids are present in the cell?
A) 170
B) 20
C) 25
D) 3000

Q.20 Which of the following amino acid is next to glycine with respect to the molecular structure?
A) Alanine
B) Serine
C) Ethanolamine
D) Aspartic acid

Q.21 A globular protein consisting of more than one polypeptide chains belongs to:
A) Primary structure
B) Secondary structure
C) Tertiary structure
D) Quaternary structure

Q.22 A protein having secondary structure possesses:
A) Hydrogen bonding
B) Disulfide bond
C) Peptide bond
D) Both A, C

Q.23 All of the following are examples of fibrous proteins except:
A) Silk fiber
B) Keratin
C) Myoglobin
D) Fibrin

Q.24 Which of the following is a complex of globular protein with non-proteinaceous material?
A) Collagen
B) Albumin
C) Fibrinogen
D) Haemoglobin

Q.25 Muscle haemoglobin possesses:
A) Primary structure
B) Secondary structure
C) Tertiary structure
D) Quaternary structure

Q.26 _____ are defensive proteins.
A) Antigens
B) Antibodies
C) Vaccines
D) Fibrinogen

Q.27 Proteins of hair, horns, feathers and other skinparts is:
A) Storage protein
B) Enzymatic protein
C) Structural protein
D) Hormonal protein

Q.28 Identify the protein, which cannot be crystallized?
A) Antibodies
B) Fibrin
C) Haemoglobin
D) Enzymes

Q.29 **How many peptide bonds are present in an insulin molecule?**

A) 49
B) 51
C) 50
D) 48

Q.30 **Usually a polypeptide chain bends and folds upon itself to form a globular shape. This isprotein's:**

A) Primary conformation
B) Secondary conformation
C) Tertiary conformation
D) Quaternary conformation

NUCLEIC ACIDS

Q.31 **All of the following biomolecules are nutritious except:**

A) Carbohydrates
B) Proteins
C) Lipids
D) Nucleic acids

Q.32 **It contains nitrogenous base:**

A) Glycogen
B) ATP
C) Cellulose
D) Haemoglobin

Q.33 **Which of following not yield phosphorus on hydrolysis?**

A) Nucleotide
B) Nucleoside
C) DNA
D) RNA

Q.34 **Which of following do not contain phosphodiester bond?**

A) DNA
B) ATP
C) RNA
D) NAD

Q.35 **Nucleic acid is:**

A) Monomer and micro molecule
B) Polymer and macro molecule
C) Monomer and macro molecule
D) Polymer and micro molecule

WATER

Q.36 **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) Organic, inorganic
C) Polar, bipolar
D) Ionic, covalent

Q.37 **Due to higher heat capacity and H bonds, water acts as:**

A) Thermo-stabilizer
B) Inert medium
C) Solvent
D) Reactive medium

ENZYEMS

Q.38 Coenzymes are closely related to:

A) Hormones
B) Inhibitors
C) Antibodies
D) Vitamins

Q.39 The effect of reversible competitive inhibitor can be neutralized by increasing the concentration of:

A) Substrate
B) Enzyme
C) Activator
D) Inhibitor

Q.40 Function of succinate dehydrogenase is aided by:

A) NAD^+
B) FAD^+
C) Metal ion
D) Vitamin

Q.41 Prosthetic groups are:

A) Metallic ions
B) Organic molecules
C) Inorganic molecules
D) Radicals

Q.42 Optimum pH value for pancreatic lipase is:

A) 7.60
B) 8.00
C) 9.00
D) 9.70

Q.43 ES complex is converted into product by:

A) Cofactor
B) Catalytic site
C) Coenzyme
D) Binding site

Q.44 Optimum pH of enterokinase is:

A) Slightly acidic
B) Slightly basic
C) Highly acidic
D) highly basic

Q.45 Allosteric enzymes have _____ major sites.

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

Q.46 Which of the following properties of amino acids is affected by a change in pH?

A) Oxidation of amino acids
B) Reduction of amino acids
C) Atomization of amino acids
D) Ionization of amino acids

Q.47 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 decrease in rate of reaction
D) First increase then become constant

PAST PAPER MCQs

2008

Q.1 **Name the human tissues that contain about 85% water:**
A) Nerve cells
B) Bone cells
C) Brain cells
D) none of these

Q.2 **Which of the following gives blue color with iodine?**
A) Starch
B) Cellulose
C) Glycogen
D) All of these

Q.3 **Which bond is the potential source of chemical energy for cellular activities?**
A) C-N
B) C-O
C) C-H
D) H-O

Q.4 **The optimum temperature for enzymes of human body is:**
A) 32°F
B) 46°C
C) 313 K
D) 37°C

2009

Q.5 **Which of the following components is less resistant to decay?**
A) Lignin
B) Starch
C) Chitin
D) Cellulose

Q.6 **Haemoglobin exhibits:**
A) Secondary Structure
B) Primary Structure
C) Quaternary Structure
D) Tertiary Structure

Q.7 **Antibodies are actually:**
A) Globular proteins
B) Glycoproteins
C) Fibrous proteins
D) Glycolipids

Q.8 **Enzyme after catalysis detaches itself from the product:**
A) Completely
B) Incompletely
C) Changed
D) Unchanged

2010

Q.9 **An activated enzyme consisting of polypeptide and a cofactor is known as:**
A) Amylase
B) Apoenzyme
C) Holoenzyme
D) Coenzyme

Q.10 **_____ forms weak linkages with enzymes and their effect can be neutralized completely or partly by an increase in the concentration of the substrate.**
A) Only competitive Inhibitors
B) Reversible inhibitors
C) Irreversible inhibitors
D) both reversible and irreversible inhibitors

2011

Q.11 **The covalent bond formed between two monosaccharides is called:**
A) Glycosidic Bond
B) Hydrogen Bond
C) Peptide Bond
D) Disulphide

Q.12 **The bond formed between glucose and fructose to form sucrose is:**
A) 1,4 Glycosidic Linkage
B) 1,2 Glycosidic Linkage
C) 1,6 Glycosidic Linkage
D) 1,3 Glycosidic Linkage

Q.13 **In an amino acid, in which the R-group is H, its name will be:**
A) Alanine
B) Glycine
C) Leucine
D) Valine

Q.14 Fatty acids are the organic compounds containing hydrogen, oxygen and one of the following are:

A) –COOH
B) $-NH_2$
C) Acyl
D) Sucrose

Q.15 The combination of a pentose sugar with a base result in a compound known as:

A) Nucleotide
B) Nucleoside
C) Nucleic Acid
D) Polynucleotide

Q.16 One of the pyrimidine bases is absent in DNA:

A) Uracil
B) Thymine
C) Cytosine
D) Adenine

Q.17 The non-protein part of enzyme which is covalently and permanently bonded is called:

A) Prosthetic Group
B) Co-Factor
C) Co-Enzyme
D) Activator

Q.18 Enzymes increase the rate of reaction by:

A) Increasing Temperature
B) Decreasing pH
C) Decreasing Activation Energy
D) Increasing Activation Energy

Q.19 An enzyme and substrate reacts through a special feature or site present in enzyme:

A) Building Site
B) Active Site
C) Catalyst Site
D) Inhibition Site

2012

Q.20 Carbohydrates are organic molecules and contain three elements:

A) Carbon, water and oxygen
B) Carbon, Sulphur and hydrogen
C) Carbon, calcium and hydrogen
D) Carbon, hydrogen and oxygen

Q.21 Which one are intermediates in respiration and photosynthesis both?

A) Ribose and heptulose
B) Glyceraldehydes and dihydroxyacetone
C) Glucose and galactose
D) Fructose and ribulose

Q.22 Which of the following component is found in the cell wall of fungi?

A) Cellulose
B) Chitin
C) Proteins
D) Glycerol

Q.23 Which of the following is a peptide bond?

A) –C–N
B) –C–O
C) H–O
D) –S–S

Q.24 Which of the following is an unsaturated fatty acid?

A) Acetic Acid
B) Butyric acid
C) Oleic acid
D) Palmitic acid

Q.25 Which of the following combination of base pair is absent in DNA?

A) A–T
B) C–G
C) A–U
D) T–A

Q.26 If the detachable co-factor is an inorganic ion then it is designated as:

A) Coenzyme
B) Prosthetic group
C) Holoenzyme
D) Activator

Q.27 The type of inhibition in which inhibitor has no structural similarity to substrate and combines with enzyme at other than the active site is called:

A) Irreversible inhibition
B) Competitive inhibition
C) Non-competitive and reversible inhibition
D) Reversible inhibition

Q.28 **The inhibitors that bind tightly and permanently to enzymes and destroy their globular structure and catalytic activity are:**
A) Reversible inhibitors
B) Irreversible inhibitors
C) Competitive inhibitors
D) Non-competitive inhibitors

Q.29 **Enzyme succinate dehydrogenase converts succinate into:**
A) Malate
B) Malonic acid
C) Citrate
D) Fumarate

2013

Q.30 **_____ is most abundant carbohydrate in nature.**
A) Waxes
B) Glycerol
C) Starch
D) Cellulose

Q.31 **Which of the following is a keto-sugar?**
A) Glyceraldehyde
B) Dihydroxyacetone
C) Ribose
D) Glucose

Q.32 **Amino acid in which the R-group is hydrogen is:**
A) Glycine
B) Alanine
C) Leucine
D) Valine

Q.33 **Acylglycerols like fats and oils are esters formed by condensation reaction between:**
A) Fatty acids and water
B) Fatty acids and alcohols
C) Fatty acids and glucose
D) Fatty acids and phosphates

Q.34 **Which of the following is purine?**
A) Guanine
B) Cytosine
C) Thymine
D) Uracil

Q.35 **If the co-factor is covalently or tightly and permanently bonded to enzyme then it will be called:**
A) Coenzyme
B) Prosthetic group
C) Activator
D) Apoenzyme

Q.36 **All coenzymes are derived from:**
A) Proteins
B) Nucleic acids
C) Carbohydrate
D) Vitamins

Q.37 **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) Induce fit model
C) Sliding filament model
D) Specificity model

Q.38 **Optimum pH value for the working of pancreatic lipase is:**
A) 4.50
B) 7.60
C) 2.00
D) 9.00

2014

Q.39 **The simplest monosaccharide containing keto group is:**
A) Glyceraldehyde
B) Dihydroxyacetone
C) Glucose
D) Ribose

Q.40 **All co-enzymes are derived from:**
A) Proteins
B) Carbohydrates
C) Metal ions
D) Vitamins

Q.41 **A co-factor tightly bound to the enzyme on the permanent basis is called:**
A) Activator
B) Co-enzyme
C) Prosthetic group
D) Apo-enzyme

Q.42 Which one of the following is the optimum pH of pancreatic lipase enzyme?
A) 7.60
B) 8.00
C) 9.00
D) 9.70

Q.43 The competitive inhibitors have structural similarity with:
A) Active site
B) Binding site
C) Substrate
D) Co-enzyme

2015

Q.44 Monosaccharides are major components of:
A) DNA, ATP, Ribulose bisphosphate and Cysteine
B) DNA, NAD and Insulin
C) DNA, NADP, ATP and Ribulose bisphosphate
D) DNA, RNA and Myosin

Q.45 Number of base pairs in one turn of DNA is:
A) 10
B) 2
C) 34
D) 54

Q.46 Which molecular structure of enzyme is essential for activity of enzyme?
A) Primary Structure
B) Quaternary Structure
C) Secondary Structure
D) Tertiary Structure

Q.47 Some enzymes require helper which is non-protein part for its efficient functioning that is called:
A) Accelerator
B) Cofactor
C) Prosthetic group
D) Apoenzyme

Q.48 Pepsin, protein digesting enzymes, sets best pH:
A) 9.70
B) 4.50
C) 2.00
D) 7. 6

Q.49 Which one of the following is an example of competitive inhibitor?
A) Glucose
B) Fumarate
C) Succinic acid
D) Malonate

2016

Q.50 The compounds which on hydrolysis yield polyhydroxy aldehyde or ketone subunits are:
A) Lipids
B) Proteins
C) Polynucleotides
D) Carbohydrates

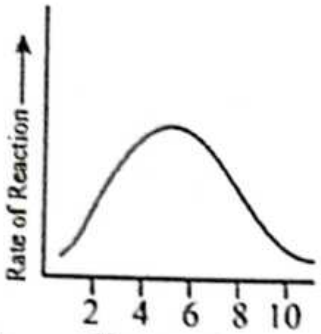
Q.51 Secondary structure of protein is found in:
A) Trypsin
B) Keratin
C) Insulin
D) Glucagon

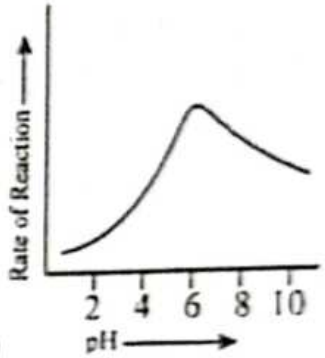
Q.52 Phosphodiester bond is:
A) P—O—C—P—O—C
B) C—O—P
C) C—O—P—O—C
D) C—C—O—P

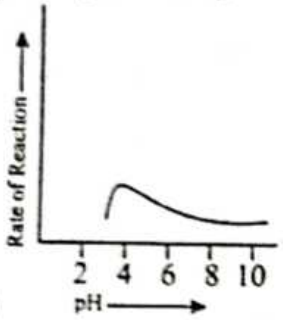
Q.53 An enzyme required Mg^{+2} to catalyze the substrate. The Mg^{++} is best identified as:
A) Prosthetic group
B) Activator
C) Co-enzyme
D) Inhibitor

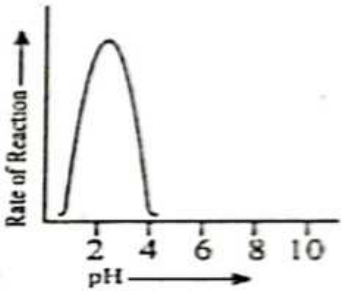
Q.54 According to _____ model, the active site of enzyme is modified as the substrate interacts with enzyme.
A) Induced fit
B) Lock and Key
C) Emil Fischer
D) Fluid Mosaic

Q.55 Which one of the following graphs shows how the rate of reaction of pepsin is affected by pH?

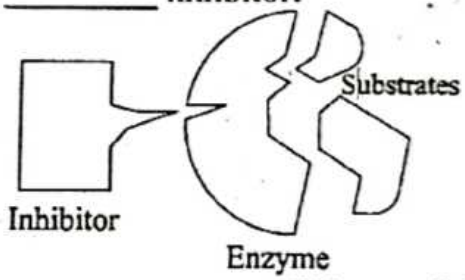
A)


C)


B)


D


Q.56 This figure represents _____ inhibitor.



A) Non-competitive
B) Competitive
C) Irreversible
D) Isosteric

2017

Q.57 _____ are the major site for storage of glycogen in animal's body.

A) Muscle and liver
B) Around thighs and belly
C) Around belly and hips
D) Liver and kidneys

Q.58 The number of amino acids that have been found to occur in cells and tissues are:

A) 170
B) 20
C) 25
D) 45

Q.59 Most proteins are made up of _____ type of amino acid.

A) 20
B) 170
C) 25
D) 200

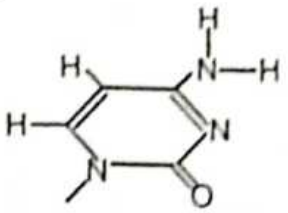
Q.60 If in lipids there is a higher proportion of unsaturated fatty acid then it will be:

A) Oils
B) Waxes
C) Phenols
D) Fats

Q.61 When X-rays are passed through crystalline DNA, it shows helix making one twist every:

A) 2nm
B) 3.4nm
C) 34nm
D) 4nm

Q.62 Following is the structure of:



A) Uracil
B) Thymine
C) Guanine
D) Cytosine

Q.63 All enzymes are_____.

A) Fibrous proteins
B) Low molecular weight proteins
C) Lipoproteins
D) Globular proteins

Q.64 The reactants on which enzyme work are:

A) Products
B) Metabolites
C) Substrates
D) Catabolites

Q.65 Which of the following comprises of inorganic ions?

A) Coenzymes
B) Activators
C) Prosthetic group
D) Apoenzyme

2017 Re-Take

Q.66 Which of the following type of carbohydrate has high molecular weight and is sparingly soluble in water?

A) Monosaccharide
B) Disaccharides
C) Oligosaccharides
D) Polysaccharides

Q.67 Backbone of amino acid comprises of:

A) C-C-N
B) –COOH group
C) $-NH_2$ Group
D) –H group

Q.68 Bonds present in alpha helix are:

A) Hydrogen bonds
B) Disulphide linkage
C) Ionic bonds
D) Peptide bonds

Q.69 Sequence of amino acids is important in:

A) Primary structure
B) Secondary structure
C) Tertiary structure
D) Quaternary structure

Q.70 All of the following are subunits of DNA except:

A) Deoxyribose sugar
B) Phosphate group
C) Nitrogenous base
D) Choline

Q.71 What is true about enzymes?

A) Fibrous proteins
B) Use in reaction
C) No effect on end product
D) Non-specific

Q.72 Modified form of Lock and model was proposed by:

A) Koshland
B) Fischer
C) Watson
D) Rosalind Franklin

Q.73 Which of the following type of inhibitor can be neutralize by adding more substrate into reaction?

A) Irreversible inhibitor
B) Reversible inhibitor
C) Irreversible non-competitive
D) Irreversible competitive

2018

Q.74 Glycosidic bond is formed by the:
A) Removal of water
B) Addition of oxygen
C) Removal of oxygen
D) Addition of water

Q.75 Which of the following holds the alpha helix of protein in its place?
A) Hydrogen bond
B) Amino group
C) R-group
D) Disulphide bond

Q.76 The number and sequence of amino acids along a polypeptide chain is called _____ structure of a protein.
A) Secondary
B) Quaternary
C) Primary
D) Tertiary

Q.77 Which of the following is unsaturated "fatty acid"?
A) Butyric acid
B) Stearic acid
C) Oleic acid
D) Palmitic acid

Q.78 A complete turn of the double helix of DNA comprises of:
A) 3.4 nm
B) 3.4 Angstrom
C) 34 nm
D) 34 μm

Q.79 Single ringed pyrimidines are:
A) Uracil, cytosine and thymine
B) Cytosine, guanine and uracil
C) Adenine and guanine
D) Cytosine, ADENINE and thymine

Q.80 A non-protein part essential for proper and essential functioning of enzyme is called:
A) Extra factor
B) Additional factor
C) Efficient cofactor
D) Cofactor

Q.81 The temperature that promotes the maximum activity of enzyme is referred as:
A) Fixed temperature
B) Optimum temperature
C) Controlled temperature
D) Active temperature

Q.82 If molecule can bind to another site of the enzyme rather than the true active site, it is referred as _____.
A) Non-competitive inhibitors
B) Allosteric inhibition
C) Competitive inhibitors
D) Irreversible inhibition

2019

Q.83 If water has high latent heat of vaporization, how this property of water could be helpful to plants and animals?
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.84 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:
A) Glucose
B) Glycogen
C) Galactose
D) Glucagon

Q.85 The covalent bond or bridge between two monosaccharides to form a disaccharide is called a:
A) Carboxyl bond
B) Hydroxyl bond
C) Hydrogen bond
D) Glycosidic bond

Q.86 Which is an example of a disaccharide?
A) Lactose
B) Glycogen
C) Starch
D) Fructose

Q.87 Most proteins are made up of:

A) 16 types of Amino acids
B) 10 types of Amino acids
C) 170 types of Amino acids
D) 20 types of Amino acids

Q.88 The structure of a fibrous protein comprises of polypeptide chains in the form of:

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

Q.89 In glycine R is _____.

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

Q.90 Sara is a chemistry student who is carrying out an experiment between an alcohol and acetic acid in the laboratory. The product formed at the end of the experiment will be:

A) Glucose and oxygen
B) Glycogen and water molecule
C) An ester and water molecule
D) Glycerol and Sulfuric acid

Q.91 Lipids contain double amount of energy as compared to the same amount of carbohydrates due to the presence of:

A) Lower proportion of C–H bonds
B) Higher proportion of C–H bonds
C) Higher proportion of C–O bonds
D) Higher proportion of oxygen

Q.92 Which one is an example of a Nucleotide?

A) Adenosine
B) ATP
C) Guanine
D) NAD

Q.93 The nitrogen containing bases in nucleotide are of two types; purines and pyrimidines; the purine bases are:

A) Guanine and Cytosine
B) Adenine, Guanine and Cytosine
C) Adenine and Guanine
D) Adenine and Thymine

Q.94 The type of energy reduced by the enzymes for biological reactions to occur is called the:

A) Light Energy
B) Activation Energy
C) Active Energy
D) Heat Energy

Q.95 What is common in both competitive and non-competitive inhibition?

A) Irreversible inhibition
B) Feedback inhibition
C) Reversible inhibition
D) Non-Reversible inhibition

Q.96 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 Dr. 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.

A) Temperature sensitive
B) Competitive reversible
C) Irreversible
D) Non-competitive reversible

ANSWER KEY

TOPIC-WISE MCQs

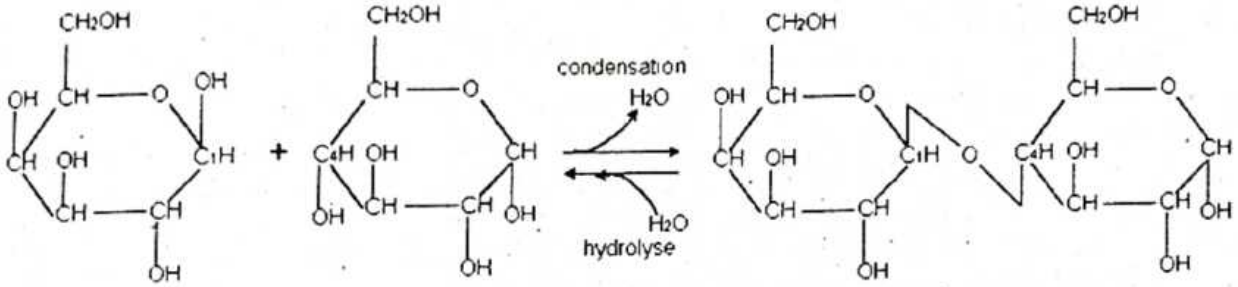
1	A	11	C	21	D	31	D	41	B
2	D	12	A	22	D	32	B	42	C
3	C	13	A	23	C	33	B	43	B
4	B	14	A	24	D	34	B	44	A
5	B	15	D	25	C	35	B	45	B
6	D	16	B	26	B	36	A	46	D
7	B	17	B	27	C	37	A	47	C
8	D	18	B	28	B	38	D		
9	C	19	A	29	A	39	A		
10	B	20	A	30	C	40	B		

PAST PAPERS MCQs

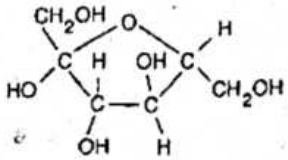
1	C	11	A	21	B	31	B	41	C	51	B	61	B	71	C	81	B	91	B
2	A	12	B	22	B	32	A	42	C	52	C	62	D	72	A	82	A	92	B
3	C	13	B	23	A	33	B	43	C	53	B	63	D	73	B	83	D	93	C
4	D	14	A	24	C	34	A	44	C	54	A	64	C	74	A	84	B	94	B
5	B	15	B	25	C	35	B	45	A	55	D	65	B	75	A	85	D	95	C
6	C	16	A	26	D	36	D	46	D	56	A	66	D	76	C	86	A	96	B
7	A	17	A	27	C	37	B	47	B	57	A	67	A	77	C	87	D		
8	D	18	C	28	B	38	D	48	C	58	A	68	A	78	A	88	D		
9	C	19	B	29	D	39	B	49	D	59	A	69	A	79	A	89	C		
10	B	20	D	30	D	40	D	50	D	60	A	70	D	80	D	90	C		

EXPLANATORY NOTES

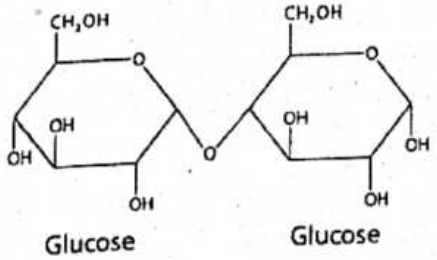
TOPIC-WISE MCQs

1. A type of carbohydrate, cellulose 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.
2. Chitin is a N_2-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.
3. 

β-D-galactose α-D-glucose Lactose
4. 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.
5. Four carbon atoms are present inside the ring of fructose while two carbon atoms are present outside of the ring.


Fructose

6. Glycogen is most abundant polysaccharide present in human muscles and liver while myoglobin, collagen, actin and myosin are proteins.
7. Cellulose, agar and pectin are the examples of polysaccharides but galactose is and example of monosaccharide.
8. Fructose can form five cornered ring structure called fructofuranose, having four carbons and one oxygen atom within the ring while first and last carbon remains outside of the ring, i.e. 1st carbon and 6th carbon.
9. Fructose has ketone functional group which gives sweet taste when dissolved in water.
10. Maltose

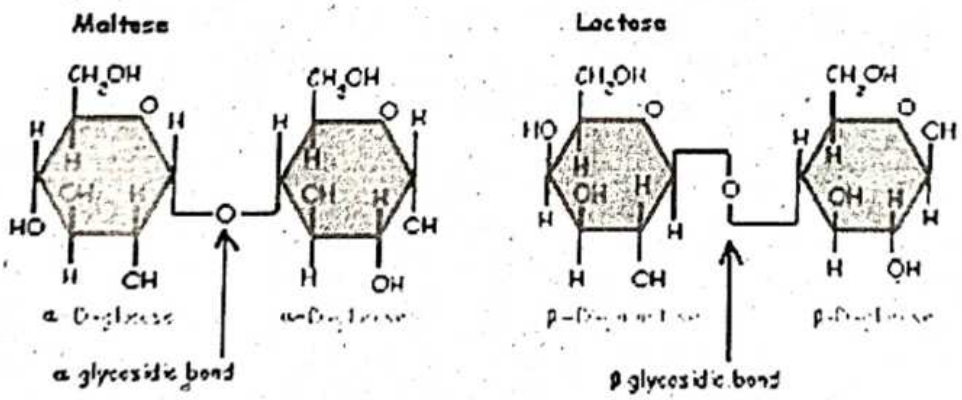

Glucose Glucose

11. 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.
12. In non-diabetic individuals, the concentration of glucose in the blood is about 0.08%.
13. Serine and aspartic acids are examples of amino acids while choline and ethanolamine are N_2-containing bases. Serine can be the constituent of phospholipids and acts as nitrogenous base.
14. The myelin sheath of neurons is composed of sphingolipids. Ethanolamine and choline are nitrogenous bases found in phospholipids. Waxes are abundantly found in protective covering of fruits and leaves.
15. Oleic acid is an example of mono-unsaturated fatty acid having single double bond between C_9 and C_{10}.
16. Chemically, waxes are mixtures of long chain alkanes (with odd number of carbons atoms ranging from C 25 to C35) and alcohols, ketones and esters of long chain fatty acids.
17. Amino acids join to form proteins. Nucleotides join to form nucleic acid while monosaccharides join to form polysaccharides.
18. Hemoglobin consists of 4 polypeptide chains and there is one haem group in each chain which can hold one oxygen molecule (two atoms), thus one hemoglobin molecule carry eight oxygen atoms.
19. 170 amino acids are present in nature, 25 types amino acid can synthesize proteins but most of the proteins can be synthesized by the combinations of 20 types of amino acids.
20. The simplest amino acid is glycine in which R is 'H' atom. Alanine is next to glycine which contains $-CH_3$ as R-group.
21. 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.
22. 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.
23. 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.
24. 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.
25. Myoglobin, also called as muscle haemoglobin, is made up of single polypeptide chain which coils upon itself forming tertiary structure.
26. Antibodies are also called immunoglobulins, they are the part of immune system and protect body against invading pathogens.
27. Usually fibrous proteins containing secondary structure are structural proteins.
28. Fibrin is an example of fibrous protein and cannot non-crystalline. Antibodies, hemoglobin and enzymes are globular proteins and can be crystalline.
29. 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.

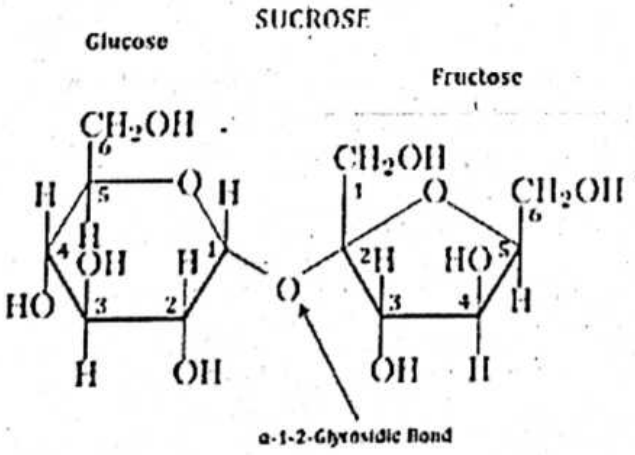
30. When a single polypeptide chain folds upon itself and form globular structure, it is tertiary structure of the proteins. It is maintain by three types of bonds, namely ionic, hydrogen and disulfide.
31. Through metabolism carbohydrates, lipids and proteins all can be the source of energy, while nucleic acids are not the source of energy.
32. 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.
33. Nucleoside is only made up of pentose sugar and nitrogenous base.
34. ATP is a single nucleotide. Phosphodiester bond is present between nucleotide.
35. Nucleic acid is a polymer of nucleotides which are joining through Phosphodiester bond.
36. 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.
37. Water has great ability to absorb heat with minimum change in its own temperature due to higher heat capacity and act as thermo-stabilizer.
38. Because many of the coenzymes are derived from the vitamins, e.g. NAD is a coenzyme and is derived from vitamins.
39. 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.
40. During the conversion of the succinic acid into fumaric acid, FAD^+ is reduced by gaining two hydrogen from succinic acid which are liberated by succinate dehydrogenase.
41. Inorganic cofactors are activators while organic cofactors may be coenzymes or prosthetic group.
42. Pancreatic enzymes mostly work in an alkaline pH which helps in the digestion of food in small intestine. The optimum pH for the working of pancreatic lipase is 9.00
43. 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.
44. The maximum catalytic activity of enterokinase at is 5.50, which id the optimum pH for enterokinase and is slightly acidic.
45. 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.
46. 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.
47. 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.

PAST PAPER MCQs

1. Water varies from 65 to 89 percent in different organisms. Human tissues contain about 20% water in bone cells and 85 percent in brain cells.
2. Cellulose gives no color with iodine. Glycogen gives red color with iodine while starch gives blue color with iodine.
3. Carbon-oxygen association in glycosidic linkages provides stability to the complex carbohydrate molecules. Carbon combines with nitrogen in amino acid linkages to form peptide bonds and forms proteins. Affinity of hydrogen for high electronegative oxygen is responsible for hydrogen bonding.
4. 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.
5. Starch is an example of functional carbohydrate and it is less resistant to decay because it can be easily digested in the human body. Lignin, chitin and cellulose are examples of structural polysaccharides and show more resistance to decay.
6. Haemoglobin consists of four polypeptide chains and exhibit quaternary structure.
7. An antibody, also known as an immunoglobulin, is a large, Y-shaped globular protein produced mainly by plasma cells and is used by the immune system to neutralize pathogens such as pathogenic bacteria and viruses.
8. Enzymes are used in biochemical reaction as a biocatalyst. After catalysis enzyme structure remains unchanged and it can be used again and again.
9. If non protein part is loosely attached to the protein part of enzyme, it is known as coenzyme. An enzyme with its coenzyme, or prosthetic group, removed is designated as apoenzyme. An activated enzyme consisting of polypeptide chain and a cofactor is known as holoenzyme. Amylase is starch digesting enzyme.
10. Addition of more substrate molecules will replace reversible inhibitors, and will bind with the enzyme and increase the rate of reaction.
11.



12.



13. R-group in amino acid may be a hydrogen atom as in glycine, or CH_3 as in alanine, or any other group. So amino acids mainly differ due to the type and nature of R group.

14. Generally, a fatty acid consists of a straight chain of an even number of carbon atoms, with hydrogen atoms along the length of the chain and at one end of the chain and a carboxyl group at the other end. It is that carboxyl group that makes it an acid (carboxylic acid).

15. The compound formed by combination of a base and a pentose sugar is called nucleoside. A nucleoside and a phosphoric acid combine to form a nucleotide. Nucleotides join to form polynucleotide. Nucleic acid is made up of polynucleotide.

16. Adenine, guanine and cytosine are the N_2 containing bases present in both DNA and RNA. Uracil is present in RNA and absent in DNA while thymine is present in DNA and absent in RNA.

17. Some enzymes consist solely of proteins. Others also have a non-protein part known as a co-factor. 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.

18. Minimum amount of energy required to start a biochemical reaction is called activation energy. Enzymes have the ability to decrease the activation energy and enhance rate of biochemical reaction.

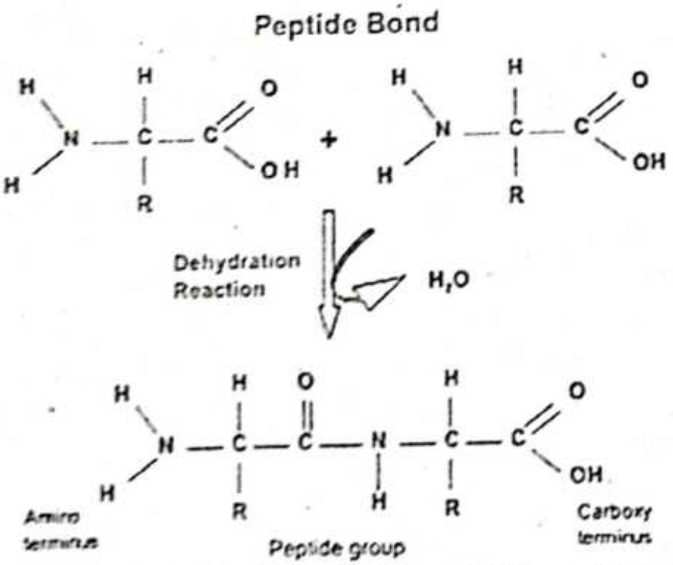
19. An enzyme and its specific substrate react with each other through a definite charge-bearing site of an enzyme called active site. The charge and shape of the active site is formed by some amino acids present in the polypeptide chain of the active site of the enzyme.

20. The word carbohydrate literally means hydrated carbons. They are composed of carbon, hydrogen and oxygen and the ratio of hydrogen and oxygen is the same as in water.

21. In nature monosaccharides with 3 to 7 carbon atoms are found. Trioses (3C) are, intermediates in respiration and photosynthesis.

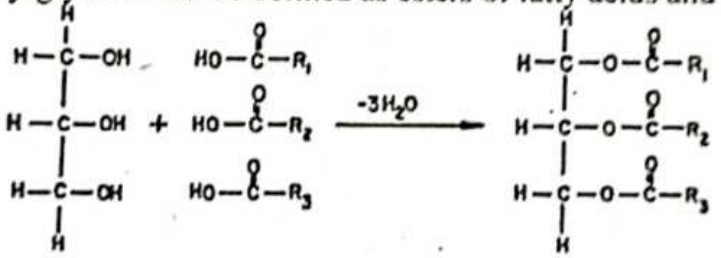
22. Chitin is a structural polysaccharide found in cell wall of fungi and made up of N- acetyl glucosamine sub-units while cell wall of plants are made up of cellulose.

23.



24. Fatty acid may contain no double bond (saturated fatty acids) or up to 6 double bonds (unsaturated fatty acids). Oleic acid is an example of unsaturated fatty acid and has one double bond between C_9 and C_{10}.

25. In RNA, nitrogenous bases form the usual complementary pairing viz. cytosine (C) with guanine (G) and uracil (U) with adenine (A).
26. 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 cofactor is called holoenzyme.
27. Non-competitive reversible inhibitor block allosteric site of enzyme while competitive inhibitor have structural similarity with substrate and they binds active site of enzyme.
28. Irreversible inhibitors can check the reaction rate by occupying the active sites or destroying the globular structure enzyme. They occupy the active sites by forming covalent bonds or they may physically block the active sites. Reversible inhibitors can form weak linkages with the enzymes and their effect can be neutralized by increasing more substrate molecules.
29. In Krebs cycle, an enzyme called succinate dehydrogenase acts on its substrate, succinate and convert in it into product, fumarate
30. A type of carbohydrate, cellulose 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.
31. Glyceraldehyde, ribose and glucose are examples of aldo sugars while dihydroxyacetone is an example of keto sugar.
32. Amino acids mainly differ due to the type or nature of R group. R may be a hydrogen atom as in glycine, or CH_3 as in alanine, or any other group.
33. Chemically, acylglycerol can be defined as esters of fatty acids and alcohol.



34. Nitrogenous bases are of two types, single ringed pyrimidines and double ringed purines. Pyrimidines are cytosine, thymine, and uracil while purines are adenine and guanine
35. 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 cofactor is removed is called apoenzyme.
36. Co enzymes are closely related to vitamins, which represent the essential raw materials from which coenzymes are made. Only small quantities of vitamins are needed because, like enzymes, co-enzyme can be used again and again.
37. According to lock and key model active site of enzyme is a rigid structure. Sliding filament model explain muscle movement while specificity model means that every enzyme react with specific substrate.
38. Optimum pH values for the catalytic activity of pepsin, sucrose, catalase and pancreatic lipase are 2.00, 4.50, 7.60 and 9.00, respectively.
39. Glyceraldehyde, ribose and glucose are aldo sugar while dihydroxyacetone are simplest three carbon keto sugar.

40. Co enzymes are closely related to vitamins, which represent the essential raw materials from which coenzymes are made. Only small quantities of vitamins are needed because, like enzymes, co-enzyme can be used again and again.
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42. Optimum pH values for the catalytic activity catalase, chymotrypsin, pancreatic lipase and arginase are 7.60, 7.00-8.00, 9.00 and 9.70, respectively.
43. Non-competitive reversible inhibitors block allosteric site of enzyme while competitive reversible inhibitors have structural similarity with substrate and they binds active site of enzyme.
44. Ribose is a five carbon sugar and a monosaccharide.It is major components of nucleosides/nucleotides, dinucleotides, nucleic acid and RuBP (carbon dioxide acceptor in dark reaction of photosynthesis).
45. The two strands of DNA are wound around each other so that there are 10 base pairs in each turn of the helix.
46. Globular structure of enzyme have very important role in its activity and this globular structure is attain at least tertiary level structure.
47. Some enzymes require non protein part for their proper functioning. 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 cofactor is removed is called apoenzyme.
48. Optimum pH values for the catalytic activity of pepsin, sucrose, catalase and arginase is 2.00, 4.50, 7.60 and 9.70, respectively.
49. Malonate have structural similarity with succinic acid and it binds competitively with active site of succinic acid dehydrogenase enzyme and blocks its activity.
50. 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.
51. 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
52. 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 3 carbon of pentose sugar of another nucleotide.
53. 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.
54. 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.
55. Every enzyme work best at its optimum PH. Pepsin optimum PH is 2. Above 2 PH pepsin will be denature.
56. Non-competitive inhibitor binds allosteric site of enzyme rather than active site.
57. Glycogen is called as animal starch and it is abundantly found in muscle and liver cells of animal tissue.

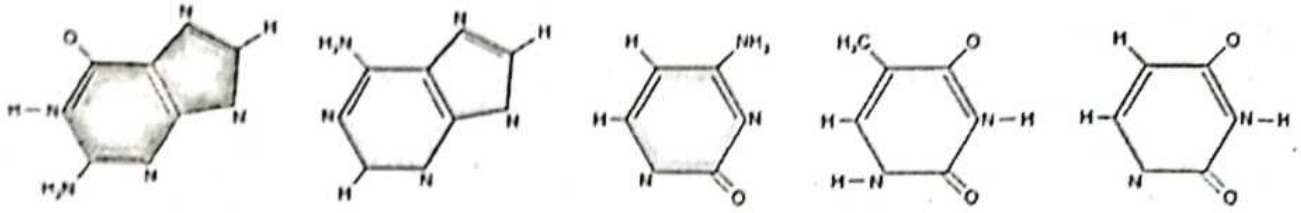
58. About 170 types of amino acids have been found to occur in cells and tissues. Of these, about 25 are constituents of proteins. Most of the proteins are, however, made of 20 types of amino acids.

59. About 170 types of amino acids have been found to occur in cells and tissues. Of these, about 25 are constituents of proteins. Most of the proteins are however, made of 20 types of amino acids.

60. Fats containing unsaturated fatty acids are usually liquid at room temperature and are said to be oils. Fats containing saturated fatty acids are solids.

61. The two strands of DNA are wound around each other so that there are 10 base pairs in each turn of about 34nm.

62.



Guanine Adenine Cytosine Thymine Uracil

Purines Pyrimidines

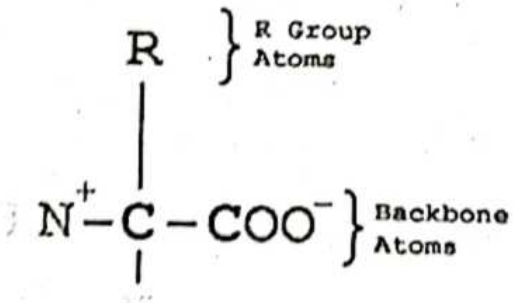
63. Enzymes are composed of hundreds of amino acids joined together and coiled upon themselves to form a globular structure.

64. 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.

65. Some enzymes use metal ions as co-factors like Mg^{2+}, Fe^{2+}, Cu^{2+}, and Zn^{2+} etc. The detachable co-factor is known as an activator if it is an inorganic ion while coenzyme, apoenzyme and prosthetic group are organic in nature.

66. Polysaccharides are made up of many monosaccharides subunits and have higher molecular weight as compare to monosaccharide and oligosaccharide. Polysaccharides are sparingly soluble in water while monosaccharide has highly solubility.

67.



68. 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 acids molecules in successive turns of the spiral.

69. The primary structure of a protein is described by number, sequence and types of amino acids in a polypeptide chain.

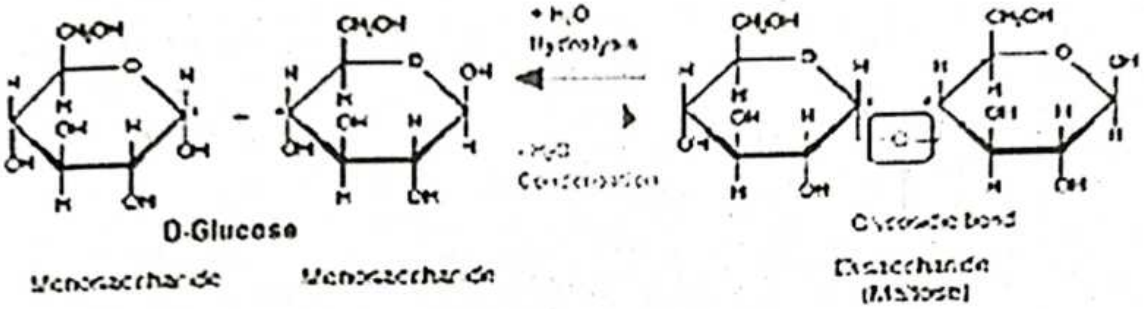
70. DNA and RNA are the polymers, formed by the dehydration condensation reaction between nucleotides. Chemically, nucleotides are composed by N_2-containing base, a pentose sugar and phosphate group/s. Choline is also an example of N_2-containing base and imported components of phospholipids.

71. Enzymes are globular proteins which act as biocatalyst and speed up biochemical reactions and their presence does not affect the nature of or properties of end product/s.

72. 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.

73. 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.

74.



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77. 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}.

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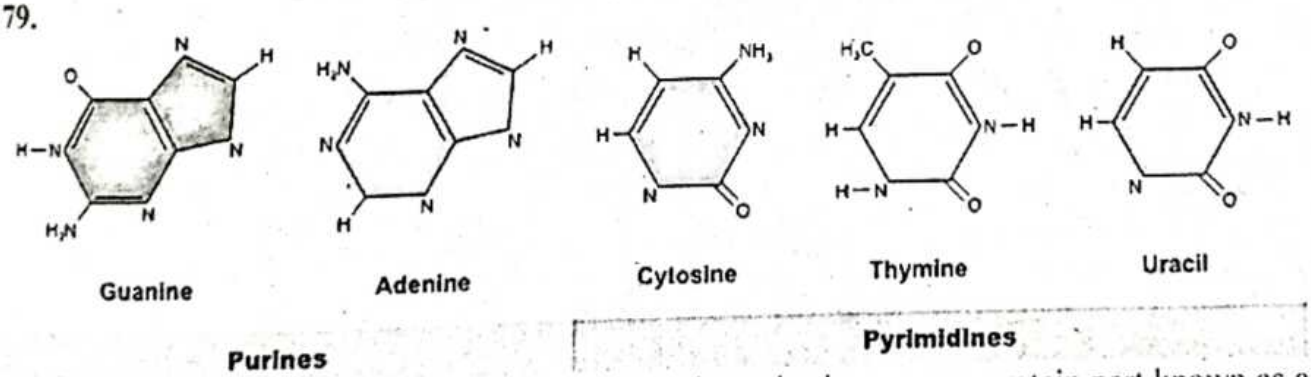


80. Some enzymes consist solely of proteins. Others also have a non-protein part known as a co-factor, which is essential for the proper functioning of the enzymes. The cofactor usually acts as 'bridge' between the enzyme and its substrate.

81. 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.

82. Non-competitive reversible inhibitor block allosteric site of enzyme while competitive inhibitor have structural similarity with substrate and they binds active site of enzyme.

83. 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.

84. Glycogen is animal starch found in liver and muscle cell while starch is stored in plants cells.

85. When two monosaccharides join through dehydration condensation process they form disaccharide with glycosidic linkage and release water molecule.

86. Glycogen and starch are examples of polysaccharides while fructose is an example of monosaccharide.

87. About 170 types of amino acids have been found to occur in cells and tissues. Of these, about 25 are constituents of proteins. Most of the proteins are however, made of 20 types of amino acids.

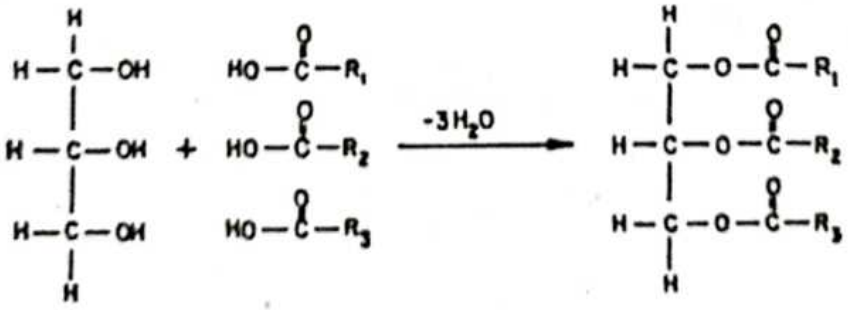
88.

Fibrous Protein

Globular Protein

89. Amino acids are mainly differ due to the type or nature of R group. R may be a hydrogen atom as in glycine, or CH_3 as in alanine, or any other group.

90. Chemically, acylglycerol can be defined as esters of fatty acids and alcohol.

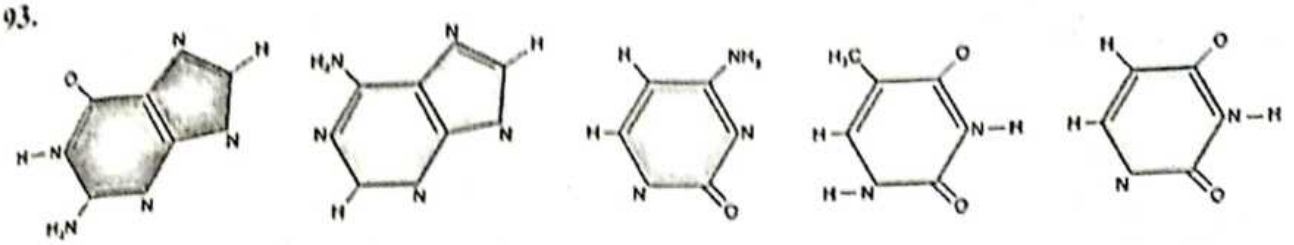


Glycerol 3 Fatty acids Triglyceride

91. C-H bond is potential source of energy. Lipids have higher proportion of C-H bonds as compare to carbohydrates and proteins.

92. Adenosine is a nucleoside while guanine is a nitrogenous base. NAD is a dinucleotide.

93.



Guanine Adenine Cytosine Thymine Uracil

Purines Pyrimidines

94. The minimum amount of energy require to start a chemical reaction is called activation energy. Enzymes speed up reaction by lowering its activation energy.

95. Both competitive and non-competitive inhibitors are example of reversible inhibitor and their effect can be neutralize by adding small amount of substrate.

96. 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'.

3 TOPIC CHROMOSOMES AND DNA

PRACTICE EXERCISE

TOPIC-WISE MCQs

CHROMOSOMES: NUCLEOSOME, DNA, HISTONES, CHRMATIDS, CENTROMERE AND TELOMERES

Q.1 Diameter of DNA double helix is:

A) 0.34 nm
B) 3.4 um
C) 2 um
D) 2nm

Q.2 Phosphodiester bond is formed between:

A) Two phosphate groups
B) One phosphate & two hydroxyl groups
C) Two phosphate & one hydroxyl group
D) Two phosphate & two hydroxyl groups

Q.3 DNA molecule is a:

A) Monomer
B) Dual polymer
C) Single polymer
D) Non-polymer

Q.4 Histones have abundance of amino acids:

A) Valine and lysine
B) Valine and arginine
C) Arginine and lysine
D) Histidine and threonine

Q.5 A portion of chromatin that is condensed only during cell division is:

A) Euchromatin
B) Biochromatin
C) Heterochromatin
D) Nucleochromatin

Q.6 Percentage of DNA in a chromosome is:

A) 60%
B) 80%
C) 40%
D) Vary small

Q.7 Histones are linked to:

A) Nitrogenous base of DNA
B) Phosphate of DNA
C) Sugar of DNA
D) All of these

Q.8 One turn of DNA duplex consists of:

A) 10 bases, one major groove
B) 20 bases, one major and two minor grooves
C) 10 bases, one major groove and on minor groove
D) 20 bases, one major groove and one minor groove

Q.9 Chromosomes were first observed by Walther Fleming in rapidly dividing cells of:

A) Sea urchin
B) *Drosophila*
C) Salamander
D) *Penicillium*

Q.10 A typical human chromosome contains _____ nucleotides in its DNA.

A) 240 million
B) 150 million
C) 140 million
D) 160 million

Q.11 A region of repetitive nucleotide sequences at each end of a chromosome is called:

A) Groove
B) Telomere
C) Single constriction
D) Centromere

Q.12 Number of chromosomes in mosquito are:

A) 6
B) 14
C) 8
D) 16

Q.13 **Euchromatin is:**
A) Condensed part of chromosome
B) Closed configuration
C) Never condensed
D) Open configuration

Q.14 **Chromosome with arms of almost equal length are:**
A) Telocentric
B) Metacentric
C) Acrocentric
D) Submetacentric

GENE

Q.15 **In a diploid individual, homologous chromosomes are present in:**
A) Single form
B) Tetrad form
C) Pair form
D) Identical form

Q.16 **When gametes fuse together, they contribute equal:**
A) Genetic information
B) Yolk
C) Cytoplasm
D) Organelles

DNA REPLICATION

Q.17 **DNA leading strand is constructed through DNA polymerase III and Okazaki fragments are constructed through:**
A) DNA polymerase I
B) DNA polymerase III
C) DNA polymerase II
D) DNA Ligase

Q.18 **Each strand acts as template for formation of new DNA molecule according to:**
A) Conservative model
B) Dispersive model
C) Semi-conservative model
D) Scale model

Q.19 **First step in DNA replication is:**
A) Addition of primer
B) Unwinding
C) Polymerization
D) Rewinding

Q.20 **In order to construct another Okazaki fragment, DNA polymerase III jumps:**
A) Towards replication fork
B) Towards another DNA molecule
C) Away from replication fork
D) Towards other strand of DNA molecule

Q.21 **In Meselson-Stahl experiment, after first round of replication, each daughter DNA duplex consist of:**
A) Two heavy strands having N^{15}
B) Two light strands having N^{14}
C) Hybrid possessing heavy and light each
D) Not specified

Q.22 **_____ shows that each strand of all daughter molecules of DNA would be a mixture of old and new DNA.**
A) Conservative model
B) Dispersive model
C) Semiconservative model
D) Scale model

Q.23 **Medium used by Meselson & Stahl for confirmation of semi conservative method was:**
A) Calcium chloride
B) Cesium chloride
C) Calcium carbide
D) Silicon carbide

Q.24 **Separation of variable DNA strands in Meselson-Stahl experiments is achieved due variability in:**
A) Pentose sugar
B) Bonding
C) Phosphate group
D) Bases

Q.25 **Rate of synthesis by DNA polymerase III is:**
A) 10 nucleotides/second
B) 1000 nucleotides/second
C) 100 nucleotides/second
D) 10000 nucleotides/second

Q.26 Which strand elongates towards the replication fork?
A) Parent strand
B) Lagging strand
C) Leading strand
D) None of these

Q.27 In prokaryotes, Okazaki fragments are _____ long.
A) 10-20 nucleotides
B) 1000-2000 nucleotides
C) 100-200 nucleotide
D) Variable

Q.28 It is the role of DNA polymerase I during replication:
A) DNA proof reading
B) DNA repair
C) Unwinding
D) Annealing

TRANSCRIPTION

Q.29 It is the first step of transcription:
A) Attachment of primer
B) Opening of double helix
C) Binding of RNA polymerase
D) Formation of GC hair pin

Q.30 It is true for transcription in bacteria:
A) Transcribed strand is coding strand
B) RNA polymerase II synthesizes mRNA
C) RNA is synthesized from 5' to 3'
D) Reverse transcriptase is used

GENETIC CODE

Q.31 The sequence of nucleotides that determines the amino acid sequence of a protein is:
A) Codon
B) Triplet code
C) Anticodon
D) Gene

Q.32 In mitochondria, UGA:
A) Acts as stop codon
B) Acts as start codon
C) Specifies tryptophan
D) Specifies arginine

Q.33 A synthetic mRNA molecule is made by using only two types of nucleotides containing adenine and cytosine. How many different codons could it contain?
A) 4
B) 16
C) 8
D) 64

TRANSLATION

Q.34 During translation, it provides the site where polypeptides are assembled:
A) mRNA
B) rRNA
C) tRNA
D) DNA

Q.35 In prokaryotes, polypeptide synthesis begins with the formation of:
A) Promoter
B) Initiation complex
C) Aminoacyl-tRNA
D) Polysome

Q.36 Translocation of ribosome on mRNA occurs due to:
A) Polymerase
B) Elongation factor
C) Initiation factor
D) Release factor

Q.37 Which process does not occur during formation of mRNA?
A) Condensation
B) Polymerization
C) Replication
D) Transcription

PAST PAPER MCQs

2008

Q.1 In what direction, can a DNA polymerase work when catalyzing the addition of nucleotide monomers to build a strand of DNA?

A) From the 5' toward the 3' end of the new strand being assembled
B) From the replication centers in two directions called replication forks
C) From the 3' to the 5' end of the strand being assembled
D) In both directions if DNA ligase is present

Q.2 The two strands in DNA are coiled _____ to each other.

A) Parallel
B) Anti-parallel
C) Both A and B
D) None of these

2009

Q.3 The reaction between the phosphate group of one nucleotide and hydroxyl group of another is a _____ synthesis in DNA molecule.

A) Dehydration
B) Rehydration
C) Oxidation
D) Reduction

Q.4 Enzyme which attaches the Okazaki fragments in lagging strand is called:

A) Restriction endonuclease
B) Primase
C) DNA helicase
D) DNA ligase

Q.5 If DNA strand is GCTATGG, mRNA strand synthesized from it would be:

A) CGAUACC
B) CGTATGC
C) CGATACC
D) CGUTCC

2010

Q.6 The process of replication of DNA begins at:

A) One place only without any specific sequence of DNA
B) One or more places without any specific sequence of DNA
C) Any place with the uncoiling of two strands of DNA
D) One or more places where there is a specific sequence of nucleotides

Q.7 Amino acid attaches at which site of tRNA?

A) Anticodon site
B) Ribosomes recognition site
C) 3'-site with terminal OH^- group
D) Activation enzyme recognition site

2014

Q.8 In translation, the terminating codon is:

A) GUA
B) UAA
C) UUG
D) AGU

Q.9 If the genetic code is made up of three nucleotides, then total possible genetic codes will be:

A) 4
B) 20
C) 64
D) 61

2017 Re-Take

Q.10 If one were to unzip the molecule, one would need only to assemble the appropriate complementary nucleotides on the exposed single strand to form two daughter complexes with the same sequence" is the definition of:

A) Semi-conservative model
B) Conservative model
C) Dispersive model
D) Destruction model

Q.11 **Formation of new strand of DNA from template strand is the function of:**

A) DNA polymerase
B) RNA Polymerase
C) DNA ligase
D) Helicase

Q.12 **Formation of RNA from DNA is called:**

A) Translation
B) Transcription
C) Replication
D) Reverse transcription

2019

Q.13 **As a result of replication, parental DNA would become completely dispersed and that each strand of all the daughter molecules would be a mixture of old and new DNA. This is called as:**

A) Conservative idea
B) Dispersive idea
C) Disruptive idea
D) Semi-conservative idea

Q.14 **Meselson and Stahl transferred few bacteria grown in N^{15}medium to N^{14} medium for replicating their DNA. What would be the result after two rounds of replication?**

A) 50% hybrid duplex and 50% light duplex
B) 50% hybrid duplex and 50% heavy duplex
C) 100% heavy duplex
D) 100% hybrid duplex

Q.15 **If sequence in DNA is CCCTAGAG, then what would be the sequence in messenger RNA after transcription?**

A) GGGAUCUC
B) GGGATCTC
C) GGGGTCTC
D) GGAAUCUC

Q.16 **The process in which a complimentary copy of the code from a gene is produced by RNA polymerase in the nucleus:**

A) Proof reading
B) DNA Replication
C) Transcription
D) Translation

Q.17 **Sequence of amino acids in a polypeptide chain of protein molecule corresponds to the sequence of nucleotides on mRNA for that protein. If reading frame of mRNA for a human protein is 993 nucleotides including a stop codon at the end, how many amino acids would be incorporated in the polypeptide chain?**

A) 331
B) 993
C) 93
D) 330

ANSWER KEY

TOPIC-WISE MCQs

1	D	11	B	21	C	31	D
2	B	12	A	22	B	32	C
3	B	13	D	23	B	33	C
4	C	14	B	24	D	34	B
5	A	15	C	25	B	35	B
6	C	16	A	26	C	36	B
7	B	17	B	27	B	37	C
8	D	18	C	28	A		
9	C	19	B	29	C		
10	C	20	A	30	C		

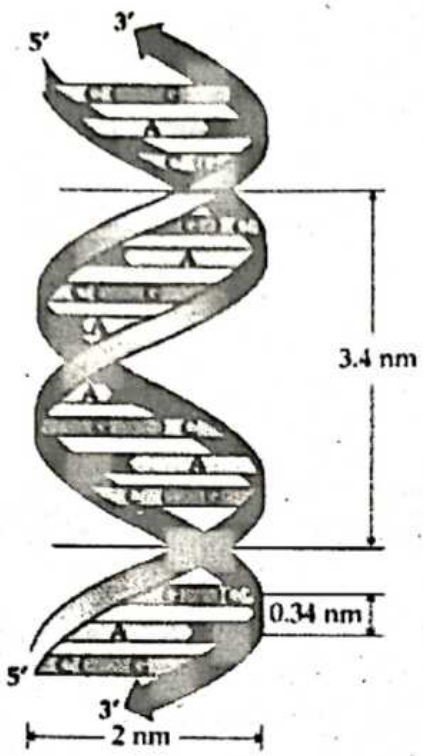
PAST PAPERS MCQs

1	A	11	A
2	B	12	B
3	A	13	B
4	D	14	A
5	A	15	A
6	D	16	C
7	C	17	D
8	B		
9	C		
10	A		

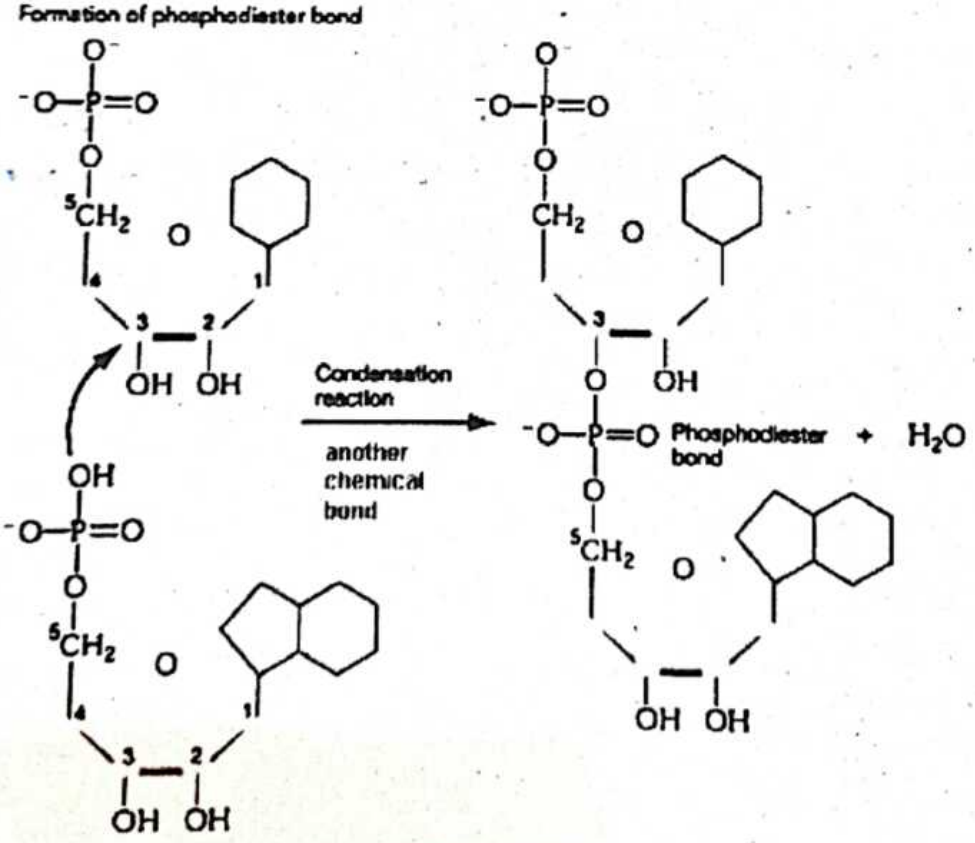
EXPLANATORY NOTES

TOPIC-WISE MCQs

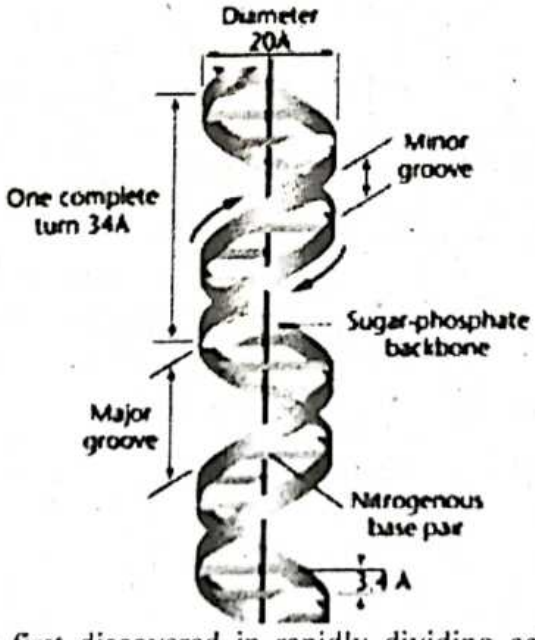
1.



2.

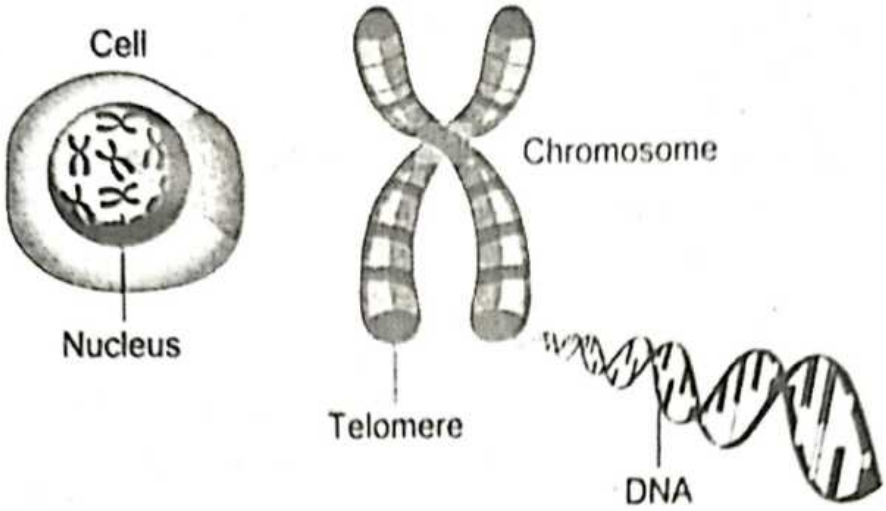


3. DNA is a polymer made from four different monomers , called nucleotides . These join together in different combinations to make long strands. In a DNA molecule , two strands wrap around each other to form a double helix structure.
4. Histones are composed of mostly positively charged amino acid residues such as lysine and arginine. The positive charges allow them to closely associate with the negatively charged DNA backbone through electrostatic interactions.
5. Heterochromatin and euchromatin are two types of chromatin. The key difference between heterochromatin and euchromatin is the packaging. Heterochromatin is the highly packed form of chromatin while euchromatin is the loosely packed form of chromatin and condensed only during cell division.
6. Chromosomes are composed of DNA and histone proteins. Most are about 40% DNA and 60% histone proteins. A significant amount of RNA is also associated with the chromosomes.
7. DNA is negatively charged due to phosphate group and overall charge on histone is positive. As opposite charges attract each other so histone and phosphate are linked together via electrostatic interactions.
8. Each turn of DNA has 10 base pairs bases which cover one major and one minor groove.



9. Chromosomes were first discovered in rapidly dividing cells of salamander larvae in 1882 by Walther Fleming.
10. A typical human chromosome contains 1.4×10^8 nucleotides in its DNA. The amount of information, one chromosome contains would fill about 280 printed books of 1000 pages each, if each nucleotide correspond to a word and each page has 500 words on it.

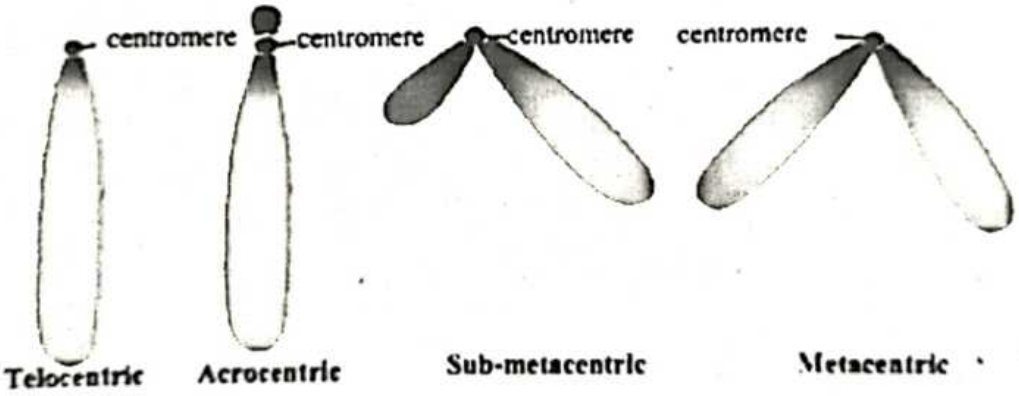
11.



12. Mosquito has 6, *Drosophila* has 8, garden pea has 14, and onion has 16 chromosomes in their diploid cells..

13. Heterochromatin and euchromatin are two types of chromatin. The key difference between heterochromatin and euchromatin is the packaging. Heterochromatin is the highly packed form of chromatin while euchromatin is the loosely packed form of chromatin.

14.

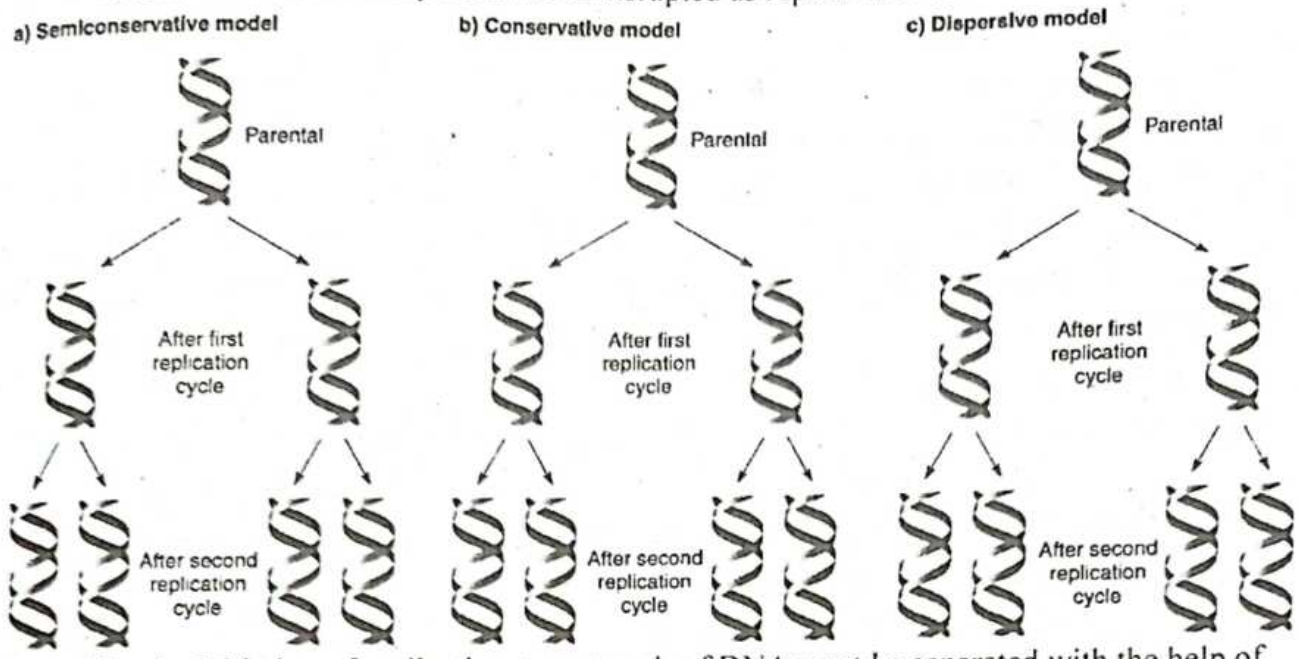


15. Diploid cells have two homologous copies of each chromosome, usually one from the mother and one from the father. Human diploid cells have 46 chromosomes (2n) and human haploid gametes have 23 chromosomes (n).

16. Gametes are haploid and have half set of chromosomes. During fertilization egg and sperm with equal number of chromosomes fuse to form zygote, and contribute equal genetic information for the development of baby.

17. DNA polymerase III is main replicating enzyme. It has two subunits. Both leading and lagging strands are constructed by DNA polymerase III.

18. According to semi-conservative replication model, primary structure of DNA remains conserved but secondary structure is disrupted as represented in the following figure:

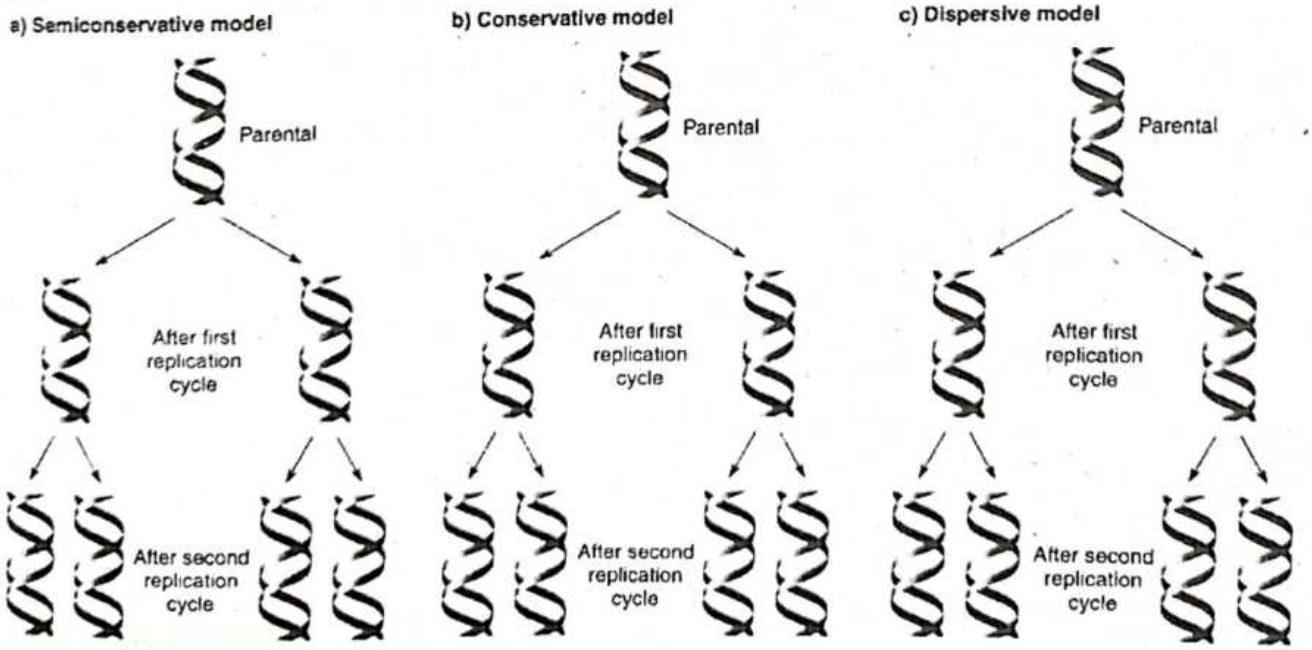


19. For the initiation of replication, two strands of DNA must be separated with the help of helicase. Primase then adds specific primer so that DNA polymerase III can work.

20. Over all process of replication is always towards the replication fork. DNA polymerase III can add nucleotides only at 3' end of the primer, and in order to construct Okazaki fragment, DNA polymerase III jumps towards the replication fork.

21. In Meselson-Stahl experiment, after first round of DNA replication, each daughter DNA duplex consist of hybrid DNA molecule possessing both heavy and light strands. When this hybrid duplex is replicated during second round of DNA replication, it contributed one heavy strand to form another hybrid duplex and one light strand to form light duplex.

22.



23. In Meselson-Stahl's experiment, CsCl was used to create density gradient which help in the separation of DNA molecules according to their density. $CaCl_2$ is commonly used to treat competent bacteria so that they take up chimeric DNA while silicon carbide needles are used in vortex mixing method so that egg cell can take up DNA from the medium which has been placed on agitator.

24. In Meselson-Stahl's experiment, radioactive isotopes of nitrogen were used. This radioactive nitrogen became incorporated nitrogenous bases and aid in separation of variable DNA strands in Meselson-Stahl experiments.

25. DNA polymerase III is the main enzyme involved in prokaryotic DNA replication. This enzyme has high processivity and can add 1000 nucleotides per second.

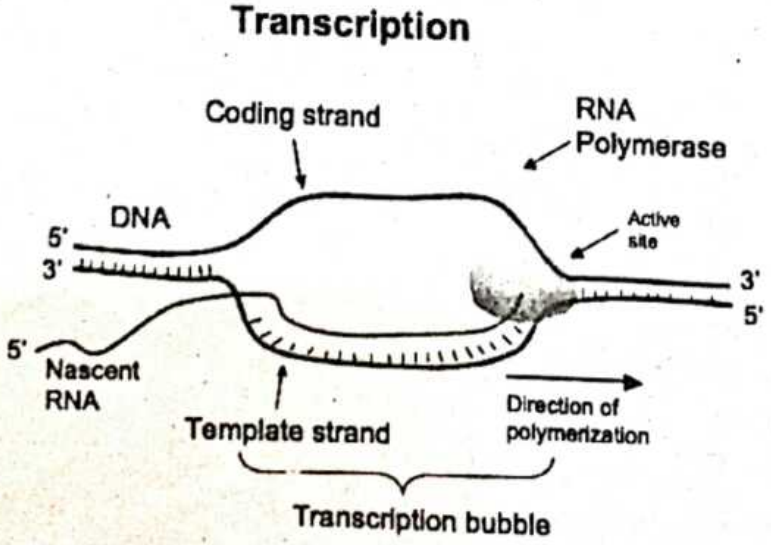
26. The leading strand is the strand of nascent DNA which is synthesized in the same direction as the growing replication fork. This sort of DNA replication is continuous.

27. Okazaki fragments are DNA nucleotides sequence synthesized by DNA polymerase III during the replication of lagging strand variable length. In case of prokaryotes, these fragments are 1000-2000 nucleotides long and in case of eukaryotes, these fragments are 100-200 nucleotides long.

28. DNA polymerase enzyme has three types;
- DNA polymerase-I is involved in proof reading activities.
- DNA polymerase-II is involved in DNA repair.
- DNA polymerase-III is the main enzyme of replication.

29. The first step of transcription is the binding of RNA polymerase by using its sigma factor with the promoter region. In the next step, DNA duplex get open and process of transcription is initiated by the core RNA polymerase and it will continue adding RNA nucleotides till it encounter stop signal.

30.



31. A gene is a sequence of nucleotides in DNA that encodes the synthesis of a gene product, either RNA or protein.

32.

Codon	Nuclear DNA	Mitochondrial DNA
UGA	Stop codon	Tryptophan
AUA	Isoleucine	Methionine
AGA and AGG	Arginine	Stop codon

33. If there are only two types of nucleotides then possible codons consisting of two nucleotides in each codon will be 8. But if there four types of nucleotides and possible codons each containing two nucleotides will be 16.

34. Ribosomes are made up of rRNA and proteins. Ribosomes are factory of proteins synthesis.

35. Elongation of polypeptide starts after the formation of initiation complex. Initiation complex is formed when chemically modified N-formyl methionine binds with smaller ribosomal subunit with the help of initiation factor.

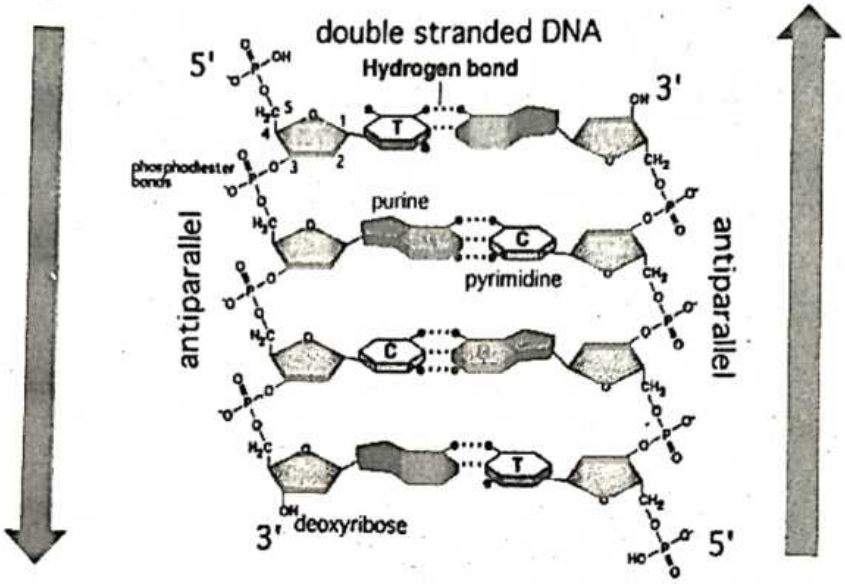
36. The ribosome moves (translocate) three nucleotides along the mRNA molecule in the 5' → 3' direction, guided by other elongation factors associated with tRNA molecules.

37. DNA replication is the process by which a ds-DNA molecule is copied to produce two daughter DNA molecules. Transcription is the process by which the information in a strand of DNA is copied into a new molecule of mRNA. Both of these processes involve dehydration condensation and polymerization of nucleotides.

PAST PAPER MCQs

1. DNA polymerase can only add new nucleotides at 3' end. The process of replication is 5' to 3' end of the growing strand.

2.



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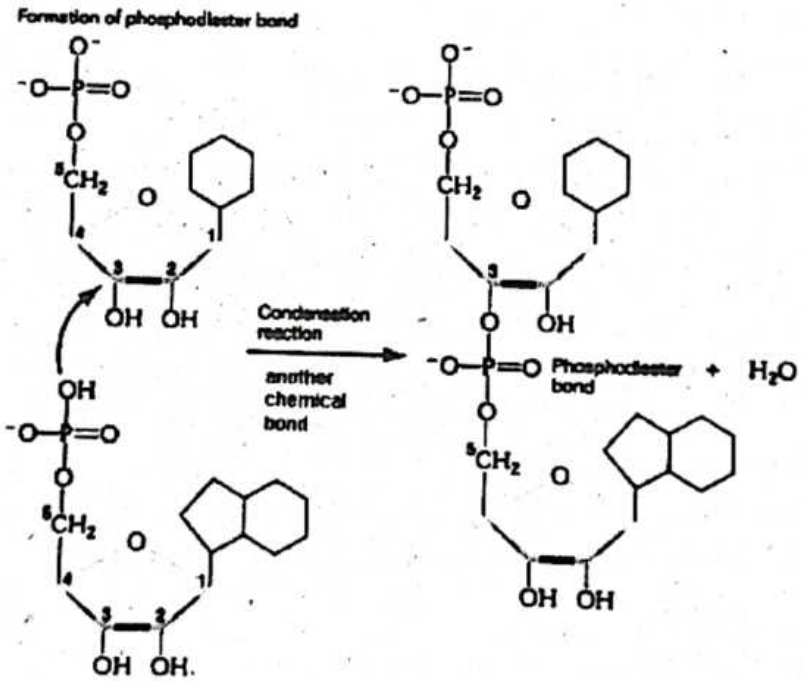
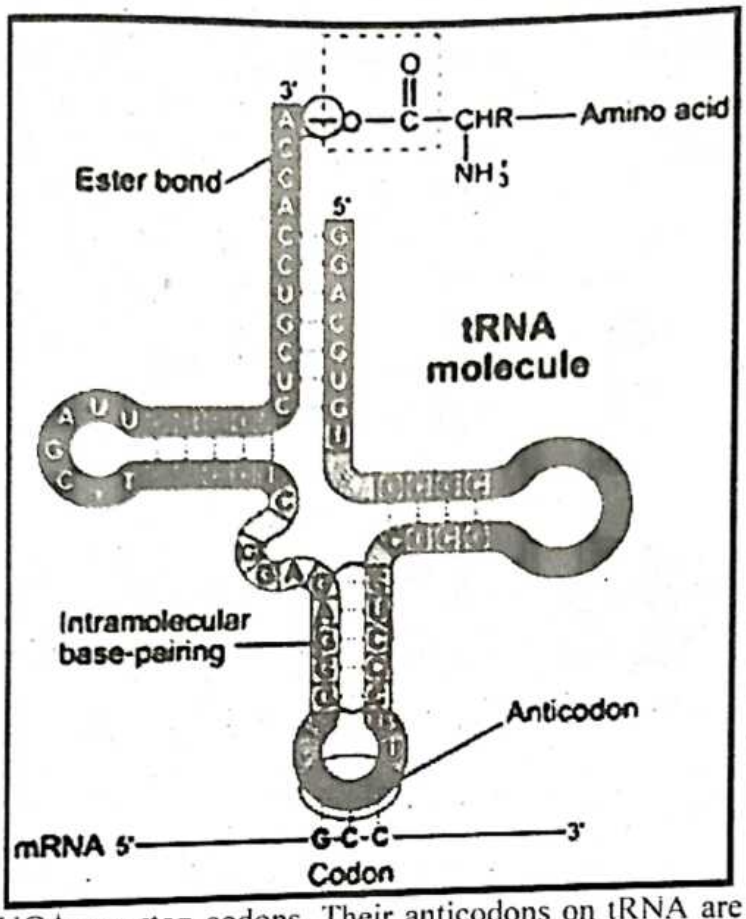


4. Okazaki fragments are short sequences of DNA nucleotides which are synthesized discontinuously and later linked together by DNA ligase to create the lagging strand during DNA replication..

5. The sequence of nucleotides on newly synthesized mRNA is same as on coding strand of DNA except 'U' is present in mRNA instead of 'T'.

6. An origin of replication is a sequence of DNA at which replication is initiated on a chromosome, plasmid or virus. For small DNAs, including bacterial plasmids and small viruses, a single origin is sufficient but in case eukaryotic genome, these can be multiple.

7.

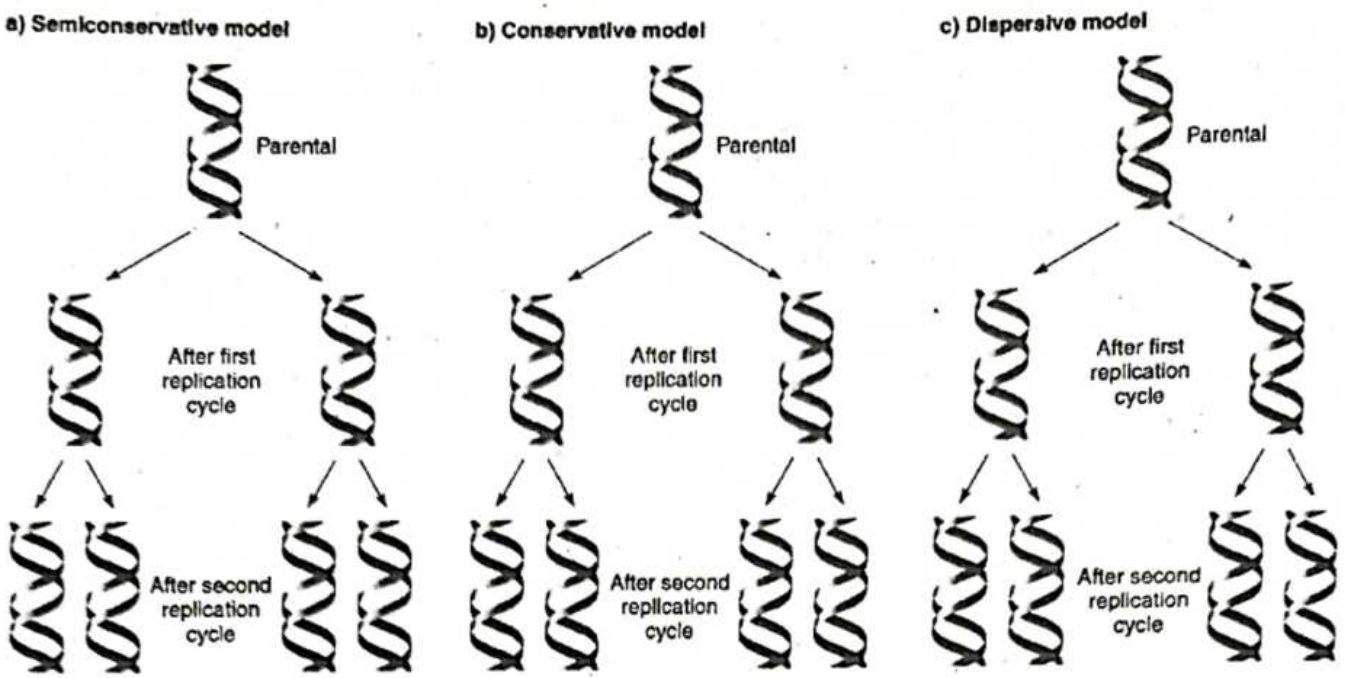


8. UAA, UAG and UGA are stop codons. Their anticodons on tRNA are not present. The presence of anyone of these codons will stops the translation process.

9.

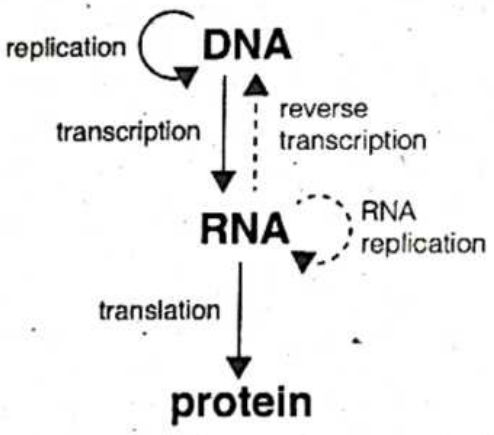
1st letter	Second Letter: U		Second Letter: C		Second Letter: A		Second Letter: G		3rd letter
U	UUU	Phe	UCU	Ser	UAU	Tyr	UGU	Cys	U
	UUC		UCC		UAC		UGC		C
	UUA	Leu	UCA		UAA	Stop	UGA	Stop	A
	UUG		UCG		UAG	Stop	UGG	Trp	G
C	CUU	Leu	CCU	Pro	CAU	His	CGU	Arg	U
	CUC		CCC		CAC		CGC		C
	CUA		CCA		CAA	Gln	CGA		A
	CUG		CCG		CAG		CGG		G
A	AUU	Ile	ACU	Thr	AAU	Asn	AGU	Ser	U
	AUC		ACC		AAC		AGC		C
	AUA		ACA		AAA	Lys	AGA	Arg	A
	AUG	Met	ACG		AAG		AGG		G
G	GUU	Val	GCU	Ala	GAU	Asp	GGU	Gly	U
	GUC		GCC		GAC		GGC		C
	GUA		GCA		GAA	Glu	GGA		A
	GUG		GCG		GAG		GGG		G

10.



11. Formation of DNA from DNA molecule with the help of DNA polymerase is known as DNA replication.

12.

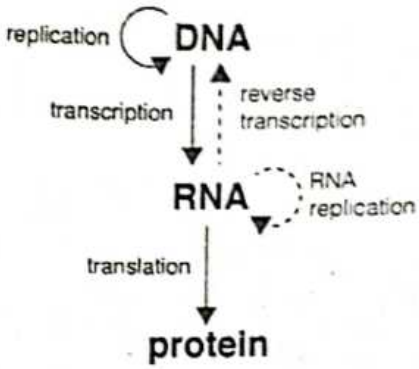


13. Dispersive replication a hypothetical model in which nucleotides of the parental DNA strand would be randomly scattered along the strands of the newly synthesized DNA, as compared with semiconservative and conservative DNA replication.

14. In Meselson-Stahl experiment, after first round of DNA replication, each daughter DNA duplex consist of hybrid DNA molecule possessing both heavy and light strands. When this hybrid duplex is replicated during second round of DNA replication, it contributed one heavy strand to form another hybrid duplex and one light strand to form light duplex.

15. The sequence of nucleotides on newly synthesized mRNA is same as on coding strand of DNA, except U is present in mRNA instead of T.

16.



17. The sequence of three nucleotides on mRNA is called codon. Each codon is responsible to specify a specific amino acid in a polypeptide chain. The total number of nucleotides in the reading frame of mRNA is 993 and it corresponds to the 331 codons. Among 331 codons, 330 are sense codons while 1 is the stop codon. The total number of sense codons is equal to the total number of amino acids incorporated in a polypeptide chain.

4 TOPIC CELL DIVISION

PRACTICE EXERCISE

TOPIC-WISE MCQs

CELL CYCLE: INTERPHASE

Q.1 Chromosome condensation, nuclear envelop breakdown and chromosome segregation occurs during:

A) M phase
B) S phase
C) G_1 Phase
D) G_2 Phase

Q.2 Bipolarity of the dividing animal cells is established by:

A) Centromere
B) Homologous chromosomes
C) Centrioles
D) Cell wall

Q.3 It is period of great biochemical activity:

A) Interphase
B) Mitotic phase
C) Prophase
D) Telophase

Q.4 Cell cycle involves:

A) Growth of cell
B) Cell division
C) Replication of DNA
D) All A, B, C

Q.5 All of the following are related to G_1 phase of the cell cycle except:

A) Extensive metabolic activities
B) Cells grow in size
C) DNA base units are accumulated
D) Energy storage for chromosomal movement

Q.6 Microtubule sub-units are synthesized during:

A) G_1 phase
B) G_2 phase
C) S phase
D) G_0 phase

Q.7 Longest stage of interphase in human cell cycle is:

A) M-phase
B) S-phase
C) G2-phase
D) G1-phase

MITOSIS

Q.8 Reverse of prophase is:

A) Interphase
B) Anaphase
C) Metaphase
D) Telophase

Q.9 Cytokinesis in animal cells starts at:

A) Anaphase
B) Late telophase
C) Metaphase
D) Prophase

Q.10 Mitosis is a continuous process but conventionally it may be divided into two phases:

A) Interphase & mitotic phase
B) Pre-mitotic phase & post-mitotic phase
C) Prophase & telophase
D) Karyokinesis& cytokinesis

Q.11 Mitotic apparatus is designed to:

A) Attach chromosomes
B) Separate chromosomes
C) Align chromosomes
D) All A, B, C

Q.12 Kinetochore is a place on chromosome where _____ are attached.

A) Sister chromatids
B) Spindle fibers are attached
C) Non-sister chromatids
D) Secondary constrictions

Q.13 Microtubules are involved in formation of:

A) Asters
B) Polar tubules
C) Kinetochore fibers
D) All A, B, C

Q.14 Which of the following fibers interdigitate with each other?

A) Astral
B) Polar
C) Kinetochore
D) Polar & kinetochore

Q.15 The kinetochore fibers contract while polar fibers elongate in pulling chromosomes apart during:

A) Prophase
B) Anaphase
C) Telophase
D) Metaphase

Q.16 When chromosomes reach at opposite poles, it terminates _____ and starts _____.

A) Prophase, metaphase
B) Anaphase, telophase
C) Metaphase, anaphase
D) Telophase, interphase

Q.17 Phragmoplast for cytokinesis in plant cells is formed at:

A) Metaphase
B) Early telophase
C) Anaphase
D) Late telophase

Q.18 Following is not reorganized during telophase of mitosis:

A) Nuclear membrane
B) Mitotic apparatus
C) Nucleoli
D) None of these

MEIOSIS

Q.19 All of the following are correct for meiosis except having:

A) Two divisions
B) Two interphase
C) Four daughter cells
D) Two times replication

Q.20 The interphase of meiosis lacks:

A) G_1 phase
B) G_2 phase
C) S phase
D) Interphase

Q.21 Separation of homologous chromosome starts in:

A) Zygotene
B) Diplotene
C) Pachytene
D) Diakinesis

Q.22 In metaphase I, structure arranged at equator is:

A) Chromatid
B) Bivalent
C) Chromosome
D) Centriole

Q.23 Number of chromosomes reduced by meiosis is restored after:

A) Gametogenesis
B) Fertilization
C) Sporogenesis
D) Development

Q.24 Actual reduction phase of meiosis I is:

A) Prophase I
B) Anaphase I
C) Metaphase I
D) Anaphase II

Q.25 In humans, the number of tetrads formed during mitosis is:

A) 23
B) 0
C) 46
D) 92

Q.26 In a diploid cell undergoing mitosis, the number of chromosomes at anaphase is:

A) 1n
B) 3n
C) 2n
D) 4n

Q.27 During which stage of meiosis,does centromere divide?

A) Prophase I
B) Prophase II
C) Anaphase I
D) Anaphase II

Q.28 Reduction division occurs during the process of:

A) Cleavage
B) Fertilization
C) Differentiation
D) Spermatogenesis

Q.29 During meiosis I, nuclear envelop breaks down during:

A) Prophase
B) Anaphase
C) Metaphase
D)Telophase

Q.30 Synapsis occurs during:

A) Pachytene
B) Zygotene
C) Leptotene
D) Diplotene

Q.31 Meiosis occurs during gamete formation in:

A) Animals
B) Fungi
C) Plants
D) Prokaryotes

Q.32 Total number of tetrads formed in human cell during meiosis:

A) 2
B) 92
C) 23
D) 46

Q.33 Pairing of homologous chromosomes during zygotene in meiosis is:

A) Non specific but exactly pointed
B) Highly specific and exactly pointed
C) Non specific and non pointed
D) Highly specific but fused

PAST PAPER MCQs

2008

Q.1 Prophase, metaphase and telophase are subdivisions of:

A) Mitosis
B) Karyokinesis
C) Cytokinesis
D) None of these

2009

Q.2 Phragmoplast is formed from vesicle which originates from:

A) Smooth Endoplasmic Reticulum
B) Golgi Complex
C) Ribosome
D) Rough Endoplasmic Reticulum

2010

Q.3 In which phase of the cell division, the metabolic activity of the nucleus is high?

A) Mitosis
B) Interphase
C) Meiosis
D) Cell Cycle

Q.4 Synthesis of microtubules increases in:

A) G_1 phase
B) S phase
C) G_2 phase
D) M phase

Q.5 Microtubules of spindle fibers are composed of a protein:

A) Tubulin
B) Actin
C) Myosin
D) Troponin

Q.6 The kinetochore fibers contract and polar fibers elongate during:

A) Prophase I
B) Metaphase I
C) Telophase I
D) Anaphase I

2011

Q.7 When chromosomes uncoil, the nucleoli are reformed and two nuclei are two poles of cell, then this stage known as:

A) Prophase
B) Metaphase
C) Telophase
D) Anaphase

Q.8 Healing of a wound and repair is the phenomenon which takes place by the process of:

A) Mitosis
B) Meiosis
C) Cell Growth
D) Mitosis & Meiosis

Q.9 Chiasmata formation takes place during the process which is known as:

A) Crossing Over
B) Attachment
C) Pairing
D) Leptotene

2012

Q.10 In which stage of interphase, there is increase in cell size and many biochemical are formed?

A) G_2 phase
B) G_1 phase
C) S phase
D) C phase

Q.11 Which one of the following is the main cause of cancer?

A) Mutation
B) Controlled Cell Division
C) Regulated Mitosis
D) Haploid Division

Q.12 Exchange of segments between homologous chromosomes is called:

A) Segregation
B) Independent assortment
C) Crossing over
D) Mutation

2014

Q.13 **During which period of interphase (cell cycle), DNA is synthesized?**
A) G_1
B) G_2
C) S
D) G_0

Q.14 **The most critical phase of mitosis which ensures equal distribution of chromatids in the daughter cells is:**
A) Prophase
B) Metaphase
C) Anaphase
D) Telophase

2015

Q.15 **At the beginning of nuclear division, the number of microtubule triplets in two pairs of centrioles that migrate to opposite poles are:**
A) 9
B) 18
C) 108
D) 36

2018

Q.16 **Crossing over takes place during _____ of meiosis.**
A) Prophase I
B) Telophase I
C) Anaphase I
D) Metaphase I

2019

Q.17 **During the G_2 phase:**
A) Specific enzymes are synthesized and DNA base units are accumulated
B) The chromosomes are left with only one chromatid
C) Chromosomes number is duplicated
D) Energy is stored for Chromosome movement and mitotic specific proteins (Tubulin) are produced

Q.18 **Microtubule subunits (for spindle fibers) are synthesized in _____ phase.**
A) G_2
B) M
C) S
D) G_1

Q.19 **The phase of mitosis in which sister chromatids move towards opposite poles:**
A) Prophase
B) Anaphase
C) Telophase
D) Metaphase

ANSWER KEY

TOPIC-WISE MCQs

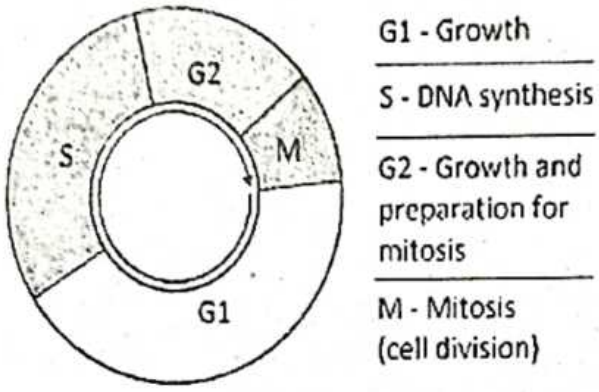
1	A	11	D	21	B	31	A
2	C	12	B	22	B	32	C
3	A	13	D	23	B	33	B
4	D	14	B	24	B		
5	D	15	B	25	B		
6	B	16	B	26	D		
7	B	17	D	27	D		
8	D	18	B	28	D		
9	B	19	D	29	C		
10	D	20	B	30	B		

PAST PAPERS MCQs

1	B	11	A
2	B	12	C
3	B	13	C
4	C	14	C
5	A	15	D
6	D	16	A
7	C	17	D
8	A	18	A
9	A	19	B
10	B		

EXPLANATORY NOTES

TOPIC-WISE MCQs

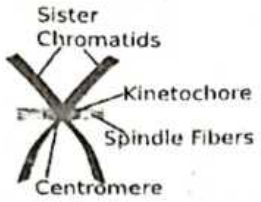
1. In interphase, cell only prepare itself for division and increase its size, while M-phase is characterized by the condensation of chromatin material, breakdown of nuclear envelop and chromosomal segregation.
2. During G_2 phase of cell cycle, cell duplicates its centrioles. A pair of centrioles move to opposite pole and form aster and spindles for the arrangement of chromosomes in cell.
3. 

4. The cell cycle, or cell-division cycle, is the series of events that take place in a cell leading to duplication of its DNA (DNA replication) and division of cytoplasm and organelles to produce two daughter cells.
5. G_1 phase is characterized by the extensive metabolic activities, cell growth, synthesis of specific enzymes and accumulation of nucleotides for DNA replication while G_2 phase is characterized by the store energy for chromosomal movement, synthesis of mitotic specific protein, RNA and microtubule subunit.
6. G_2 phase is characterized by the store energy for chromosomal movement, synthesis of mitotic specific protein, RNA and microtubule subunit.
7. In case of human cells, the average cell cycle is about 24 hours and the length of each phase is variable. For example;
   - G_1-phase = 9 hours
   - S-phase = 10 hours
   - G_2-phase = 4.5 hours
   - M-phase = 30 minutes
8. Telophase is the last phase of mitosis in which nuclear membrane and nucleolus re-appears, chromosomes decondensed to chromatin, while prophase is first stage of mitosis in which chromatin condensed to form chromosomes, and nuclear membrane and nucleolus disappears.
9. During late telophase the astral microtubules send signals to the equatorial region of the cell, where actin and myosin are activated which form contractile ring, followed by cleavage furrow, which deepens towards the center of the cell, dividing the parent cell into two daughter cells.

10. Cell cycle is divided into two phases; one is interphase in which cell increase in size and DNA replicate, while the second phase of cell cycle is M-phase which further divided into karyokinesis and cytokinesis in which parental cell divided into two daughter cells.

11. Specialized microtubules structure including aster and spindle which form by centrioles in animals' cells are called mitotic apparatus. Mitotic apparatus is a temporary structure in a dividing cell that enables the chromosomes to move to the poles of the cell, thus ensuring their even distribution between the daughter cells.

12.



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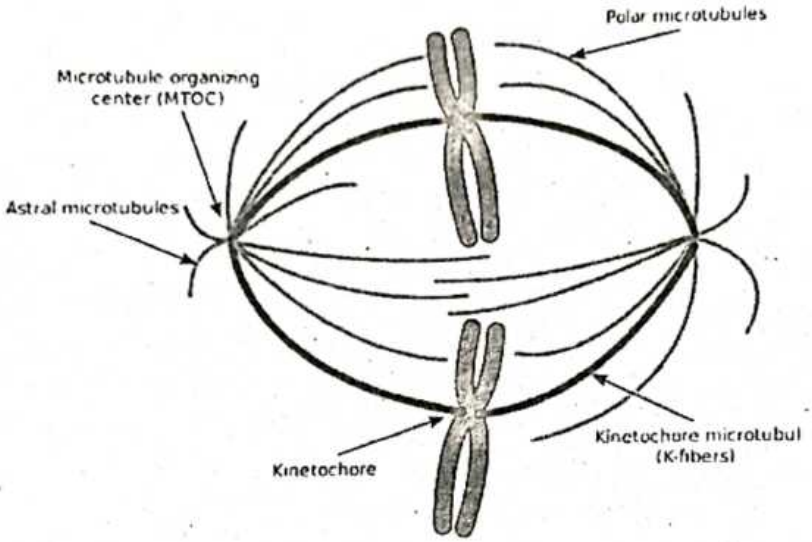

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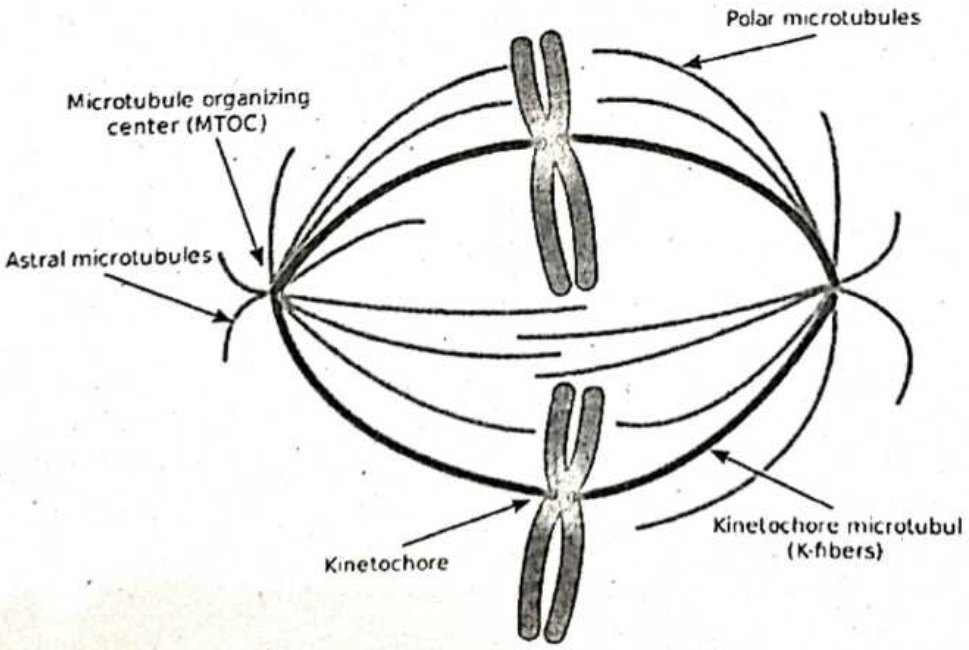

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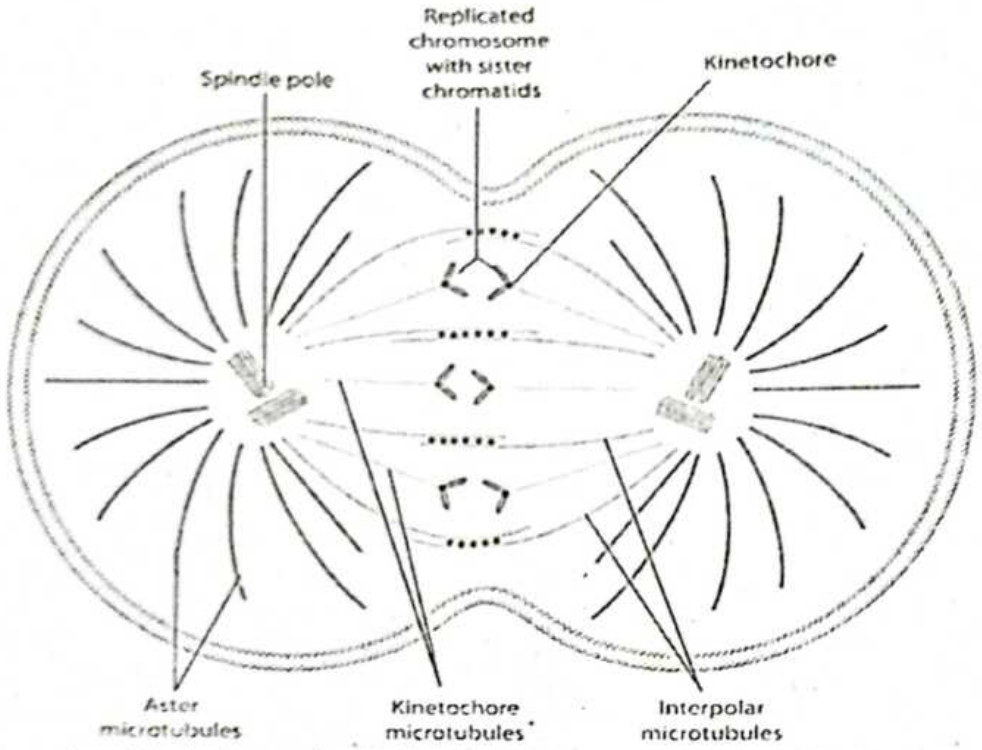


16. Anaphase is critical phase of cell division which ensures equal distribution of chromatids in the daughter cells. When in anaphase chromosomes get separated (due to division of centromere) and move to opposite pole, it terminate anaphase and now early telophase start in which nuclear membrane, nucleolus reappear and chromosomes become decondensed and form chromatin.

17. At cytokinesis, in place of contractile ring a membrane structure, phragmoplast is formed from vesicles which originate from Golgi complex in plant cells. These vesicles originate actually during metaphase and line up in the center of the dividing cell, where they fuse to form phragmoplast at the end of telophase.

18. Telophase of mitosis is opposite to prophase, so in telophase mitotic apparatus disorganize, nucleolus and nuclear membrane reappear, chromosomes become uncondensed and form chromatin.

19. Meiosis is a type of cell division in which chromosomes duplication only occur once during meiosis I, while there is no replication in second meiotic division due to absence of S-phase.

20. Interphase of first meiotic division lacks G_2 phase, while interphase of second meiotic division lack S-phase.

21. In Zygotene, homologous chromosomes start pairing which complete in pachytene, where crossing over occurs. In diplotene, these paired chromosomes repel each other and begin to separate. Separation of homologous chromosomes not complete because chromosomes remain united by their chiasmata. Separation of homologous complete in anaphase-I.

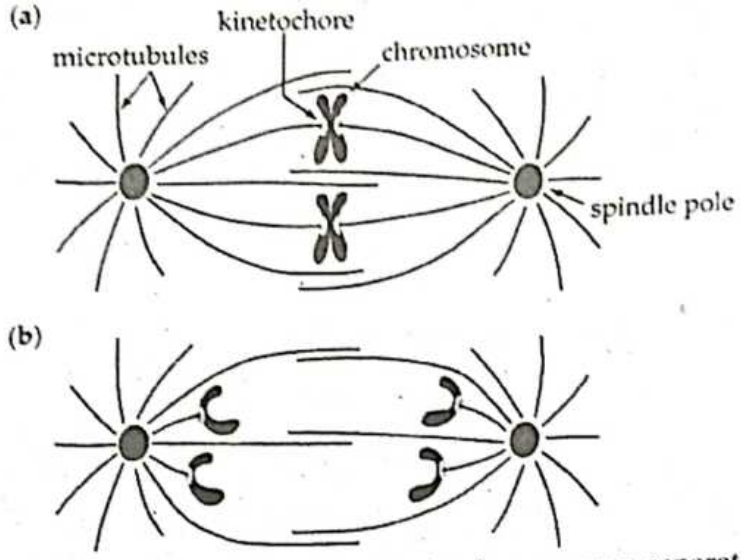
22. Metaphase I of meiosis I is characterized by the disorganization of nuclear membrane. Spindle fibers originate and the kinetochore fibers attach to the kinetochore of homologous chromosomes from each pole and arrange bivalents at the equator.

23. During gametogenesis in animals and sporogenesis in plants, chromosomes numbers reduce to half, which on fertilization again restore.

24. Anaphase I of meiosis I is the actual reduction phase because each pole receives half of the total number of chromosomes.

25. Tetrad formation is associated with meiosis and is characterized by the pairing of homologous chromosomes. This pairing is highly specific and exactly pointed. During mitosis, no such pairing takes place.

26.



27. During anaphase II, sister chromatids of each chromosome separate and move toward opposite poles. The centromeres separate and the sister chromatids, now individual chromosomes, move toward the opposite poles of the cell.

28. Cleavage, fertilization and regenerations all are the gifts of mitosis, while spermatogenesis is the sperm production process in human male that occur by meiosis.

29. During meiosis, chromosomal condensation and crossing over occur in prophase I, while nuclear envelop will disappear at the start of metaphase I.

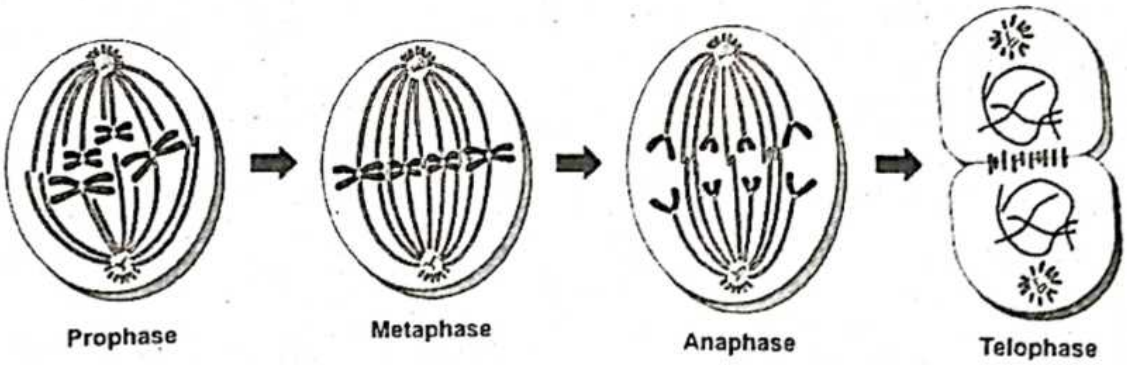
30. During zygotene pairing of homologous chromosomes called synapsis start. This pairing is highly specific and exactly pointed. Each paired and complex structure is called bivalent or tetrad.

31. Meiosis is the special type of cell division in which the number of chromosomes in daughter cells is reduced to half, as compared to the parent cell. In animals at the time of gamete formation, while in plants when spores are produced. Each diploid cell after meiosis produces four haploid cells, because it involves two consecutive divisions after single replication of DNA.

32. In case of human cells, the total number of tetrads formed during zygotene is 23.

33. First essential phenomenon of meiosis i.e., pairing of homologous chromosomes called synapsis starts. This pairing is highly specific and exactly pointed, but with no definite starting point(s). Each paired but not fused, complex structure is called bivalent or tetrad.

PAST PAPER MCQs

1. M phase of cell cycle is divided into karyokinesis and cytokinesis. Karyokinesis is the division of nucleus. It is further divided into prophase, metaphase, anaphase and telophase while cytokinesis refers to the division of whole cell.
2. Phragmoplast is formed from vesicles which originate from Golgi complex during metaphase and line up in the center of cell where they fuse to form phragmoplast at the end of telophase.
3. Interphase is the period of non-apparent division and is characterized by the period of great biochemical activity while the period of division is known as mitotic phase.
4. G_2 phase is characterized by the storage of energy for chromosomal movement during M-phase, synthesis of mitotic specific protein, RNA and microtubule subunits.
5. Chemically, microtubules are composed of tubulin protein and traces of RNA while microfilaments are composed of actin protein. Myosin and troponin proteins are associated with thick and thin filaments of muscle fibers, respectively.
6. During meiosis I, the most critical phase is anaphase I in which spindle fibers contract and polar fibers elongates which pulls the individual chromosome towards their respective poles.
7. 

8. Regeneration, healing of wounds and replacement of older cell is gift of mitosis in animals, while meiosis is responsible for the process of gametogenesis.
9. Chiasmata are the X-shaped structure formed due to the point of contact between paired chromatids during meiosis. It is the point representing the crossing over where the homologous chromosomes are joined to each other.

10. The phase of extensive metabolic activities is G_1 phase. In this phase cell normally grow in size. specific enzymes are synthesized and DNA base unit are accumulated for DNA synthesis.

11. Cancer is caused mainly by the mutations in somatic cells is and it may results due to the accumulation of as few as three to as many as twenty mutations in the genes that regulate cell division.

12. During prophase I, non-sister chromatids of homologous chromosomes undergo crossing over and exchange of genetic material take place. This exchange leads towards genetic variations.

13. S phase is called synthesis phase. During S phase, DNA is synthesized and chromosome number is doubled.

14. During cell division, most sensitive phase is that in which spindle fibers contract and chromosomes move away from one another to opposite poles of the spindle. Anaphase ensures the equal distribution of genetic material in next generation.

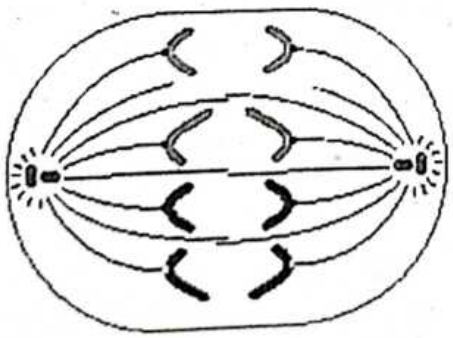
15. One centriole is made up of nine triplet of microtubule and two pairs of centrioles are made up of thirty six microtubule triplets.

16. During prophase I, the exchange of genetic material between non-sister chromatids of homologous chromosome takes place.

17. G_2 phase is characterized by the storage of energy for chromosomal movement, synthesis of mitotic specific protein, RNA and microtubule subunits.

18. G_2 phase is characterized by the storage of energy for chromosomal movement, synthesis of mitotic specific protein, RNA and microtubule subunits.

19.



Anaphase
The chromosomes have separated and are moving toward the poles.

5 TOPIC VARIETY OF LIFE

PRACTICE EXERCISE

TOPIC-WISE MCQs

TWO TO FIVE KINGDOM CLASSIFICATION SYSTEM

Q.1 All eukaryotes that did not fit the definition of plants, fungi or animals were included in kingdom:

A) Protista
B) Prokaryote
C) Monera
D) Animalia

Q.2 All of the following are developed from embryo except:

A) Plants
B) Whale
C) Animals
D) Protists

Q.3 Amoeba belongs to which kingdom?

A) Prokaryotae
B) Monera
C) Plantae
D) Protista

Q.4 Kingdom protoctista includes:

A) Prokaryotic organisms
B) Fungi
C) All unicellular organisms
D) Eukaryotic organisms

Q.5 Organisms of which of the following kingdom has absorptive mode of nutrition?

A) Prokaryotae
B) Animalia
C) Protoctista
D) Fungi

Q.6 It is believed that all complex animal forms evolved from:

A) Protista
B) Poriferans
C) Coelenterates
D) Arthropods

VIRUSES

Q.7 Viruses may not replicate in:

A) Blood Plasma
B) A plant cell
C) Skin cell
D) Hepatocytes

Q.8 Nucleic acid is the only component of:

A) Virus
B) Viroid
C) Virion
D) Prion

Q.9 It is false for viruses:

A) Viruses contain both DNA and RNA
B) No independent metabolic activities
C) Viruses are non-cellular
D) Tiny and infectious agent

Q.10 The component responsible for determination of shape of virus is:

A) Kind of nucleic acids
B) Kind of hosts
C) Protein subunits
D) Viral envelop

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

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

Q.12 _____capsomeres are present in capsid of herpes virus.

A) 152
B) 252
C) 162
D) 262

HIV

Q.13 Major Cells that are infected by HIV are:

A) B-lymphocytes
B) Natural cells
C) T-Helper cells
D) T-Lymphocytes

Q.14 It acts as a template strand for reverse transcriptase:

A) Viral DNA
B) Viral RNA
C) Host DNA
D) T-lymphocytes

Q.15 The phenomenon of transcription in HIV life cycle occurs in:

A) Nucleus
B) Cytoplasm
C) Inside viral capsid
D) None of these

Q.16 Attachment of HIV DNA with host DNA is done via action of:

A) Integrase
B) Protease
C) Reverse transcriptase
D) Nuclease

Q.17 HIV can be transmitted by all of the following sources except:

A) Intimate sexual contact
B) Breast feeding
C) Contact with blood
D) Saliva

Q.18 Uncoating of HIV virion occurs:

A) Outside the cell
B) In nucleus
C) In cytoplasm
D) At any place

PAST PAPER MCQs

2009
Q.1 **The major cell infected by the HIV is:**
A) Leucocyte
B) Monocyte
C) Helper T-lymphocyte
D) B-lymphocyte

2010
Q.2 **Chemically, viruses are made up of:**
A) Nucleic acid only
B) Protein only
C) Nucleic acid and protein
D) Core and coat

2012
Q.3 **In HIV viruses, reverse transcriptase converts single-stranded RNA into double stranded viral DNA. This process is called:**
A) Translation
B) Duplication
C) Replication
D) Reverse Transcriptase

2013
Q.4 **Reverse transcriptase is used to make DNA copies of:**
A) Host RNA
B) Viral RNA
C) Host DNA
D) Viral DNA

2014
Q.5 **Which of the following cells are mainly infected by HIV?**
A) T-killer lymphocytes
B) T-helper lymphocytes
C) B-plasma cells
D) B-memory cells

2015
Q.6 **HIV is classified as:**
A) Bacteriophage
B) Oncovirus
C) Retrovirus
D) Icosahedral virus

2016
Q.7 **AIDS is caused by:**
A) Bacteria
B) Virus
C) Fungi
D) Alga

2017
Q.8 **Cilia and flagella are absent in:**
A) Viruses
B) Bacteria
C) Higher plants
D) Lower animals

2018
Q.9 **In viruses, a combined structure formed by core (Nucleic Acid) and capsid is:**
A) Nucleocapsid
B) Envelope
C) Capsomeres
D) Prions

2019
Q.10 **Taxonomy includes the arrangement of organisms into different taxa. Which of the following represents the correct hierarchy of various taxa of classification?**
A) Species, genus, family, order, class, phylum
B) Order, family, class, phylum, kingdom
C) Species, genus, order, family, class, phylum
D) Species, genus, family, class, order, phylum

Q.11 **Capsid, the protective coat of a virus is made up of _____ subunits known as capsomeres.**
A) Lipid
B) Protein
C) RNA
D) DNA

Q.12 **Among followings, _____ enzyme is naturally found in human immunodeficiency virus.**
A) DNA polymerase
B) RNA polymerase
C) Reverse transcriptase
D) Ligase

ANSWER KEY

TOPIC-WISE MCQs

1	A	11	B
2	D	12	C
3	D	13	C
4	D	14	B
5	D	15	A
6	A	16	A
7	A	17	D
8	B	18	C
9	A		
10	C		

PAST PAPERS MCQs

1	C	11	B
2	C	12	C
3	D		
4	B		
5	B		
6	C		
7	B		
8	A		
9	A		
10	A		

EXPLANATORY NOTES

TOPIC-WISE MCQs

1. All those eukaryotic organisms which cannot be placed in kingdom animalia, kingdom plantae or kingdom fungi due to their peculiar characteristics are present in kingdom Protista.
2. A major difference in early development found in plants and animals is that the organisms of these kingdoms develop from embryo, while protists never form embryo during their reproduction.
3. All unicellular eukaryotic organisms are placed in kingdom protista while multi-cellular eukaryotic organism are placed in kingdom animalia, kingdom plantae or kingdom fungi. Kingdom fungi, however, also includes unicellular yeast.
4. All eukaryotic unicellular and some simple multi-cellular organisms are placed in kingdom protista while prokaryotic organisms are placed in kingdom monera.
5. Kingdom fungi include those organisms which are eukaryotic, mainly multi-cellular, but some are unicellular like yeast, heterotrophs, contains chitinous cell wall and show absorptive mode of nutrition.
6. All the higher eukaryotic kingdoms like animalia, plantae and fungi are thought to be evolved from simple or colonial protists.
7. One of the most important features of viruses is that they can reproduce only in animal or plant cells or in micro-organisms, where they reproduce by replication. Hence, 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.
8. Viroids are made up of only small, circular ssRNA molecules. Prions are of controversial nature and chemically, these are composed of mis-folded or infectious proteins. Virions are complete, mature and infectious particles.
9. Viruses are composed of central core of nucleic acid, either DNA or RNA but not the both, which is also known as the genome and is surrounded by a protein coat, the capsid.
10. The viral capsid is made up of protein subunits known as capsomeres. The number of capsomeres is characteristics of a particular virus and gives definite shape to the virion.
11. Prions are mis-folded or infectious proteins with the ability to transmit their mis-folded shape onto normal variants of the same protein.
12. 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.
13. HIV attacks a specific type of immune cell in the body, known as helper cells. When HIV destroys these cells, then it becomes difficult for the body to fight against the infections.
14. HIV is equipped with reverse transcriptase along with the other essential enzymes. Reverse transcriptase responsible for reverse transcription, during which viral genomic ssRNA is converted into viral dsDNA in the cytoplasm of helper T-cells.
15. In HIV infected helper T-cells, the process of transcription occurs in nucleus while the process of reverse transcription occurs in cytoplasm.
16. HIV integration is the insertion of HIV genetic material into the genome of the infected cell. This process is completed with the help of integrase.
17. Modes of transmission of HIV are blood transfusion, sexual contacts and breast feeding. Saliva is not the source of transmission of HIV.

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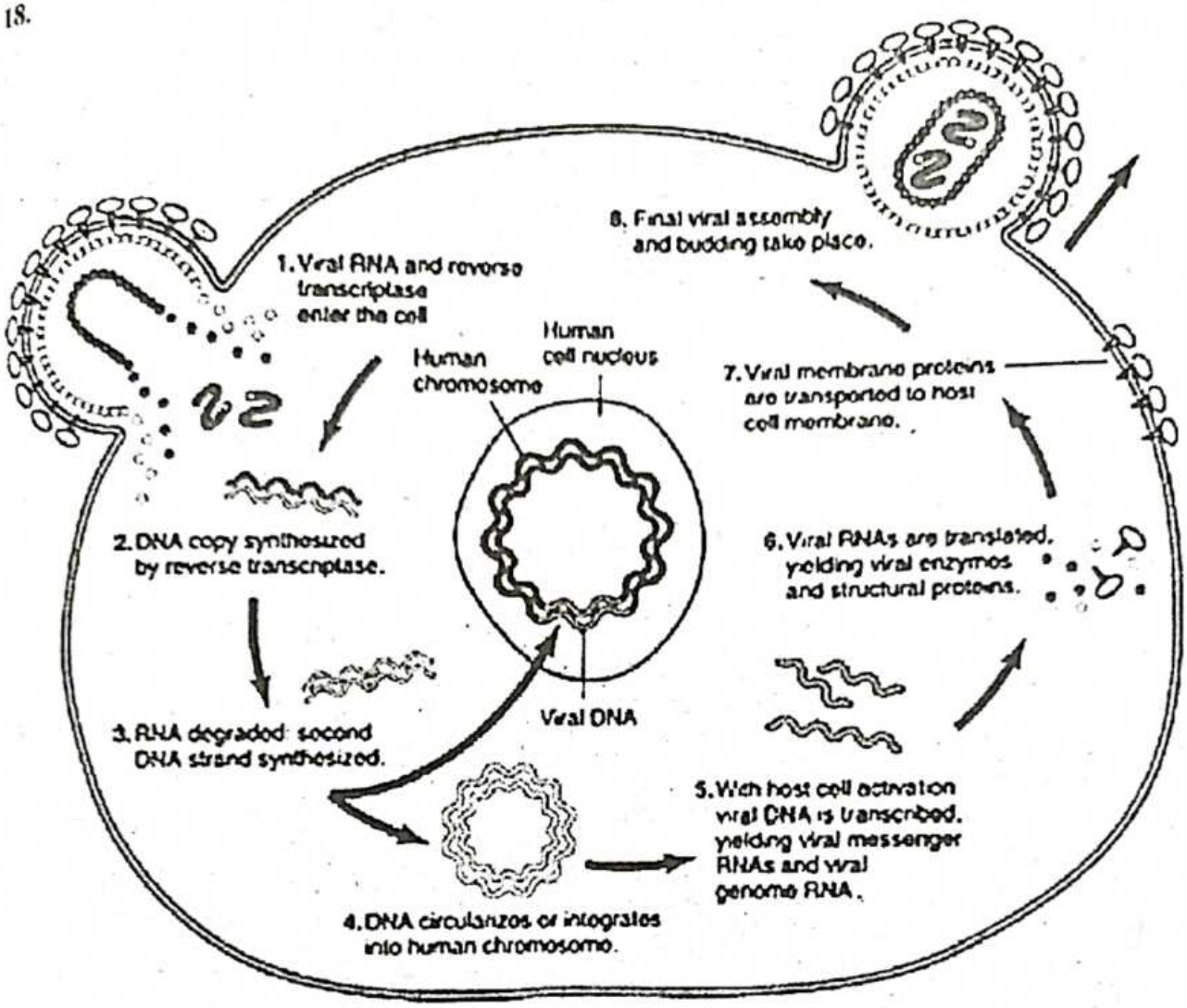
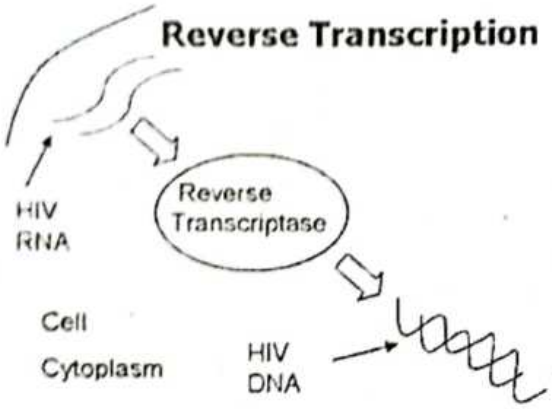
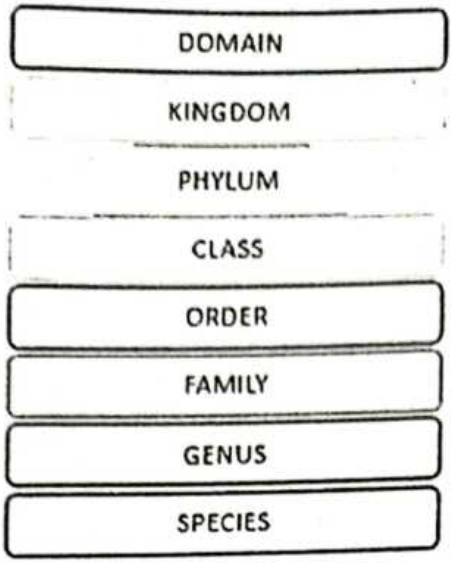

8. Final viral assembly and budding take place.
1. Viral RNA and reverse transcriptase enter the cell
Human chromosome
Human cell nucleus
7. Viral membrane proteins are transported to host cell membrane.
2. DNA copy synthesized by reverse transcriptase.
6. Viral RNAs are translated, yielding viral enzymes and structural proteins.
3. RNA degraded second DNA strand synthesized.
Viral DNA
5. With host cell activation viral DNA is transcribed, yielding viral messenger RNAs and viral genome RNA.
4. DNA circularizes or integrates into human chromosome.

PAST PAPERS MCQs

1. HIV attacks a specific type of immune cell in the body, known as helper cells. When HIV destroys these cells, then it becomes difficult for the body to fight against the infections.
2. Viruses are composed of central core of nucleic acid, either DNA or RNA but not the both, which is also known as the genome and is surrounded by a protein coat, the capsid.
3. 

4. HIV is equipped with various enzymes and among them; reverse transcriptase is of great importance. It takes HIV genomic ssRNA as template and reverse transcribe it to form viral dsDNA in the cytoplasm of the infected cells.
5. HIV attacks a specific type of immune cell in the body, known as helper cells. When HIV destroys these cells, then it becomes difficult for the body to fight against the infections.
6. Retroviruses are a type of viruses that uses RNA as its genetic material. 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.
7. 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.
8. 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.
9. All viruses contain two main components; a nucleic acid 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.

10.



SCIENTIFIC CLASSIFICATION

11. 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.

12. HIV particles are equipped with reverse transcriptase, integrase and proteases while DNA polymerase, RNA polymerase and ligase are absent in HIV.

6 TOPIC BIOENERGETICS

PRACTICE EXERCISE

TOPIC-WISE MCQs

PHOTOSYNTHETIC PIGMENTS

Q.1 Carotenoids absorb strongly:

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

Q.2 The most abundant protein in chloroplast is:

A) Rubisco
B) Ribulosebisphosphatase
C) RUBP
D) Ribulosebisphosphate hydrogenase

Q.3 Magnesium is central part of:

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

Q.4 The products of photosynthesis in green plants are:

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

Q.5 Location of phytol tail of chlorophyll b is:

A) Stroma
B) Thylakoid surface
C) Thylakoid membrane
D) Thylakoid lumen

Q.6 PS-I is named as it:

A) Absorbs wavelength of 680 nm
B) Absorbs wavelength of 700 nm
C) Discovered earlier than PS-II
D) Slightly located upward than PS-II

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

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

Q.8 Which one the following is not function of carotenoids?

A) Convert light energy into chemical energy
B) Transfer energy
C) Protect Chlorophyll
D) Protect human eye

Q.9 Which of the following is correct sequence for the movement of electrons during non -cycling photophosphorylation?

A) P680 $\rightarrow$ P700 $\rightarrow$ water $\rightarrow$ $NADP^+$
B) Water $\rightarrow$ P680 $\rightarrow$ P700 $\rightarrow$ $NADP^+$
C) Water $\rightarrow$ P700 $\rightarrow$ P680 $\rightarrow$ $NADP^+$
D) P680 $\rightarrow$ P700 $\rightarrow$ $NADP^+$ $\rightarrow$ water

Q.10 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 nitrogens
D) A head of four pyrrole rings and a phytol tail

Q.11 Following is correct sequence of energy transfer between photosynthetic pigments:

A) Chl.a $\rightarrow$ Chl.b $\rightarrow$ Carotenoids
B) Chl.b $\rightarrow$ Carotenoids $\rightarrow$ Chl.a
C) Carotenoids $\rightarrow$ Chl.b $\rightarrow$ Chl.a
D) In any direction

Q.12 Conversion of light energy into chemical energy is function of:

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

Q.13 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

ABSORPTION & ACTION SPECTRA

Q.14 Spectrophotometer is used to measure:
A) Absorption of CO_2
B) Reflection of pigments
C) Absorption of O_2
D) Absorption of different wavelengths

Q.15 Which shows the effectiveness of wavelengths of light driving photosynthesis?
A) Absorption spectrum
B) Broad spectrum
C) Action spectrum
D) Narrow spectrum

LIGHT & DARK REACTIONS

Q.16 Incorrect statement for photosynthesis is:
A) It occurs during day time
B) It requires chlorophyll
C) It uses water with CO_2
D) It uses oxygen

Q.17 Which is not true for dark reaction?
A) Does not require light directly
B) Also called Z-scheme
C) It uses ATP
D) G3P is produced

Q.18 Where does the light reactions take place?
A) Stroma
B) Chloroplast
C) Thylakoid membrane
D) Leucoplast

Q.19 Each photon of light excites how many electrons?
A) 1
B) 2
C) 4
D) 6

Q.20 Water splits during photosynthesis in/on:
A) Interior space of thylakoid
B) Into the stroma
C) Outside the thylakoid membrane
D) At ATP synthase complex

Q.21 During cyclic photophosphorylation, electrons pass from all except:
A) Photosystem I
B) Photosystem II
C) Ferridoxin
D) Cytochrome complex

Q.22 The process in which carbon from CO_2 is incorporated into organic molecules:
A) Glycolysis
B) Krebs cycle
C) Calvin cycle
D) Light dependent reactions

Q.23 Which statement is not true about the noncyclic electron pathway?
A) It absorbs photons into PS-I
B) It produces ATP
C) It is a long pathway
D) Carbon dioxide fixation

Q.24 Which is most necessarily associated with the Calvin cycle?
A) ATP production
B) Carbon dioxide fixation
C) Oxygen production
D) Carbon dioxide production

Q.25 The product of the dark reaction is:
A) ATP
B) G3P
C) RuBP
D) PEP

Q.26 The final acceptor of electrons during the noncyclic electron pathway is:
A) Photosystem I
B) ATP
C) Photosystem II
D) $NADP^+$

Q.27 If 12 NADPH are used in Calvin cycle, then how many glucose molecules will be formed?
A) One
B) Two
C) Six
D) Twelve

Q.28 Calvin cycle is also known as C_3 pathway due to:
A) Initial incorporation of 3 CO_2molecules
B) Production of 3 carbon 3PGA
C) Production of 3 carbon G3P
D) Cycle has 3 steps

Q.29 $NADPH_2$ is produced in photosynthesis during:
A) Dark reaction
B) Non-cyclic photophosphorylation
C) Pseudocyclic photophosphorylation
D) Cyclic photophosphorylation

Q.30 For fixing 3 molecules of CO_2 in Calvin cycle, what is needed?
A) 9ATP + 6$NADPH_2$
B) 6ATP + 9$NADPH_2$
C) 18ATP + 12$NADPH_2$
D) 3ATP + 3$NADPH_2$

CELLULAR RESPIRATION

Q.31 ATP formation through oxidative phosphorylation involves:
A) Light reactions
B) Chemiosmosis
C) Dark reactions
D) Fermentation

Q.32 $NADP^+$ reductase transfers electron from:
A) $NADP^+$ to ferridoxin
B) ADP to ATP
C) Ferridoxin to $NADP^+$
D) Cytochrome complex to $NADP^+$

Q.33 How much energy is released by breaking of terminal phosphate group of ATP?
A) 4.3 KCal
B) 6.3 KCal
C) 5.3 KCal
D) 7.3 Kcal

Q.34 What happens in glycolysis when fructose 1,6-bisphosphate is converted into two 3 carbon compound?
A) ATP is used
B) No ATP and NADH used
C) NADH is used
D)Both ATP and NADH produce

Q.35 Water is released during conversion of:
A) 2-phosphoglycerate ⟶ PEP
B) 3- phosphoglycerate ⟶ 2-phosphoglycerate
C) 1,3bisphosphoglycerate ⟶ 3- phosphoglycerate
D) G3P ⟶ 1,3bisphosphoglycerate

Q.36 The oxidation of succinate produces:
A) NADH
B) Malate
C) $FADH_2$
D) ATP

Q.37 Both NADH and $FADH_2$ are formed during:
A) Glycolysis
B) The Krebs cycle
C) The electron transport system
D) Fermentation

Q.38 When products of glycolysis passes through Krebs cycle, it will produce?
A) 2NADH, 2$FADH_2$, 2ATP
B) 1 NADH, 3 $FADH_2$, 2 ATP
C) 1NADH, 1$FADH_2$, 1ATP
D) 6 NADH, 2 $FADH_2$, 2 ATP

Q.39 Acetyl-CoA formation is from:
A) Pyruvate and a coenzyme
B) ATP and pyruvate
C) Citric acid and a coenzyme
D) Carbon dioxide and pyruvate

Q.40 Which one of following Give more ATP in ETC?
A) NADH
B) Pyruvate
C) $FADH_2$
D) Glucose

Q.41 **Biological oxidation involves removal of hydrogen, linked with specific coenzymes and is catalyzed by:**
A) Carboxylase
B) Dehydrogenases
C) Hydrogenases
D) Catalases

Q.42 **Which of the following is the final acceptor of electron in respiratory chain?**
A) Cytochrome a
B) Oxygen
C) Cytochrome a_3
D) Hydrogen

Q.43 **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) ATP
C) $FADH_2$
D) ADP

Q.44 **Electron transport chain in mitochondria is used to:**
A) Synthesize $NADP^+$
B) Create electron gradient
C) Synthesize ADP
D) Create proton gradient

Q.45 **The precursor of fumarate during Krebs cycle require _____for fumarate synthesis.**
A) Succinate
B) Succinate dehydrogenase
C)Fumarate dehydrogenase
D) FAD^+ Oxidase

Q.46 **Starting from end products of glycolysis, how many CO_2 are produced upto the formation of succinate in a single Krebs cycle?**
A) 2
B) 6
C) 12
D) 3

Q.47 **In respiratory chain, $FADH_2$ causes reduction of:**
A) Coenzyme Q
B) Cytochrome c
C) Cytochrome a
D) Cytochrome b

Q.48 **The stage of cellular respiration producing maximum ATP:**
A) Glycolysis
B) Krebs cycle
C) Oxidation of pyruvate
D) Chemiosmosis

Q.49 **Phosphofructokinase is inhibited by:**
A) Decrease in ATP
B) Increase in NADH
C) Decrease in citrate
D) Increase in ATP

Q.50 **Phosphorylation of ADP during glycolysis occurs via:**
A) Photophosphorylation
B) Chemiosmosis
C) Oxidative phosphorylation
D) Substrate level phosphorylation

Q.51 **Which one of the following represents de-phosphorylation?**
A) Fructose 1-phosphate → Fructose 1,6-biphosphate
B) Fructose 1,3bisphosphoglycerate → 3 phosphoglycerate
C) Fructose 1-phosphate → Fructose 6-phosphate
D) Glucose 6-phosphate → Fructose 1-phosphate

Q.52 **In cellular respiration, product formed as a result of release of energy:**
A) ATP
B) NADH
C) Oxygen
D) Glucose

Q.53 **Which of the following process is used in the conversion of pyruvate to acetyl CoA?**
A) Decarboxylation
B) Dehydrogenation
C) Dehydration
D) Both A and B

Q.54 **The net gain of energy from one molecule of glucose during aerobic respiration in prokaryotes is:**
A) 2 ATP
B) 4 ATP
C) 38 ATP
D) 40 ATP

ANAEROBIC RESPIRATION

Q.55 In yeast, pyruvic acid is converted to:

A) Ethyl alcohol
B) Acetic acid
C) Lactic acid
D) Fumaric acid

Q.56 About 2% energy of chemical bonds of glucose is converted into ATP by:

A) Glycolysis
B) Fermentation
C) Chemiosmosis
D) Calvin cycle

Q.57 This process may has CO_2 as its products:

A) Glycolysis
B) Fermentation
C) Chemiosmosis
D) Calvin cycle

Q.58 $C_3H_6O_3$ formation relates to:

A) Glycolysis
B) The Krebs cycle
C) The electron transport system
D) Fermentation

Q.59 Cellular respiration is essentially a/an _____ process.

A) Oxidation
B) Reduction
C) Redox
D) Hydrogenation

Q.60 Which of the following types of mammalian cell does not carry out oxidative phosphorylation?

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

Q.61 The difference between respiration and combustion is related to respiration being:

A) Multistep reactions
B) Enzyme controlled
C) Intracellular
D) All A, B, C

Q.62 In plants, energy is released during the process of:

A) Photosynthesis
B) Transpiration
C) Respiration
D) Water absorption

Q.63 During process of lactic acid fermentation:

A) CO_2 is produced
B) Ethanol is produced
C) NADH is oxidized
D) ATP are produced

Q.64 The molecule regenerated by fermentation:

A) O_2
B) NAD^+
C) ATP
D) Pyruvate

Q.65 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

PAST PAPER MCQs

2008

Q.1 **Chlorophylls absorb mainly _____ wave length.**

A) Yellow
B) Green
C) Violet-blue
D) Indigo

Q.2 **In which stage of aerobic respiration is 2-carbon molecules oxidized completely to carbon dioxide?**

A) Glycolysis
B) ETC
C) Krebs cycle
D) Calvin cycle

Q.3 **Which form of anaerobic respiration occurs in muscle cell of humans and other animals during extreme physical activities?**

A) Alcoholic fermentation
B) Lactic acid fermentation
C) Glycolysis
D) Pyruvic acid oxidation

2009

Q.4 **Which of the following molecules is reduced by accepting hydrogen in Calvin Cycle?**

A) Glyceraldehyde-3-phosphate
B) Ribulose bisphosphate
C) 3-Phosphoglycerate
D) 1,3-Bisphosphoglycerate

Q.5 **Immediate source of energy for cellular metabolism is:**

A) Lipids
B) ATP
C) Carbohydrates
D) Proteins

Q.6 **The molecule formed after first phosphorylation during glycolysis is:**

A) Fructose-6-phosphate
B) Fructose-1, 6-bisphosphate
C) Glucose-1-phosphate
D) Glucose-6-phosphate

Q.7 **Krebs cycle in mitochondria takes place in:**

A) Cytosol
B) Matrix
C) Outer Membrane
D) Inner Membrane

2010

Q.8 **Instrument which is used to measure relative abilities of different pigments to absorb different wavelengths of light is called:**

A) Spectrometer
B) Photometer
C) Barometer
D) Spectrophotometer

Q.9 **Type of respiration which involves step by step breakdown of carbon chain molecules in the cell is called:**

A) External respiration
B) Cellular respiration
C) Pulmonary respiration
D) Cutaneous respiration

Q.10 **Krebs cycle takes place in:**

A) Ribosomes
B) Golgi Apparatus
C) Mitochondria
D) Endoplasmic reticulum

Q.11 **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 and water
D) Methanol, lactic acid and citric acid

2011

Q.12 Z-scheme is used for:
A) Non-Cyclic Photophosphorylation
B) Cyclic Photophosphorylation
C) Both Cyclic and Non-Cyclic Photophosphorylation
D) Oxidative Phosphorylation

Q.13 Some electron from the second primary acceptor may pass back to chlorophyll molecules by electron carrier system, yielding ATP. This process is called:
A) Phosphorylation
B) Photophosphorylation
C) Non-Cyclic Phosphorylation
D) Cyclic Phosphorylation

Q.14 Oxidative phosphorylation, synthesis of ATP in the presence of oxygen occurs in:
A) All types of cells
B) All anaerobic cells
C) All primitive cells
D) All aerobic cells

Q.15 Glycolysis is the breakdown of glucose into two molecules of:
A) Glycerate
B) Lactic Acid
C) Pyruvate
D) Succinic Acid

Q.16 Before entering Krebs cycle, the pyruvate is first decarboxylated and oxidized into:
A) Alpha ketoglutaric acid
B) Citric acid
C) Glyceric acid
D) Acetic acid

2012

Q.17 Which one are intermediates in respiration and photosynthesis both?
A) Ribose and heptulose
B) Glyceraldehydes & dihydroxyacetone
C) Glucose and galactose
D) Fructose and ribulose

Q.18 The product/s of cyclic photophosphorylation is/are:
A) ATP
B) NADP
C) NADP and ATP
D) NADP, ATP and O_2

Q.19 The end product of glycolysis is:
A) ADP
B) Reduced FAD
C) Citric acid
D) Pyruvate

Q.20 Total NADH formed by one glucose molecule during Krebs Cycle are:
A) 6
B) 3
C) 8
D) 18

Q.21 One molecule of $FADH_2$ is produced in Krebs cycle during conversion of:
A) Fumarate to Malate
B) Succinate to Fumarate
C) Malate to Oxaloacetate
D) α-Ketoglutarate to Succinate

Q.22 The terminal electron acceptor in electron transport chain is:
A) Hydrogen
B) Iron
C) Cytochrome
D) Oxygen

2013

Q.23 A biochemical process which occurs within a cell to breakdown complex compounds to produce energy is called:
A) Respiration
B) Photosynthesis
C) Oxidation reduction
D) Photophosphorylation

Q.24 Which part of chlorophyll molecule absorbs light?
A) Phytol
B) Porphyrin ring
C) Pyrrole
D) Thylakoid membrane

Q.25 Every molecule of NADH fed into ETC produces:
A) 2 ATP
B) 3 ATP
C) 4 ATP
D) 6 ATP

Q.26 **Final acceptor of electrons in respiratory chain is:**
A) Cytochrome a
B) Oxygen
C) Cytochrome a3
D) Cytochrome c

Q.27 **The end product of anaerobic respiration in humans and other mammals is:**
A) Pyruvic acid
B) Ethanol
C) Lactic acid
D) Glucose

2014

Q.28 **The most common respiratory substrate as a source of energy is:**
A) Glucose
B) Sucrose
C) Fructose
D) Insulin

Q.29 **Oxidative phase of glycolysis starts with dehydrogenation of:**
A) Glycolysis
B) Ribulose bisphosphate
C) Glyceraldehyde 3-phosphate
D) NADH

Q.30 **Which one of the following is the stage of cellular respiration for which oxygen is not essential?**
A) Glycolysis
B) Pyruvate oxidation
C) Krebs cycle
D) Electron Transport Chain

Q.31 **Pyruvate, the end product of glycolysis moves from cytosol to mitochondrial matrix where it is oxidized into _____ producing CO_2 as a by-product.**
A) Active acetic acid
B) Citrate
C) NAD^+
D) FAD

Q.32 **Pyruvate** **Acetyl Co-A:**

A) $FAD^+ \longrightarrow FADH$
B) $NAD^+ \longrightarrow NADH$
C) $NADH^- \longrightarrow NAD + H^+$
D) $FADH^+ \longrightarrow FAD + H^+$

Q.33 **In one turn, the Krebs cycle produces one molecule of ATP, one molecule of $FADH_2$ and _____ molecules of NADH.**
A) 1
B) 2
C) 3
D) 4

Q.34 **Which one of the following is the site of oxidative phosphorylation in mitochondria?**
A) Cristae
B) Matrix
C) Outer membrane
D) Ribosomes

2015

Q.35 **In light independent stage of photosynthesis, the CO_2 combines with _____ to form an unstable 6-carbon intermediate.**
A) Ribulose bisphosphate
B) Hexose sugar
C) Glycerate-3-phosphate
D) Glyceraldehyde-9-phosphate

Q.36 **In glycolysis, glycerate-1,3-bisphosphate is converted into glycerate-3-phosphate by losing _____ phosphate molecules.**
A) 3
B) 2
C) 1
D) 4

Q.37 **Malate is oxidized by _____ to oxaloacetate in Krebs cycle.**
A) ATP
B) $NADP^+$
C) NAD^+
D) FAD

Q.38 **In electron transport chain, the electrons from NADH and $FADH_2$ are passed to:**
A) Cytochrome a
B) Cytochrome a3
C) Co-enzyme c
D) Co-enzyme Q

Q.39 Carriers of the respiratory chain are located on:

A) Matrix of mitochondria
B) Outer membrane of mitochondria
C) Inner membrane of mitochondria
D) Cytoplasmic matrix

2016

Q.40 Functional group of chlorophyll 'a' is:

A) $-CH_3$
B) $-CHO$
C) $-COOH$
D) $-OH$

Q.41 Photosystem I has chlorophyll 'a' molecules which absorb maximum light of:

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

Q.42 Cyclic flow of electrons produces:

A) ATP and CO_2
B) ATP
C) Only CO_2
D) Only Oxygen

Q.43 Each _____ consists of a light gathering antenna complex and reaction center.

A) Chlorophyll
B) Photosystem
C) Photon
D) Electron

Q.44 Immediate product formed after CO_2 fixation in Calvin Cycle is:

A) Unstable 6-carbon compound
B) Unstable 5-carbon compound
C) Unstable 4-carbon compound
D) Unstable 3-carbon compound

2017

Q.45 Chlorophyll molecule contains:

A) Mg^{++}
B) Ca^{++}
C) K^{+}
D) Na^{+}

Q.46 The tail of chlorophyll molecule is embedded in:

A) Membrane of mitochondria
B) Thylakoid membrane
C) Membrane of SER
D) Membrane of RER

Q.47 Chlorophyll 'a' and chlorophyll 'b' differ in one of the functional groups. Chlorophyll 'a' has:

A)-CHO
B)-OH
C)-CH3
D)-NH2

Q.48 Glycerate-3-phosphate in the presence of ATP and reduced NADP from light dependent stage is reduced to:

A) 3-carbon compound
B) Ribulose bisphosphate
C) 5-carbon compound
D) 6-carbon compound

Q.49 Calvin cycle occurs in:

A) Grana of chloroplast
B) Stroma of chloroplast
C) Chlorophyll (Reaction center)
D) Roots of plants

2017 Re-take

Q.50 Pick the characteristic of tail of chlorophyll:

A) Hydrophilic
B) Hydrophobic
C) Present in stroma
D) $C_{20}H_{20}$

Q.51 Which of the following color is maximum absorbed by chlorophyll?

A) Red
B) Green
C) Yellow
D) Indigo

Q.52 Graph showing effectiveness of absorbed light is called:

A) Absorption spectrum
B) Action spectrum
C) Light spectrum
D) Dark spectrum

Q.53 Splitting of water in sunlight is called:
A) Lysis
B) Condensation
C) Photolysis
D) Hydrolysis

Q.54 CO_2 acceptor in Calvin cycle is:
A)Rubisco
B) RuBP
C)RuP
D) G_3P

Q.55 Glycolysis is conversion of:
A) Glucose to Acetyl Co-A
B) Glucose to G3P
C) Glucose to pyruvate
D) Glucose to Serine

Q.56 Acceptor of acetyl Co-A in Krebs cycle is:
A) Oxaloacetate
B) Citrate
C) Succinate
D) Fumarate

2018

Q.57 When we extract carotenoids from its source we see that it is:
A) Violet in colour
B) Blue green in colour
C) Yellow green in colour
D) Yellow and orange red in colour

Q.58 _____ is the site of light independent reaction.
A) Thylakoid space
B) Thylakoid membrane
C) Grana
D) Stroma

Q.59 At the last step of glycolysis which of the following compound is formed?
A) Fructose phosphate
B) Ethyl alcohol
C) Pyruvic acid/ Pyruvate
D) Lactic acid

Q.60 The enzymes required in glycolysis are present in:
A) Golgi apparatus
B) Cell cytoplasm
C) Inner mitochondrial membrane
D) Matrix of mitochondria

Q.61 In aerobic respiration:
A) Pyruvate is completely oxidized to form oxygen and water
B) Pyruvate is carboxylated to produce citrate
C) Pyruvate is converted to ethanol and carbon dioxide
D) Pyruvate is completely oxidized to form carbon dioxide and water

Q.62 The enzymes required for Krebs cycle are found in _____.
A) Lysosomes
B) Matrix
C) Cytoplasm
D) F_1 particles

2019

Q.63 The photosynthetic pigments of plants are arranged as clusters in thylakoid membranes. The reaction centers of these clusters consist of _____ molecules.
A) ATP
B) Chlorophyll
C) Glucose
D) Carotenoids

Q.64 Which of the following photosystem is involved in cyclic photophosphorylation?
A) PS I and PS II
B) PS II
C) PS III
D) PS I

Q.65 In chemiosmosis, the proton (H^+) pumps moves from _____.
A) Stroma to Lumen
B) Stroma to cytoplasm
C) Lumen to Stroma
D) Cytoplasm to Stroma

Q.66 Glycolysis takes place in the _____ of cell.
A) Golgi complex
B) Nucleus
C) Cytoplasm
D) Mitochondria

Q.67 How many molecules of ATP would be utilized for phosphorylation of one glucose molecule during glycolysis?
A) One
B) Four
C) Two
D) Three

ANSWER KEY

TOPIC-WISE MCQs

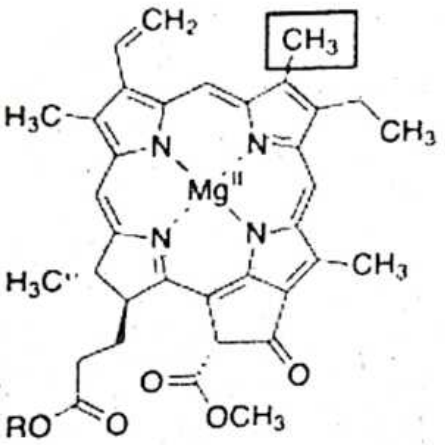
1	D	11	C	21	B	31	B	41	B	51	B	61	D
2	A	12	D	22	C	32	C	42	B	52	A	62	C
3	A	13	D	23	D	33	D	43	A	53	D	63	C
4	D	14	D	24	B	34	B	44	D	54	C	64	B
5	C	15	C	25	B	35	A	45	B	55	A	65	B
6	C	16	D	26	D	36	C	46	D	56	B		
7	A	17	B	27	A	37	B	47	A	57	B		
8	A	18	C	28	B	38	D	48	D	58	D		
9	B	19	A	29	B	39	A	49	B	59	A		
10	D	20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

PAST PAPERS MCQs

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

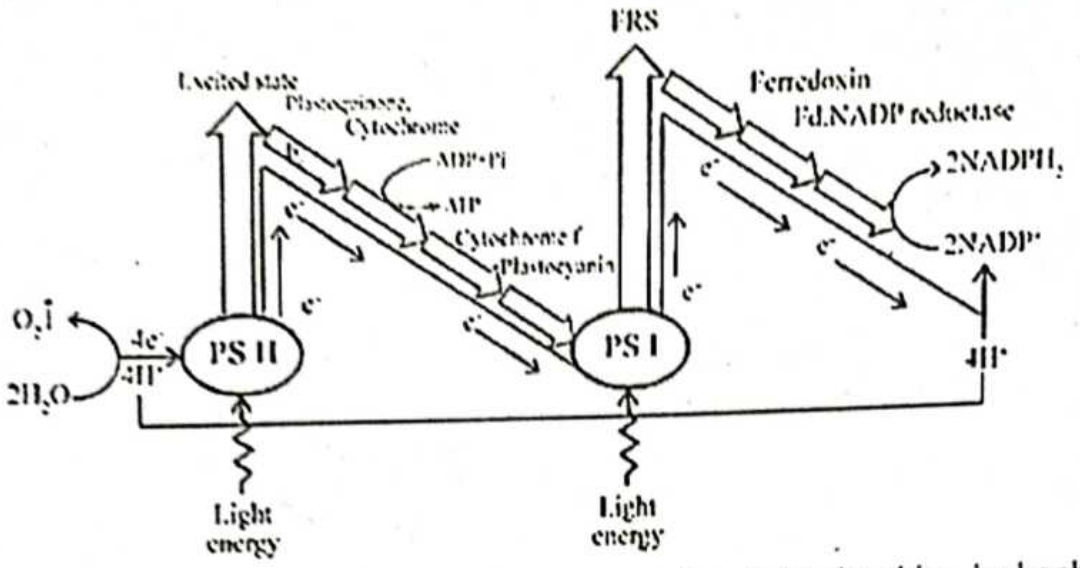
EXPLANATORY NOTES

TOPIC-WISE MCQs

1. 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 the provide energy for photosynthesis.
2. 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.
3. 

4. $6CO_2$ (Carbon dioxide) + $12H_2O$ (Water) $\xrightarrow[\text{Chlorophyll}]{\text{Light}}$ $C_6H_{12}O_6$ (Glucose) + $6H_2O$ (Water) + $6O_2$ (Oxygen)
5. 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 thylakoid membrane.
6. 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.
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. Transfer of energy, broadening the spectrum and 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.

9.



10. 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

11. 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 → chlorophyll b→ chlorophyll a

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

13. 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 ETC.

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

15. A graph plotting absorption of light of different wavelengths by a pigment is called absorption spectrum while the graph showing relative effectiveness of different wavelengths of light in driving photosynthesis is called action spectrum.

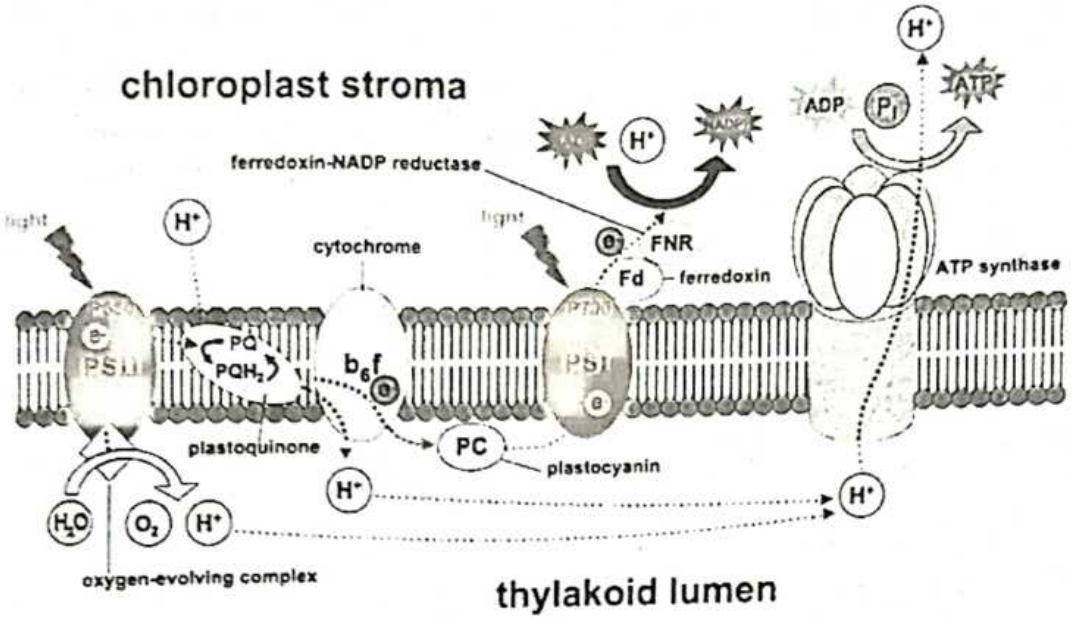
16. Photosynthesis is the biochemical process that occurs during day time and requires chlorophyll for sugar synthesis and uses CO_2 as reactant. O_2, however, is produced as by-product during light dependent phase of photosynthesis and consumed during cellular respiration.

17. The option 'B' is incorrect with respect to dark reaction because light reactions (non-cyclic phosphorylation) called as Z-scheme.

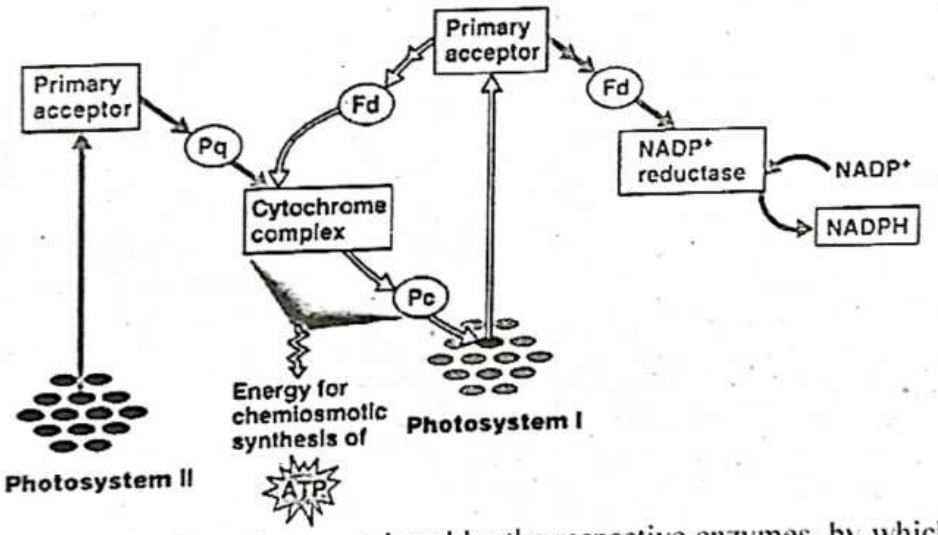
18. The light reactions of photosynthesis take place at thylakoid membrane while dark reactions take place in stroma of chloroplast.

19. Each photon of light is able to excite a single electron during light reactions of photosynthesis.

20.



21.



22. The cyclic series of reactions, catalyzed by the respective enzymes, by which the carbon is fixed and reduced, resulting in the synthesis of sugar during the dark reactions of photosynthesis, is called Calvin cycle in which organic RuBP is used as CO_2 acceptor.

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

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

25. During dark reactions fixed carbon is reduced to energy rich G3P with the energy and reducing power of ATP and NADPH, respectively (both the products of light-dependent reactions).

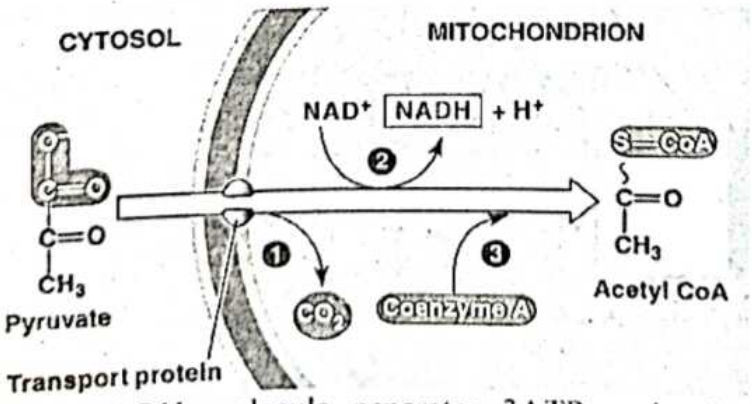
26. $NADP^+$ acts as the final electron acceptor during non-cyclic electron flow, while electrons are moved back from ferredoxin to cytochrome complex to generate assimilating power via cyclic electron flow.

27. Since 6 molecules of NADPH are used for the synthesis of 1 G3P in Calvin cycle, so for the synthesis of one glucose molecule 12 molecules of NADPH are required.
28. Because the product of initial carbon fixation is a three - carbon compound, the Calvin cycle is also known as C3 pathway.
29. As a result of energy conversion in light reaction, reducing and assimilating power in the form of NADPH (NADPH + H+) and ATP are formed, both temporarily storing energy to be carried along with H+ to the light independent reactions.
30. The chemical equation of dark reaction is:

$$3CO_2 + 6NADPH + 9ATP \longrightarrow (CH_2O)_3 + 6NADP + 9ADP + 9Pi + 3H_2O$$

(carbohydrate)

31. 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.
32. The primary electron acceptor of PS-I passes the photo-excited electrons to ETC, which transfers them to ferridoxin. NADP reductase then transfers the electrons from ferridoxin to $NADP^+$ and converts it into NADPH. This is the redox reaction that stores the high energy electrons in NADPH.
33. ATP molecules have three phosphate groups i.e. α, β and γ phosphates. The bond between the phosphate groups are the source of energy and their breaking will release 7.3 Kcal of energy.
34. During the preparatory phase of glycolysis, one molecule of fructose 1, 6-bisphosphate is converted into 2 molecules of phosphorylated trioses e.g. G3P and DAP. No ATP and NADH are consumed or produced in this reaction.
35. When 2-phosphglycerate is converted into PEP, a water molecule is released.
36. The oxidation of succinate into fumarate produces $FADH_2$.This reaction is catalyzed by an enzyme called succinic acid dehydrogenase.
37. 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.
38. When products of glycolysis pass through Krebs cycle, it will produce 6 molecules of NADH, 2 molecules of $FADH_2$ and 2 molecules of ATP.
39.

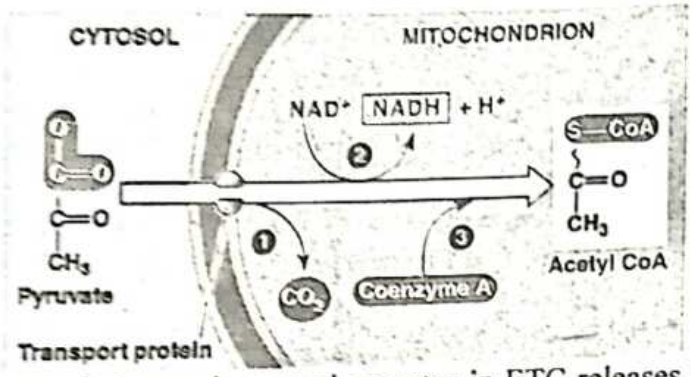


40. Theoretically, one NADH molecule generates 3ATP molecules while one $FADH_2$ generates 2 ATP molecules during their oxidation through electron transport chain.

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

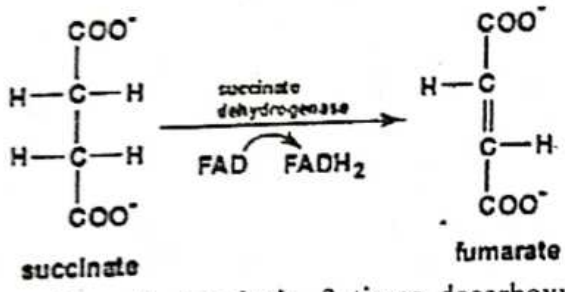
42. At the mitochondrial inner membrane, electrons from NADH and $FADH_2$ pass through the electron transport chain to oxygen, which is then reduced to water.

43.



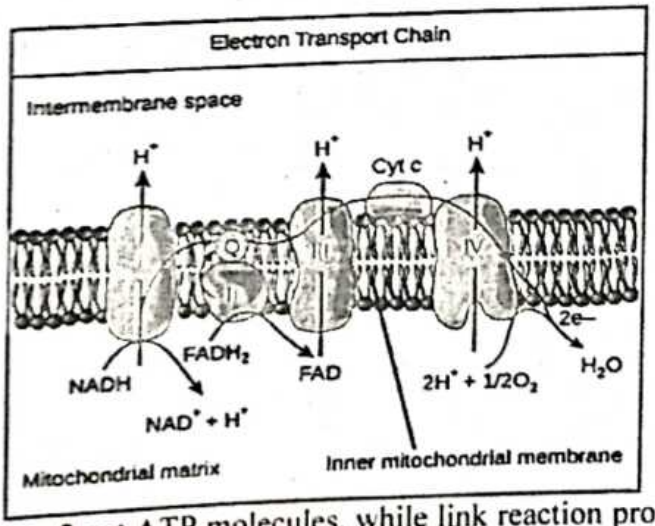
44. Passage of electrons between donor and acceptor in ETC releases energy, which is used to generate a proton gradient across the mitochondrial membrane by actively "pumping" protons into the inter-membrane space, producing a thermodynamic state that has the potential to do work.

45.



46. Starting from end product of glycolysis, 3 times decarboxylation occurs. It means 3 molecules of CO_2 produced.

47.



48. 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 ETC to generate maximum ATP molecules through chemiosmosis.

49. Phosphofructokinase is the main regulatory enzyme in preparatory phase of glycolysis and it is inhibited by the increased concentration of NADH.

50. 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.

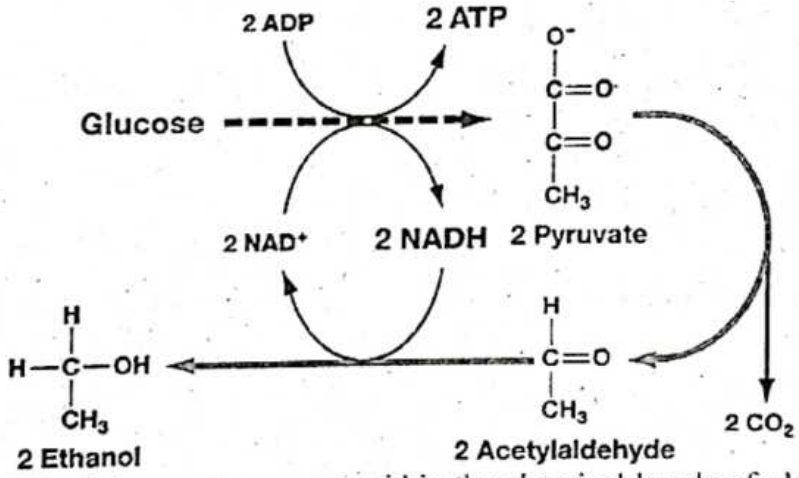
51. Removal of phosphate group from a molecule is called de-phosphorylation. Conversion of fructose 1,3-bisphosphoglycerate into 3-phosphoglycerate is a de-phosphorylation reaction.

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

53. 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.

54. 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.

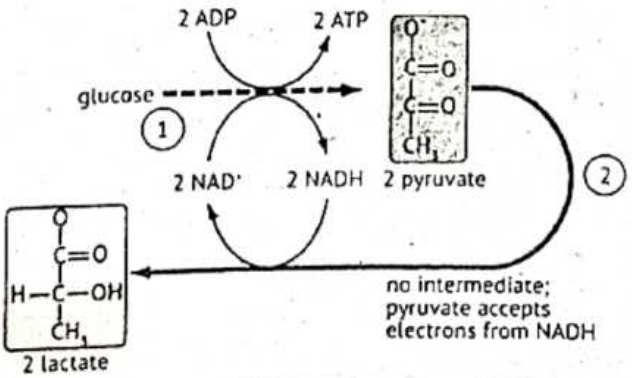
55.



56. Only about 2% of the energy present within the chemical bonds of glucose in converted into ATP during anaerobic respiration/fermentation.

57. CO_2 is not produced during glycolysis and chemiosmosis while it is being consumed in Calvin cycle. During alcoholic fermentation, pyruvate molecules are decarboxylated to form acetaldehyde which is then reduced to ethanol.

58.



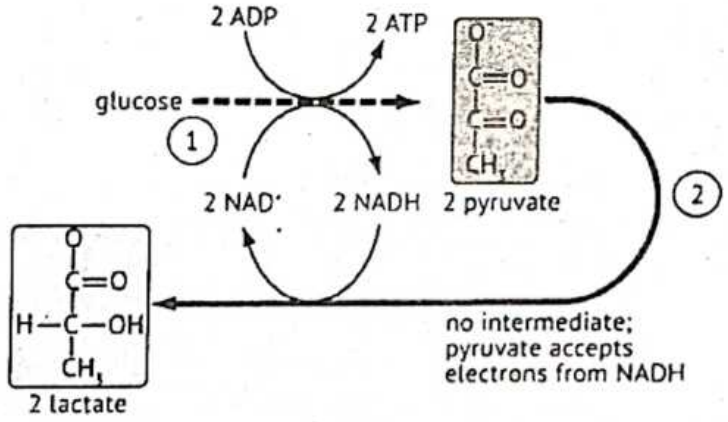
59. Cellular respiration is essentially an oxidation process while photosynthesis is essentially a reduction process.

60. RBCs are unable to carry put 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.

61. Combustion is not amultistep reaction, enzyme controlled and intracellular. All these are the characteristics are related to cellular respiration.

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

63.

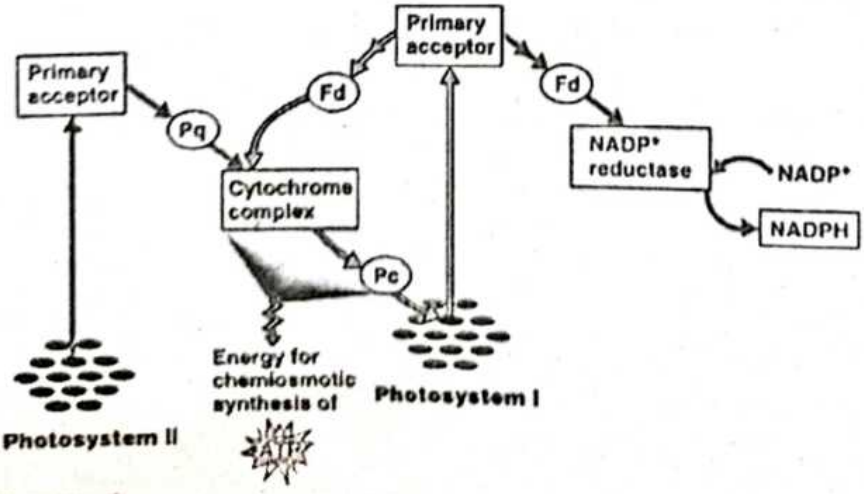


64. During fermentation of lactic acid, NADH is oxidized to regenerate NAD^+.

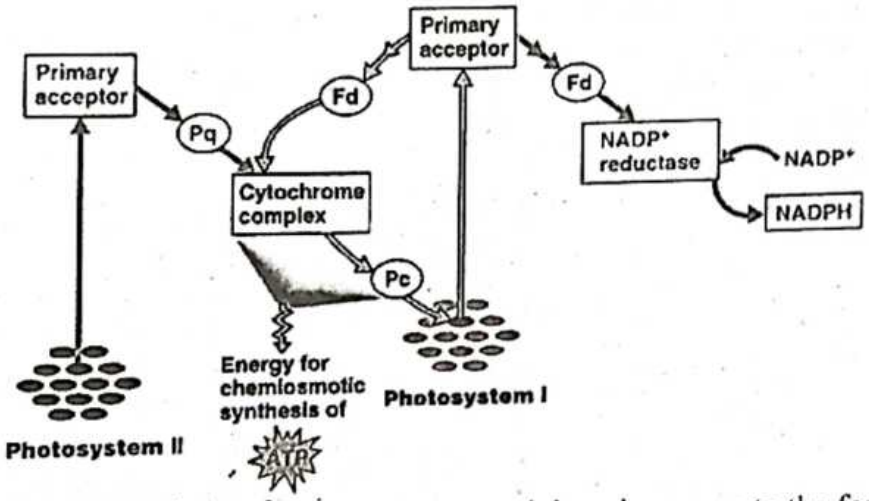
65. Photosystem II is involved in photolysis of water as result oxygen is evolved. If photosystem II is absent in an organism oxygen will be not liberated.

PAST PAPER MCQs

1. Carotenoids are yellow and red to orange pigments that absorb strongly the blue violet range, different wavelengths than the chlorophyll absorbs.
2. After pyruvic acid oxidation, acetyl CoA enters a cyclic series of chemical reactions during which oxidation process is completed. This cyclic series of reactions is called Krebs cycle.
3. Lactic acid fermentation occurs in muscle cells of humans and other animals during extreme physical activities, such as sprinting, when oxygen cannot be transported to the cells as rapidly as it is needed.
4. In Calvin cycle, each molecule of PGA receives an additional phosphate from ATP of light reaction, forming 1,3 - bisphosphoglycerate as the product which is then reduced to glyceraldehyde 3-phosphate by receiving a pair of electrons donated from NADPH of light reactions.
5. During cellular respiration, ATP molecules are produced. This ATP is source for all cellular activity.
6. The first step in glycolysis is the transfer of a phosphate group from ATP to glucose. As a result a molecule of glucose-6 -phosphate is formed.
7. Glycolysis is take place in cytosol while Krebs cycle takes place in mitochondrial matrix. ETC occurs at cristae.
8. Spectrophotometer is an electrical instrument which is used to measure the relative abilities of different pigments to absorb different wavelengths of light. By using spectrophotometer we can plot absorption spectrum.
9. Cellular respiration is a process in which organic molecule is breakdown step by step in a cell to extract energy. External respiration, pulmonary respiration and cutaneous respiration are different types of gas exchange mechanisms in different organisms.
10. Glycolysis is take place in cytosol while Krebs cycle takes place in mitochondrial matrix. ETC occurs at cristae.
11. Cell processes pyruvic acid in two major ways during anaerobic respiration, alcoholic fermentation and lactic acid fermentation. During alcoholic fermentation carbon dioxide and alcohol is produced while during lactic acid fermentation lactic acid is produced.
12. The path of electrons through the two photosystems during non-cyclic photophosphorylation is known as Z-scheme from its shape.
13.

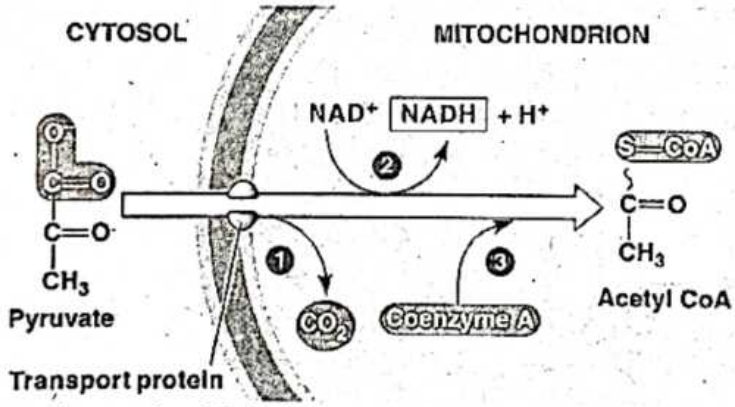


14. The synthesis of ATP molecules during oxidative phosphorylation is the feature of all those organisms that perform aerobic respiration.
15. Glycolysis is the breakdown of glucose up to the formation of pyruvic acid. Glycolysis can take place both in the absence of oxygen (anaerobic condition) or in the presence of oxygen (aerobic condition).
16. The pyruvate (3- carbon molecule) is first changed into 2-carbon acetic acid molecule. One carbon is released as CO_2 (decarboxylation). Acetic acid on entering the mitochondrion unites with coenzyme-A to form acetyl CoA (active acetate). In addition, more hydrogen atoms are transferred to NAD^+.
17. Two trioses Glyceraldehydes and dihydroxyacetone are, intermediates in respiration and photosynthesis.
18.



19. Glycolysis is the breakdown of six carbon containing glucose up to the formation of three carbon containing pyruvic acid. Glycolysis can take place both in the absence of oxygen (anaerobic condition) or in the presence of oxygen (aerobic condition).
20. When single acetyl CoA molecule enter into Krebs cycle, it yield 3 molecules of NADH, hence, two molecules of acetyl CoA will produced 6 NADH.
21. After succinate formation, the next step in the Krebs cycle is the oxidation of succinate to fumarate. Again, two hydrogen atoms are removed, but this time the oxidizing agent is a coenzyme called FAD, which is reduced to $FADH_2$.
22. In ETC, Cytochrome 'a_3' is oxidized by oxygen and the electrons arrive at the bottom end of the respiratory chain. Oxygen is the most electronegative substance and act as the final acceptor of the electrons.
23. Respiration is a catabolic process in which organic molecule is broken down to produced energy in the form of ATP.
24. A chlorophyll molecule has two main parts: One flat, square, light absorbing hydrophilic head and the other long, anchoring, hydrophobic hydrocarbon tail. The head is complex porphyrin ring which is made up of 4 joined smaller pyrrole rings composed of carbon and nitrogen atoms.
25. Every NADH produced three molecules of ATP during electron transport chain while $FADH_2$ produced two molecules of ATP.

26. In ETC, Cytochrome 'a_3' is oxidized by oxygen and the electrons arrive at the bottom end of the respiratory chain. Oxygen is the most electronegative substance and act as the final acceptor of the electrons.
27. Anaerobic respiration occurs in muscle cells of humans and other animals during extreme physical activities, such as sprinting, when oxygen cannot be transported to the cells as rapidly as it is needed.
28. The most common fuel used by the cell to provide energy by cellular respiration is glucose. The way glucose is metabolized depends on the availability of oxygen. Prior to entering a mitochondrion, the glucose molecule is split to form two molecules of pyruvic acid.
29. Oxidative phase of glycolysis start when Two electrons or two hydrogen atoms are removed from the molecule of 3-phosphoglyceraldehyde and transferred to a molecule of NAD^+. This is of course, an oxidation-reduction reaction, with the PGAL being oxidized and the NAD^+ being reduced.
30. During glycolysis glucose molecule is split to form two molecules of pyruvic acid. Glycolysis is a common step in both aerobic and anaerobic respiration.
31. Pyruvic acid oxidation takes place in mitochondria. Firstly carbon dioxide is removed from pyruvic acid during this process as a result two carbon compound acetic acid is formed which join with coenzyme A to form acetyl coenzyme A.
32.



33. In one turn of Krebs cycle, 3 NADH, 1 $FADH_2$ and 1 ATP molecule is produced from acetyl coenzyme A when it is oxidized.
34. ATP formation in the presence of oxygen is called oxidative phosphorylation. ETC is responsible for this which is present take at cristae.
35. The Calvin cycle begins when a molecule of CO_2 reacts with a highly reactive phosphorylated five carbon sugar RuB). This reaction is catalyzed by the enzyme ribulose bisphosphate carboxylase, also known as Rubisco.
36. The oxidation of PGAL is an energy yielding process. Thus a "high energy" phosphate bond is created in this molecule. At the very next step in glycolysis this phosphate group is transferred to a molecule of ADP converting it into ATP. The end product of this reaction is 3PG.
37. NAD^+ mediated oxidation of malate produces oxaloacetate, the original 4-carbon molecule.
38. NADH and $FADH_2$ are oxidized by coenzyme 'Q' in electron transport chain. This oxidation yields enough free energy to permit the synthesis of a molecule of ATP from ADP and inorganic phosphate.

39. Carriers of electron transport chain are located on cristae and these carriers are involves in ATP formation by the process of chemiosmosis.
40. Functional group of chlorophyll 'a' is -CH_3 while functional group of chlorophyll 'b' is -CHO.
41. Chlorophyll 'a' itself exists in several forms differing slightly in their red absorbing peaks e.g. at 670,680, 690, 700 nm. Chlorophyll 'a' of photosystem I absorbs 700nm and Chlorophyll 'a' of photosystem II absorb light of 680 nm.
42. During non-cyclic phosphorylation ATP and NADPH are produced while during cyclic flow of electron only ATP is produced.
43. Each photosystem consists of a light-gathering 'antenna complex' and a 'reaction center'. 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 a primary electron acceptor, and associated electron carriers of 'electron transport system'.
44. The Calvin cycle begins when a molecule of CO_2 reacts with a highly reactive phosphorylated five carbon sugar named RuBP. The product of this reaction is a highly unstable, six carbon intermediate that immediately breaks into two molecules of three carbon compound called 3-PGA.
45. An atom of magnesium is present in the center of porphyrin ring and is coordinated with the nitrogen of each pyrrole ring .That is why magnesium deficiency causes yellowing in plants. Haem portion of haemoglobin is also a porphyrin ring but containing an iron atom instead of magnesium atom in the center.
46. A chlorophyll molecule has two main parts: One flat, square, light absorbing hydrophilic head and the other long, anchoring, hydrophobic hydrocarbon tail. The chlorophyll molecule is embedded in the hydrophobic core of thylakoid membrane by this tail.
47. Functional group of chlorophyll 'a' is -CH_3 while functional group of chlorophyll 'b' is -CHO.
48. In Calvin cycle reduction phase, 1, 3 bisphosphoglycerate is reduced to glyceraldehyde 3-phosphate (G3P) by receiving a pair of electrons donated from NADPH of light reactions. G3P is the same three-carbon sugar which is formed in glycolysis.
49. Light reactions take place in/on thylakoid membrane while dark reaction occurs at stroma of chloroplasts.
50. Chlorophyll molecule has long, anchoring, hydrophobic hydrocarbon tail which is called phytol. The chlorophyll molecule is embedded in the hydrophobic core of thylakoid membrane by this tail.
51. Chlorophylls absorb mainly violet-blue and orange-red wave lengths. Green, yellow and indigo wave lengths are least absorbed by chlorophylls and are transmitted or reflected, although the yellow are often masked by darker green color.
52. A graph plotting absorption of light of different wavelengths by a pigment is called absorption spectrum while graph showing relative effectiveness of different wavelengths of light in driving photosynthesis is called action spectrum.
53. During non-cyclic phosphorylation water molecules splits into two hydrogen ions and an oxygen atom, which immediately combine with another oxygen atom to form O_2. This water splitting step of photosynthesis that releases oxygen is called photolysis. The oxygen produced during photolysis is the main source of replenishment of atmospheric oxygen.

54. The Calvin cycle begins when a molecule of CO_2 reacts with a highly reactive phosphorylated five carbon sugar named ribulose bisphosphate (RuBP).This reaction is catalyzed by the enzyme ribulose bisphosphate carboxylase, also known as Rubisco.

55. Glycolysis is the breakdown of glucose up to the formation of pyruvic acid. Glycolysis can take place both in the absence of oxygen (anaerobic condition) or in the presence of oxygen (aerobic condition).

56. The first step in the Krebs cycle is the union of acetyl CoA with oxaloacetate to form citrate. In this process, a molecule of CoA is regenerated and one molecule of water is used. Oxaloacetate is a 4-carbon acid and citrate thus has 6 carbon atoms.

57. Carotenoids are yellow and red to orange pigments that absorb strongly the blue violet range, different wave lengths than the chlorophyll absorbs.

58. Light reactions take place in thylakoid membrane while dark reaction occurs at stroma.

59. Glycolysis is the breakdown of glucose upto the formation of pyruvic acid. Glycolysis can take place both in the absence of oxygen (anaerobic condition) or in the presence of oxygen (aerobic condition).

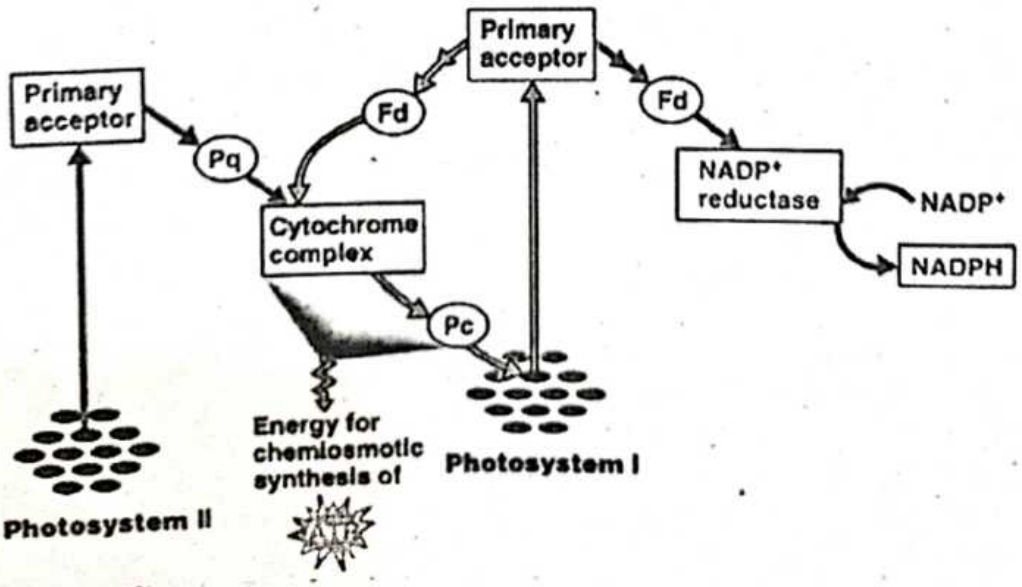
60. The enzymes required for glycolysis are present in cytoplasm of the cell while enzymes required for pyruvic acid oxidation and Krebs cycle are present in mitochondrial matrix.

61. The complete breakdown of glucose molecule occurs only in the presence of oxygen, i.e. in aerobic respiration. During aerobic respiration glucose is oxidized to CO_2 and water and energy is released.

62. The enzymes required for glycolysis are present in cytoplasm of the cell while enzymes required for pyruvic acid oxidation and Krebs cycle are present in mitochondrial matrix.

63. Reaction center of photosystem has one or more molecules of chlorophyll 'a' along with a primary electron acceptor, and associated electron carriers of 'electron transport system'.

64.



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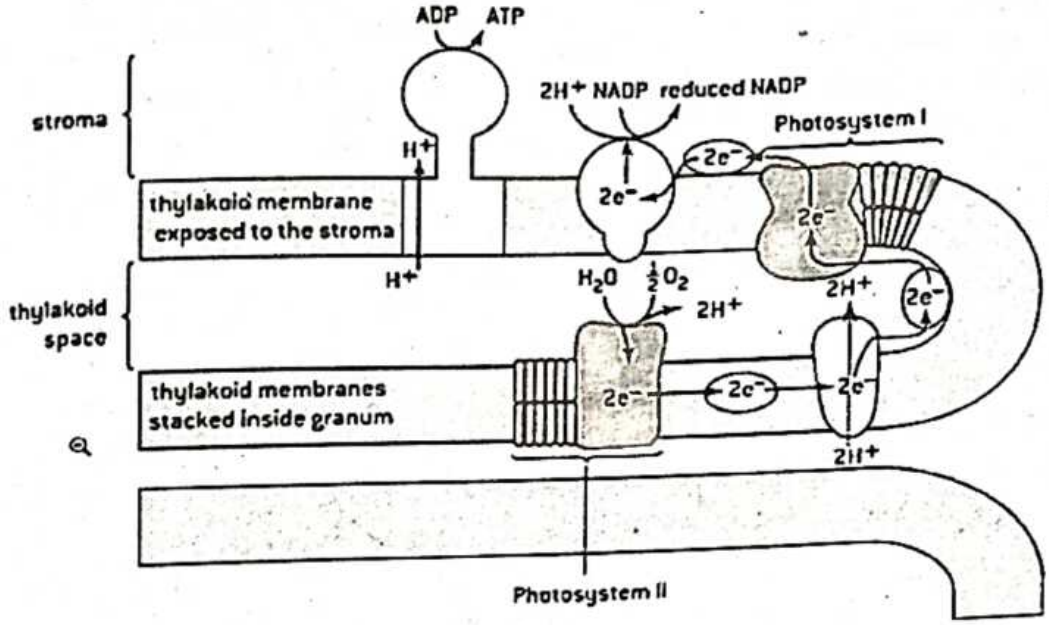


66. Glycolysis is take place in cytoplasm while Krebs cycle takes place in mitochondrial matrix. Golgi complex is associated with various functions like modification and packaging o biological molecules.

67. During glycolysis two molecule of ATP are used during preparatory phase while four molecule of ATP are produced.

7 TOPIC GAS EXCHANGE

PRACTICE EXERCISE

TOPIC-WISE MCQs

ANATOMY OF HUMAN RESPIRATORY SYTSME

Q.1 All of the following are lined with mucous membrane of ciliated epithelium except:

A) Nasal cavity
B) Bronchi
C) Trachea
D) Bronchioles

Q.2 Which of the following function is not associated with nasal cavity?

A) Filtration
B) Moistening
C) pH adjustment
D) Temperature adjustment

Q.3 A complex cartilaginous structure surrounding the upper end of the trachea:

A) Larynx
B) Pharynx
C) Esophagus
D) Epiglottis

Q.4 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) Uvula
C) Esophageal sphincter
D) Respiratory valve

Q.5 Opening from nose to throat is closed by:

A) Epiglottis
B) Soft palate
C) Esophageal sphincter
D) Tongue

Q.6 A cavity bounded by ribs and diaphragm is called:

A) Abdominal cavity
B) Pelvic cavity
C) Thoracic cavity
D) Pleural cavity

Q.7 Bronchioles are cartilage less tubules having largest diameter of:

A) 1mm
B) 1μm
C) 0.1mm
D) 1nm

Q.8 Bronchioles are made up of mainly:

A) Connective tissues
B) Circular smooth muscles
C) Goblet cells
D) Endothelial cells

Q.9 Functional units of lungs are:

A) Alveoli
B) Air sacs
C) Bronchioles
D) Epithelial cells

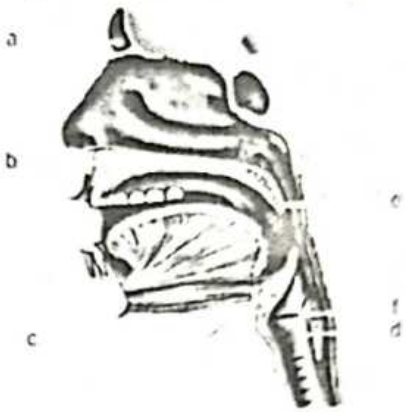
Q.10 Each air sac consist of several microscopic alveoli which are:

A) Double layered structures
B) Triple layered structures
C) Single layered structures
D) Multi layered structures

Q.11 A sheet of skeletal muscles forming the floor of chest cavity is called:

A) Pleura
B) Diaphragm
C) Peritoneum
D) Serosa

Q.12 All of the following correctly explain the role of labeled structure in given figure except:



A) D: Voice box
B) F: Common opening for food and air
C) E: obstruct entry of food into nasal cavity
D) C: Separates respiratory and digestive tract

Q.13 The function of nasal cavity is:
A) Protection
B) Temperature regulation
C) Moisten
D) All A, B and C

Q.14 The epithelium of alveoli is:
A) Ciliated epithelium
B) Cuboidal epithelium
C) Squamous epithelium
D) Columnar epithelium

Q.15 How many functional pairs of vocal cords are present in humans?
A) 1
B) 2
C) 3
D) 4

Q.16 Trachea lies_____ to the esophagus.
A) Dorsal
B) Ventral
C) Medial
D) Lateral

Q.17 _____ are folds of tissue within the larynx, creates sounds when vibrate.
A) Vocal cords
B) Glottis
C) Epiglottis
D) Trachea

Q.18 The respiratory bronchioles terminate in elongated airways called:
A) Alveolar sacs
B) Alveolar duct
C) Bronchi
D) Alveoli

Q.19 Cartilage rings present in trachea which prevent it from collapsing and keep the air passage way open, are:
A) "O" shaped
B) "D" shaped
C) "C" shaped
D) "G" shaped

Q.20 Vocal cords are stretched across:
A) Larynx
B) Pharynx
C) Glottis
D) Bronchi

MECHANISM OF BREATHING

Q.21 The chemical nature of surfactant is:
A) Glycolipids
B) Glycoproteins
C) Nucleoproteins
D) Lipoproteins

Q.22 In humans, the respiratory center is:
A) Cerebrum
B) Pons
C) Medulla oblongata
D) Midbrain

Q.23 Surfactant is present in:
A) Bronchi
B) Bronchioles
C) Alveoli
D) Trachea

Q.24 During exercise, the breathing rate may rise to:
A) 15 times per minute
B) 30 times per minute
C) 20 times per minute
D) 25 times per minute

Q.25 Which energy is consumed in breathing?
A) Chemical
B) Potential
C) Physical
D) Mechanical

Q.26 Find out the incorrect statement:
A) Inspired air contains more O_2 than exhaled air
B) Amount of N_2 is equal in both inhaled and exhaled air
C) Expired air has 100 times greater CO_2 as inspired air
D) Exhaled air is comparatively dried than inhaled air

Q.27 Breathing is a mechanical process consisting of:
A) 2 phases
B) 3 phases
C) 4 phases
D) 5 phases

Q.28 During inspiration fresh air moves in, which has high percentage of:
A) CO
B) N_2
C) O_2
D) CO_2

Q.29 Partial pressure of oxygen is maximum in:
A) Inspired air
B) Expired air
C) Alveolar air
D) Oxygenated blood

Q.30 Which of the following play passive role during breathing?
A) Lungs
B) Diaphragm
C) Intercostal muscles
D) Pleura

Q.31 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) O_2 partial pressures in the blood
C) H^+ concentration in the blood
D) Blood glucose level

Q.32 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) Decrease, Increase
C) Increase, increase
D) Decrease, decrease

Q.33 During expiration, the diaphragm becomes:
A) Less dome-shaped
B) Flattened
C) Oblique
D) More dome-shaped

Q.34 Which of the following condition is responsible for increase in ventilation rate?
A) Decrease in O_2 content of inhaled air
B) Decrease in O_2 content of exhaled air
C) Increase of CO_2 content in inhaled air
D) Increase of CO_2 content in exhaled air

Q.35 During inspiration, the diaphragm:
A) Contracts and relax
B) Relax and rises
C) Contracts and goes downward
D) Relax and goes downward

TRANSPORT OF RESPIRATORY GASES

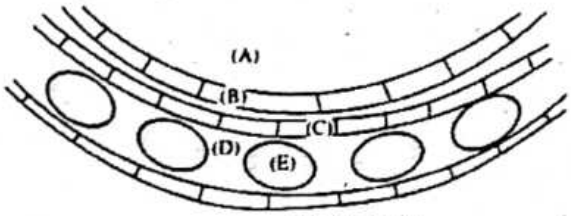
Q.36 Diffusion of respiratory gases is inversely proportional to:
A) Surface area
B) Difference in concentration
C) Thickness of the membrane
D) Presence of moisture

Q.37 At normal alveolar ventilation, the respiratory center is stimulated by:
A) O_2 concentration in venous blood
B) CO_2 concentration in arterial blood
C) CO_2 concentration in venous blood
D) O_2 concentration in arterial blood

Q.38 Which one of these shows the path of blood after it leave the lungs?
A) Pulmonary Vein – Left Atrium – Left Ventricle – Aorta
B) Pulmonary Artery – Left Atrium – Left Ventricle – Aorta
C) Pulmonary Vein – Right Atrium – Right Ventricle – Aorta
D) Pulmonary Artery – Right Atrium – Right Ventricle – Aorta

Q.39 Which of the following correctly describes the binding affinities of gases with haemoglobin?
A) $CO>CO_2>O_2$
B) $O_2>CO_2>CO>$
C) $CO_2>O_2>CO$
D) $O_2>CO_2>CO$

Q.40 Just after inhalation, the highest partial pressure of oxygen will be in:



A) B and C
B) D and E
C) Only A
D) Only E

Q.41 All of the following occurs due to presence of carbon dioxide in blood except:
A) Increases rate of breathing
B) Makes blood more acidic
C) Increases respiratory volume
D) Lowers the H^+ concentration in the blood

Q.42 Most of the CO_2 in the blood is carried as/by:
A) Hemoglobin
B) Dissolved form
C) Bicarbonate ions
D) Bound to plasma proteins

Q.43 The amount of CO_2 in pulmonary artery is:
A) 54ml/100ml of blood
B) 60ml/100ml of blood
C) 50ml/100ml of blood
D) 4ml/100ml of blood

Q.44 Which of the following incorrectly explains the binding of inorganic component in structures found in erythrocytes?
A) CO with organic portion of haem
B) O_2 with Fe^{++} of haem
C) CO_2 with NH_2 group of haemoglobin
D) H^+ with COOH group of haemoglobin

Q.45 Partial pressure of O_2 in alveolar sacs, during inhalation, is:
A) 158 mmHg
B) 115 mmHg
C) Less than 100 mmHg
D) 60 mmHg

Q.46 Which of the following shows maximum solubility in blood plasma?
A) Oxygen
B) Nitrogen
C) Carbon dioxide
D) Carbon monoxide

Q.47 Amount of oxygen absorbed by haemoglobin at 115mmHg per 100 ml of blood is:
A) 20 ml
B) 13.4 ml
C) 16 ml
D) 19.6ml

Q.48 Which of the following is false regarding to haemoglobin?
A) It is a globular protein
B) Abundantly found in RBC's
C) It contains organic haem group and inorganic Fe^{++}
D) Each haem in haemoglobin can bind to four O_2 molecules

Q.49 All of the following can bind to haemoglobin except:

A) HCO_3^-
B) H^+
C) O_2
D) CO_2

Q.50 O_2 pressure in cells or tissues is:

A) 158mmHg
B) 115mmHg
C) Less than 100mmHg
D) Less than 60mmHg

Q.51 The oxygen content of fresh air is about:

A) 200 ml/lit
B) 300 ml/lit
C) 400 ml/lit
D) 500 ml/lit

ROLE OF HEMOGLOBIN AS RESPIERATORY PIGMENT

Q.52 All of the following facilitates the release of O_2 from haemoglobin except;

A) High CO_2concentration
B) High temperature
C) High pH
D) High Acidity

Q.53 In reduced form, hemoglobin carries:

A) CO_2
B) Hydrogen ion
C) O_2
D) CO

Q.54 Which of the following has maximum oxygen carrying capacity?

A) Haemoglobin in erythrocytes
B) Myoglobin in sarcoplasm
C) Globulin in blood plasma
D) Bicarbonate ions in RBCs

Q.55 The binding capacity of haemoglobin is greater than myoglobin by:

A) 80%
B) 90%
C) 75%
D) 100%

Q.56 The characteristics red color of hemoglobin is due to:

A) Haem
B) α –globin chains
C) β –globin chains
D) Central iron atom

Q.57 What is true about haemoglobin?

A) It is dipeptide and present in RBC
B) It is present in dissolved state in blood plasma
C) It is dipeptide in mammals and localized in RBC
D) It is having haem group

RESPIRATORY DISORDERS

Q.58 All are respiratory disorders except:

A) Pulmonary tuberculosis
B) Rickets
C) Emphysema
D) Lungs Cancer

Q.59 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) Asthma
C) Emphysema
D) Bronchitis

PAST PAPER MCQs

2008 Q.1 **When carbon dioxide pressure increases, the capacity of haemoglobin to hold oxygen:**
A) Increases many folds
B) Decreases
C) Remains constant
D) Is doubled

2009 Q.2 **Most of the carbon dioxide is carried in the blood in the form of:**
A) Bicarbonate
B) Carboxyhaemoglobin
C) CO_2
D) Blood plasma protein

Q.3 **The respiratory pigment, which has much higher affinity to combine with oxygen, is:**
A) Myoglobin
B) Globin
C) Haemoglobin
D) Hemocyanin

2010 Q.4 **Which one of the following acts as functional unit of lungs in man?**
A) Air sac
B) Larynx
C) Trachea
D) Bronchioles

Q.5 **Expiration in human beings is carried out by:**
A) Contraction of lungs
B) Contraction of intercostal membrane
C) Relaxation of intercostal and diaphragm muscles
D) Contraction of diaphragm muscle

Q.6 **Which one of following factor is directly proportional to oxygen carrying capacity of haemoglobin?**
A) Carbon dioxide
B) Temperature
C) pH
D) Light

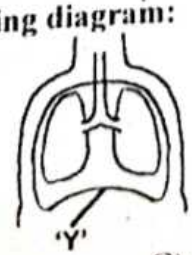
2015 Q.7 **About 70-85% CO_2 in blood is carried:**
A) As carboxylase myoglobin
B) With proteins in plasma
C) Freely as CO_2
D) As bicarbonate

2016 Q.8 **Breathing consists of:**
A) Four phases
B) Three phases
C) One phase
D) Two phases

Q.9 **Carboxyhaemoglobin (10-20%) is formed when CO_2 combines with:**
A) Amino group of haemoglobin
B) Iron part of haemoglobin
C) Haem portion of haemoglobin
D) Plasma proteins

2017 Q.10 **Respiratory tubules are termed as bronchioles when they attain the diameter of _____ or lesser.**
A) 1.2cm
B) 1cm
C) 1mm
D) 1.2mm

Q.11 **Label the part 'Y' in the following diagram:**



A) Pleura
B) Diaphragm
C) Chest cavity
D) Intercoastal muscle

Q.12 **Low partial pressure of oxygen in tissues favors _____ of oxyhaemoglobin.**
A) Dissociation
B) Formation
C) Stability
D) Transformation

Q.13 **Which of the following is a respiratory disorder related to malnutrition?**
A) Cancer
B) Asthma
C) Emphysema
D) Tuberculosis

2017 Re-Take

Q.14 **Site of gaseous exchange in humans is:**
A) Trachea
B) Alveoli
C) Bronchus
D) Nose

Q.15 **Gaseous exchange in animals takes place with the help of process called as:**
A) Active transport
B) Phagocytosis
C) Cyclosis
D) Diffusion

Q.16 **Breakdown of thin wall of alveoli occurs in:**
A) Emphysema
B) Cancer
C) T.B
D) Asthma

2018

Q.17 **During breathing air from pharynx enters to:**
A) Alveoli
B) Bronchioles
C) Bronchi
D) Trachea

Q.18 **Which of the following statement is correct about the respiratory pigments:**
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

Q.19 **Gradual breakdown of the alveolar wall leads to which type of disease in a smoker?**
A) Asthma
B) Bronchitis
C) Coronary heart disease
D) Emphysema

Q.20 **The low levels of surfactant produced by alveolar epithelium causes:**
A) Emphysema
B) Bronchitis
C) Respiratory distress syndrome
D) Asthma

2019

Q.21 **During inspiration the space inside the chest cavity is increases due to:**
A) Increased pressure
B) The relaxation of the muscle of the diaphragm
C) Relaxation of the external intercostal muscle
D) The contraction of the muscles of the diaphragm

Q.22 **A disease caused by gradual breakdown of the thin walls of alveoli is _____.**
A) Tuberculosis
B) Asthma
C) Emphysema
D) Bronchitis

ANSWER KEY

TOPIC-WISE MCQs

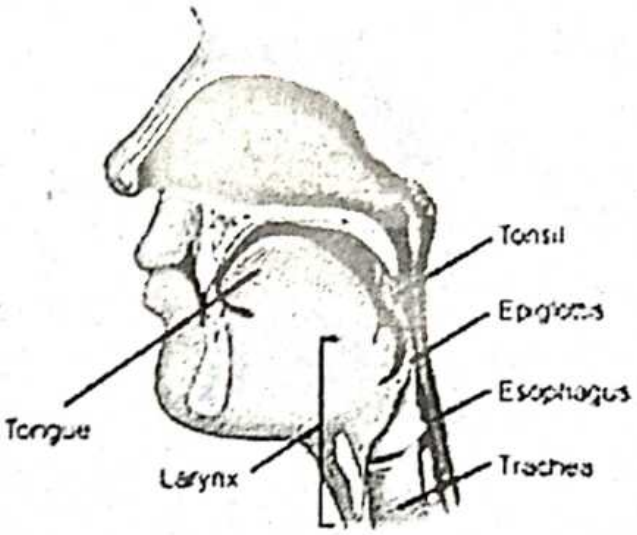
1	D	11	B	21	D	31	D	41	C	51	A
2	C	12	B	22	C	32	A	42	C	52	C
3	A	13	D	23	C	33	D	43	A	53	B
4	A	14	C	24	B	34	A	44	A	54	A
5	B	15	B	25	A	35	C	45	B	55	C
6	C	16	B	26	D	36	C	46	C	56	A
7	A	17	A	27	A	37	C	47	D	57	D
8	B	18	B	28	B	38	A	48	D	58	B
9	B	19	C	29	A	39	A	49	A	59	C
10	C	20	A	30	A	40	C	50	D		

PAST PAPERS MCQs

1	B	11	B	21	D
2	A	12	A	22	C
3	A	13	D		
4	A	14	B		
5	C	15	D		
6	C	16	A		
7	D	17	D		
8	D	18	C		
9	A	19	D		
10	C	20	C		

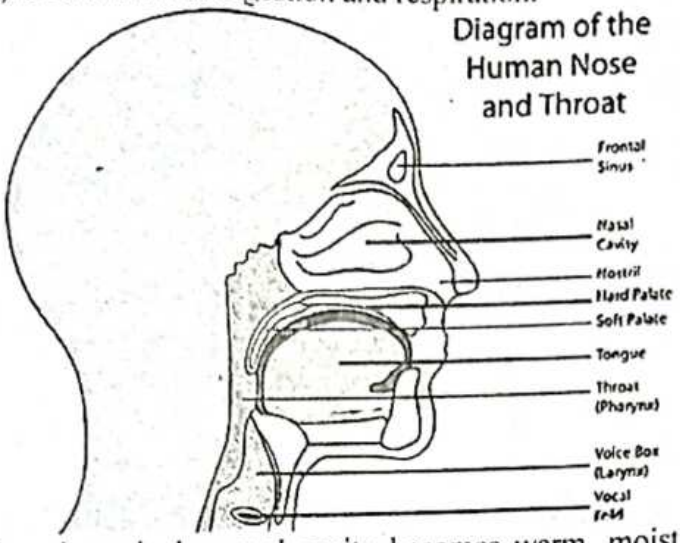
EXPLANATORY NOTES

TOPIC-WISE MCQs

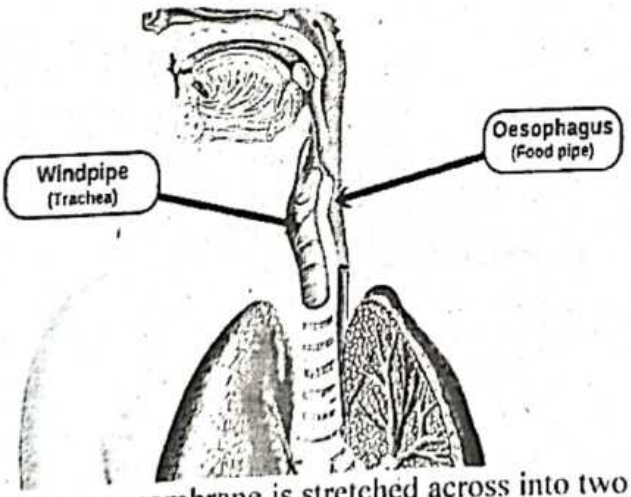
1. Ciliated epithelium containing goblet cells is absent in bronchioles.
2. Air while passing through the nasal cavity becomes warm, moist and filtered of smaller foreign particles by mucous membrane.
3. Larynx is also known as voice box and has vocal cards for sound production. It made up of complex cartilaginous structure surrounding the upper end of the trachea.
4. 

5. During swallowing backward movement of tongue pushes the soft palate up and closes the nasal opening at the back.
6. Chamber of the body of vertebrates that is protected by the rib cage.
7. When the diameter of bronchi becomes 1mm or less and it is devoid of cartilage is named as bronchioles.
8. Bronchioles have circular smooth muscles. Cartilage, ciliated epithelium are absent in bronchioles.
9. Air sac is the functional unit of the lungs. Air sac consists of several microscopic single layered structures called alveoli.
10. Air sac is the functional unit of the lungs. Air sac consists of several microscopic single layered structures called alveoli which are single layered structures.
11. 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.

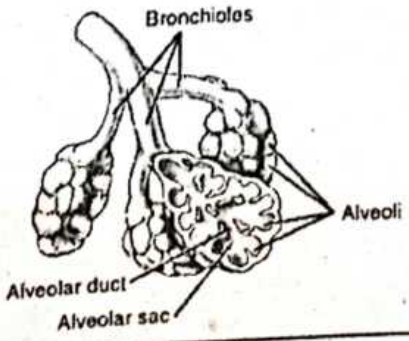
12. Pharynx (throat) is common for digestion and respiration.



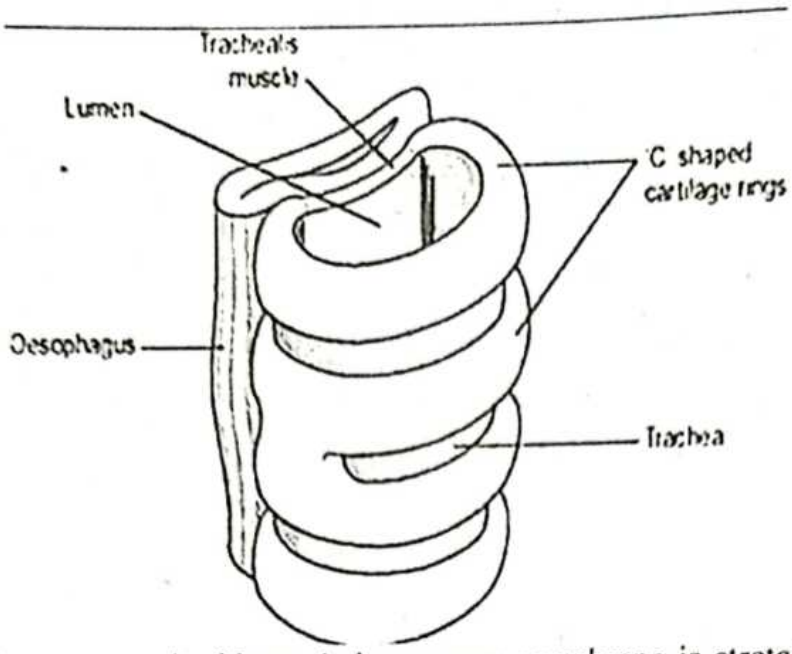
13. Air while passing through the nasal cavity becomes warm, moist and filtered of smaller foreign particles by mucous membrane.
14. In epithelium squamous or flattened epithelial cells, very thin and irregular in outline, occur as the covering epithelium of the alveoli of the lung.
15. In the glottis, the mucous membrane is stretched across into two thin edged fibrous bands called vocal cords, which help in sound production.
16. Ventral is the underside of an organism or an organ.



17. In the glottis, the mucous membrane is stretched across into two thin edged fibrous bands called vocal cords, which help in sound production.
18.

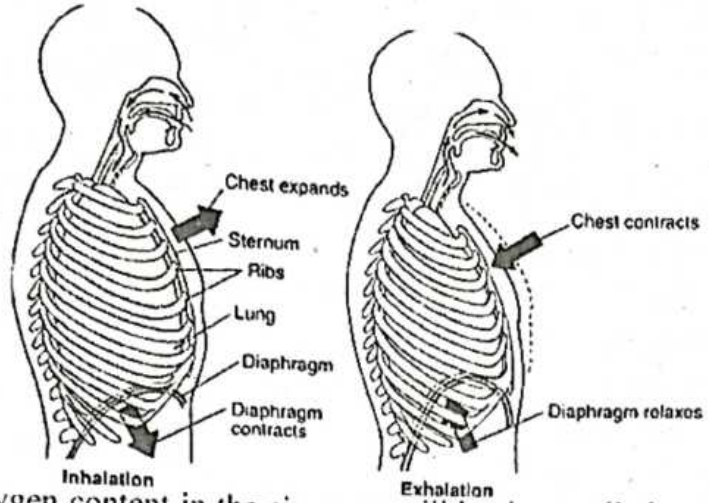


19.



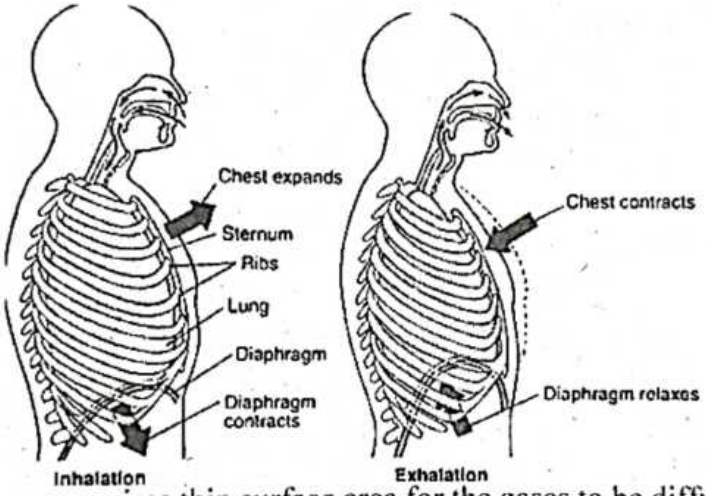
20. In the glottis (upper end of larynx) the mucous membrane is stretched across into two thin edged fibrous bands called vocal cords, which help in sound production.
21. Surfactants are compounds that lower the surface tension (or interfacial tension) between two liquids, between a gas and a liquid, or between a liquid and a solid. Surfactants may act as detergents, wetting agents, emulsifiers, foaming agents, and dispersants.
22. Involuntary breathing is controlled by medulla oblongata.
23. Surfactant (the mixture of lipoproteins) produced by the secretory cells of the alveolar epithelium.
24. At rest, we inhale and exhale 15-20 times per minute. During exercise, the breathing rate may rise to 30 times per minute.
25. Over all process of breathing is active and consumes energy during inspiration in the form of ATP.
26. Exhaled air has saturated water contents as compared to inhaled air which has variable water contents.
27. Breathing is mechanical process consisting of two phases i.e., inspiration and expiration.
28. Highest concentration in inhaled air and exhaled air is that of N_2 that is 79%.
29. Oxygen is 21% in inhaled air and it is 16% in exhaled air.
30. 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.
31. CO_2, O_2, pH and temperature are the factors responsible to affect the capacity of haemoglobin to combine with oxygen.
32. If we hold our breath for long time then due to increased metabolic activity CO_2 level will be increased and pH will also be increased.

33.



34. Lesser the oxygen content in the air, more will be the ventilation rate to compensate the required oxygen quantity in the body.

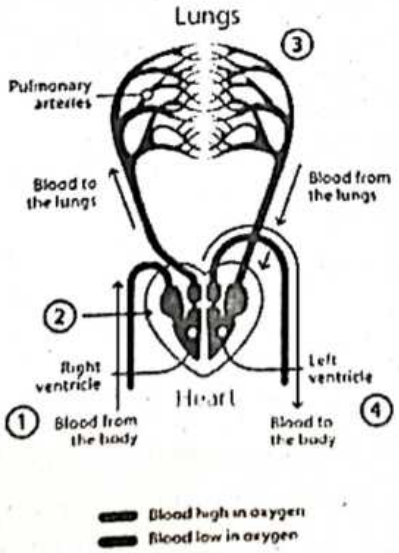
35.



36. Gaseous exchange requires thin surface area for the gases to be diffused.

37. Carbon dioxide is much more important than oxygen as a regulator of normal alveolar ventilation.

38.



39. 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.
40. Partial pressure of oxygen is more in alveoli than blood vessels surrounding alveoli.
41. 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 lesser will be the H^+ ions concentration.
42. About 70% of CO_2 is carried as bicarbonate ions.
43. Venus blood contains 4% more CO_2 per 100ml (54ml/100ml) of blood as compared to arterial blood (50ml/100ml).
44. Binding site of CO and O_2 with haemoglobin is common that is Fe^{++} of haem.
45. Partial pressure of O_2 is less in alveoli than that in atmosphere. It is about 115mmHg.
46. Carbon dioxide is more soluble in blood than is oxygen; about 5 to 7 percent of all carbon dioxide is dissolved in the plasma.
47. When oxygen tension is 115mmHg mercury, haemoglobin is 98% saturated and therefore contains 19.6ml of oxygen per 100ml of blood.
48. Haemoglobin has four polypeptide chains; each chain has one haem group which can bind with single oxygen molecule.
49. 70% of carbon dioxide is transported in the form of $NaHCO_3$ CO_2 combines with amine group of haemoglobin.
50. 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.
51. Approximately there is 20% oxygen in the air (20ml/100ml or 200ml/1000ml).
52. More CO_2, less O_2, high temperature and less pH facilitate oxygen dissociation from oxyhaemoglobin.
53. Addition of H^+ ions or electrons is known as reduction. Reduced form of haemoglobin contains H^+.
54. 90% of cytoplasm of erythrocytes is occupied by haemoglobin. Each molecule of haemoglobin carries four oxygen molecules.
55. Each molecule of haemoglobin four oxygen molecules but each molecule of myoglobin contains one oxygen molecule. Because haemoglobin has four polypeptide chains while myoglobin has one polypeptide chain.
56. The actual colour of RBCs is red and it is due to the presence of iron in the haem group of haemoglobin.
57. Haemoglobin is four polypeptide chains containing protein.
58. Rickets is the softening and weakening of bones in children, usually because of an extreme and prolonged vitamin D deficiency.
59. 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.

PAST PAPER MCQs

1. 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.
2. About 70% of CO_2 is transported as bicarbonate ions.
3. Myoglobin has more affinity to bind with oxygen as compare to haemoglobin which has more capacity for oxygen.
4. Air sac is the functional unit of the lungs. Air sac consists of several microscopic single layered structures called alveoli.
5. During expiration, intercostal muscles are relaxed and diaphragm becomes more dome shape.
6. Less the pH means more H^+ ion concentration. More the H^+ ions concentration less is the oxygen carrying capacity of haemoglobin.
7. About 70% of CO_2 is transported as bicarbonate ions.
8. Breathing is mechanical process consisting of two phases i.e., inspiration and expiration.
9. 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.
10. When the diameter of bronchi becomes 1mm or less and it is devoid of cartilage is named as bronchioles.
11. Floor of chest cavity is known as diaphragm.
12. More CO_2, less O_2, high temperature and less pH facilitate oxygen dissociation from oxyhaemoglobin.
13. Malnutrition and poor living conditions facilitate *Mycobacterium* to grow.
14. 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.
15. Gaseous exchange is always a passive process in which gases move from higher concentration to lower concentration.
16. 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.
17. Pharynx is common of digestion and respiration. Air from pharynx moves to trachea and food is pushed to esophagus.
18. 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.
19. 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.
20. Respiratory distress syndrome is common, and it occurs because enough surfactant is not produced by secretory cells of the alveolar epithelium.
21. During inspiration muscles of ribs and diaphragm contract due to which ribs are elevated and diaphragm becomes less dome shape. The space in chest cavity is increased.
22. 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.

8 TOPIC TRANPORT IN PLANTS

PRACTICE EXERCISE

TOPIC-WISE MCQs

TRANSPORT OF WATER & MINERALS

Q.1 The site/s where most of the uptake of water and minerals take place is/are:

A) Root hairs
B) Underground stem
C) Root cells
D) Leaves

Q.2 At incipient plasmolysis, the protoplast has just ceased to exert any pressure against:

A) Cell membrane
B) Cell wall
C) Tonoplast
D) Cytoplasm

Q.3 The pathway adopted by water in plants through adjacent cell walls is:

A) Apoplast pathway
B) Vacuolar pathway
C) Symplast pathway
D) Tonoplast pathway

Q.4 The roots bear a dense cluster of tiny hair like structures which are extensions of:

A) Mesodermal cells
B) Endodermal cells
C) Epidermal cells
D) Epithelial cells

Q.5 Apoplast pathway can take water and minerals upto:

A) Xylem
B) Endodermis
C) Cortex
D) Pericycle

Q.6 The membrane of vacuoles is known as:

A) Cisternae
B) Cristae
C) Tonoplast
D) Protoplast

Q.7 In plants, the neighbouring cells are connected with one another by:

A) Plasmodesmata
B) Vacuoles
C) Cell walls
D) Casparian strips

Q.8 In the root cells_____ pathway becomes discontinuous in the endodermis due to the presence of casparian strip.

A) Tonoplast
B) Symplast
C) Apoplast
D) Vacuolar

Q.9 Transport of minerals from soil to epidermal cells of roots via carrier protein molecules along their concentration gradient is called:

A) Diffusion
B) Passive transport
C) Facilitated diffusion
D) Active transport

Q.10 Pulling upward of water and dissolved minerals towards the leaves through the xylem tissue is called:

A) Pressure flow
B) Ascent of sap
C) Root pressure
D) Imbibition

Q.11 It is the attraction among water molecules, which holds water together, forming a solid chain-like column within the xylem tubes:

A) Cohesion
B) Tension
C) Imbibition
D) Adhesion

TRANSPIRATION AND FACTORS AFFECTING IT

Q.12 Cuticular transpiration is_____ of total transpiration.

A) 6-8%
B) 7-9%
C) 5-7%
D) 4-6%

Q.13 All plants do not possess:

A) Lenticels
B) Stomata
C) Cuticle
D) Chlorophyll

Q.14 Aerating openings formed in the bark through which exchange of gases takes place and water is lost in the form of vapours are:

A) Hydathodes
B) Lenticels
C) Stomata
D) Ostia

Q.15 Increase in the following causes, increase in rate of transpiration except:

A) Light intensity
B) Humidity
C) Temperature
D) Wind

Q.16 _____ provides the necessary energy or force for ascent of sap according to cohesion tension theory.

A) Cohesion
B) Transpiration
C) Adhesion
D) Imbibition

Q.17 Out of total water pulled upward, how much is used in various plant activities?

A) 1%
B) 25%
C) 10%
D) 99%

OPENING AND CLOSING OF STOMATA

Q.18 They function as multisensory hydraulic valve:

A) Lenticels
B) Hydathodes
C) Guard cells
D) Mesophyll cells

Q.19 Stomata open due to_____ of K^+ into the guard cells from the surrounding epidermis.

A) Diffusion
B) Osmosis
C) Active transport
D) Facilitated diffusion

Q.20 The opening and closing of stomata is directly controlled by the:

A) Temperature
B) Light
C) pH
D) Humidity

Q.21 Stomata are enclosed by inner walls of guard cells which are:

A) Thin and concave
B) Thick and concave
C) Thin and convex
D) Thick and convex

Q.22 **Stomata are opened by _____ of potassium ions in guard cells causing water to flow in by osmosis.**

A) Passive movement
B) Diffusion
C) Active movement
D) Osmosis

Q.23 **_____ are the main sites of exchange of gases in plants.**

A) Lenticels
B) Stomata
C) Air spaces
D) Aerating pores

TRANSLOCATION AND PRESSURE FLOW THEORY

Q.24 **The cells of phloem that conduct or transport sugars and other organic material throughout plant are called:**

A) Tracheids
B) Companion cells
C) Sieve elements
D) Phloem parenchyma cells

Q.25 **The water potential of pure water is:**

A) Zero
B) Infinity
C) One
D) Negative

Q.26 **The main component of honey dew dry matter/phloem sap is:**

A) Glucose
B) Starch
C) Maltose
D) Sucrose

Q.27 **Active transport is selective and is dependent upon:**

A) Photosynthesis
B) Transportation
C) Respiration
D) Permeability

XEROPHYTES

Q.28 **_____ have adaptations for the reduced rate of transpiration.**

A) Hydrophytes
B) Mesophytes
C) Halophytes
D) Xerophytes

Q.29 **Small thick leaves with waxy and leathery cuticle is related to:**

A) Xerophytes
B) Mesophytes
C) Hydrophytes
D) Halophytes

Q.30 **Some xerophytes, during the driest season, shed their leaves to:**

A) Restrict transpiration partially
B) Restrict transpiration completely
C) Promote transpiration partially
D) Promote transpiration completely

PAST PAPER MCQs

2008
Q.1 **The attraction among water molecules which hold water together is called:**

A) Tension
B) Adhesion
C) Cohesion
D) Imbibition

2019
Q.2 **Water and minerals move down their concentration gradient through plasmodesmata, to cells of cortex, endodermis, pericycle and then to sap in the xylem cells. This is also known as the:**

A) Symplastic pathway
B) Mineral absorption pathway
C) Vacuolar pathway
D) Apoplastic pathway

Q.3 **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?**

A) Plant B
B) Plant D
C) Plant C
D) Plant A

Q.4 **In plants, which sugar is transported from source to sink through sieve tubes?**

A) Fructose
B) Sucrose
C) Glucose
D) Starch

Q.5 **Xerophytes have small thick leaves to:**

A) Help them float on water
B) Help them survive in salty environment
C) Limit water loss by reducing the surface area
D) Limit water loss by increasing the surface area

ANSWER KEY

TOPIC-WISE MCQs

1	A	11	A	21	B
2	B	12	C	22	C
3	A	13	A	23	B
4	C	14	B	24	C
5	B	15	B	25	A
6	C	16	B	26	D
7	A	17	A	27	C
8	C	18	C	28	D
9	C	19	C	29	A
10	B	20	B	30	B

PAST PAPERS MCQs

1	C
2	A
3	B
4	B
5	C

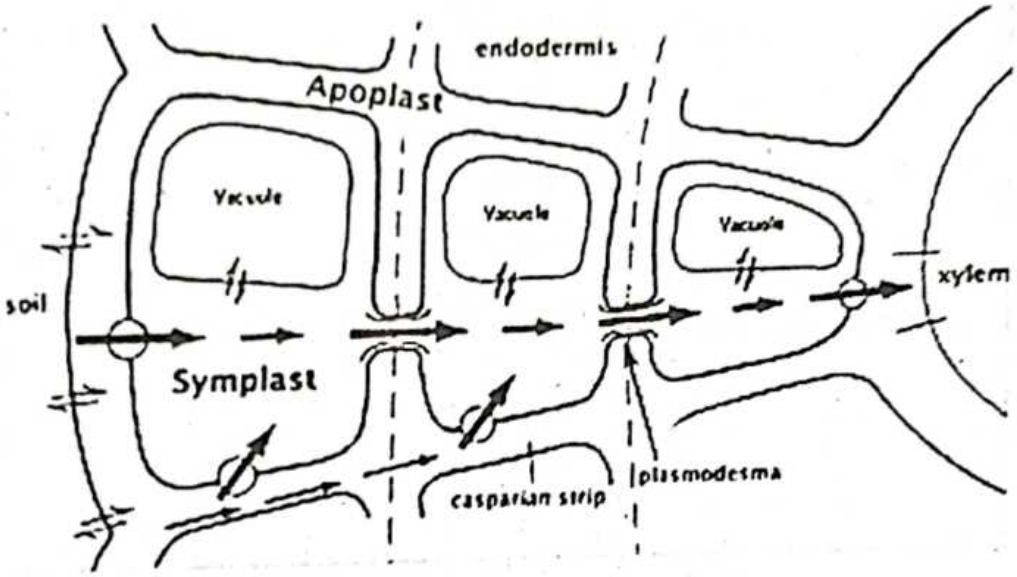
EXPLANATORY NOTES

TOPIC-WISE MCQs

1. A root hair or the rhizoid of a vascular plant, these are hairs-forming cell on the epidermis of a plant 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.

2. The point at which the protoplast is just pulled away from the cell wall at corners is called as incipient plasmolysis. When protoplast is completely detached from the cell wall, it is called as evident plasmolysis. When cytoplasm is found at the center of the cell, it is called as final plasmolysis.

3.



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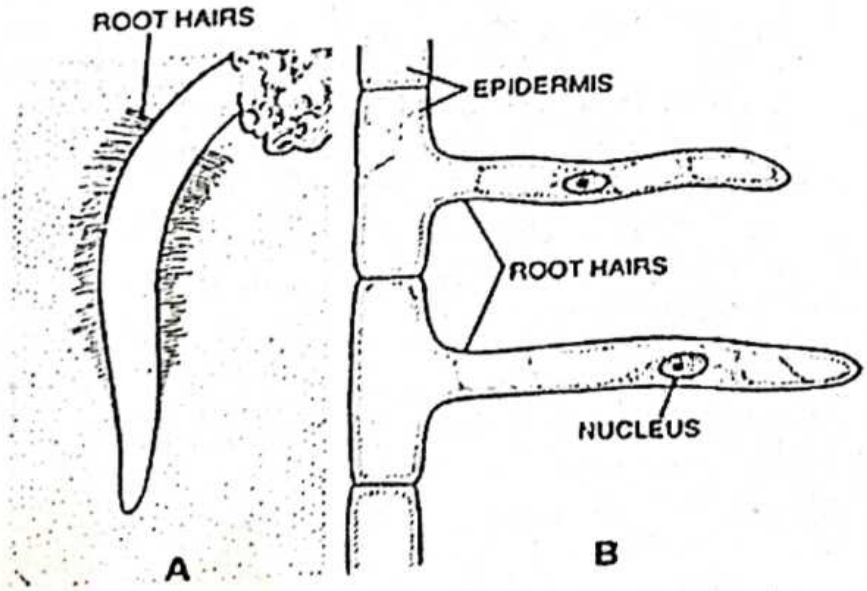
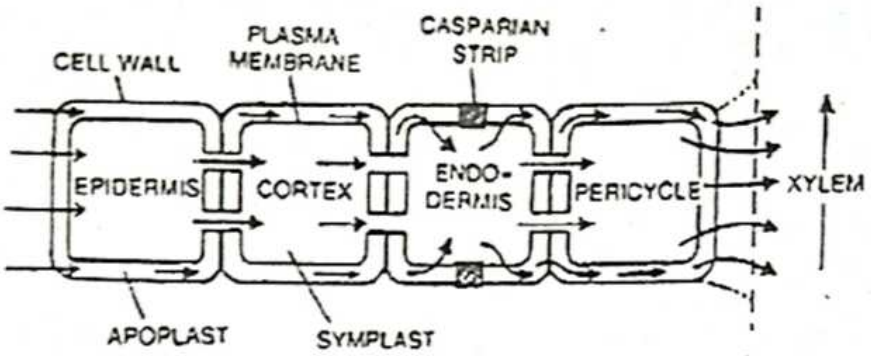


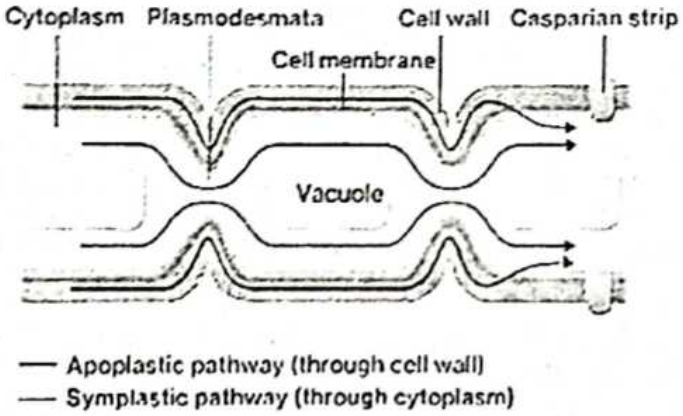
ot hair. A, young seedling of radish with root hairs developing acropetally; B, highly magnified mature root hairs with vacuolated cytoplasm.

5.



6. 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 infoldings of inner mitochondrial membrane.

7.



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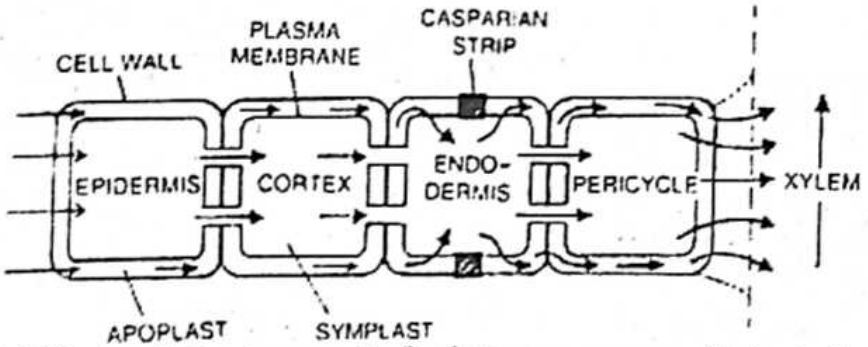


9. Facilitated diffusion is the transport of substances across a biological membrane from an area of higher concentration to an area of lower concentration with the help of a transport molecule.

10. Water and dissolved minerals are carried or pulled upwards towards the leaves through xylem tissue. This is called ascent of sap. This may involve the following mechanisms: root pressure, cohesion tension theory and imbibition.

11. Tension is provided when water chain is pulled up in the xylem. The absorption of one substance by another, in particular the uptake of water by a plant or seed. Adhesion is the attachment of water molecules to the xylem surface.

12. Transpiration is the loss of water from aerial parts of plants in the form of vapours. Out of total water absorbed by plants 1% use for photosynthesis, while 5-7% water loss by cuticular transpiration, 1-2% by lenticular transpiration and remaining by stomatal transpiration.

13. Lenticels are one of many raised pores in the stem of a woody plant that allows gas exchange between the atmosphere and the internal tissues.

14. Lenticels are one of many raised pores in the stem of a woody plant that allows gas exchange between the atmosphere and the internal tissues.

15. Rate of transpiration is directly proportional to light, temperature and wind, while it is inversely proportional to humidity in air.

16. More the rate of transpiration more will be the minerals and water absorption from the soil. Transpiration provides necessary force for ascent of sap. Sap movement is accomplished through cohesion (attraction between water molecules), adhesion (the attachment of water molecules to surface of xylem).

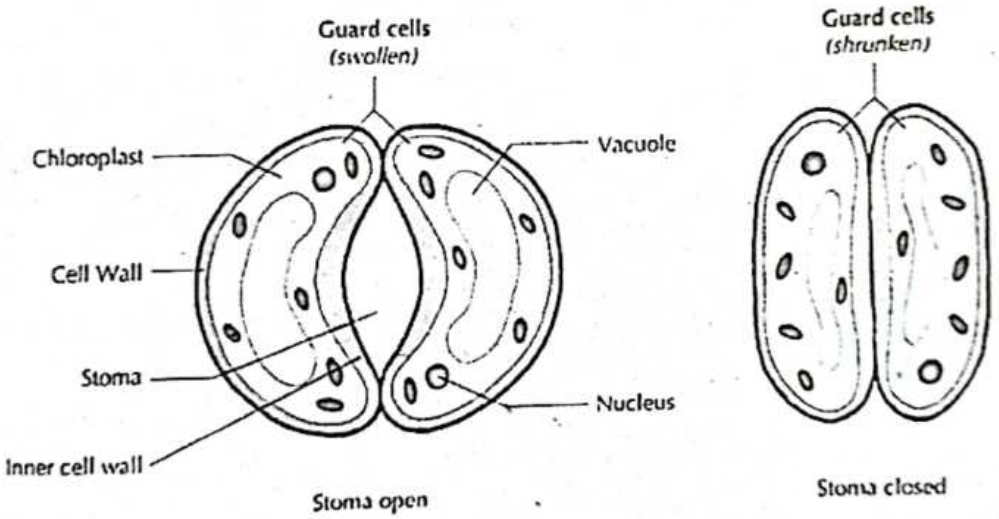
17. Out of total water absorbed by plants, only 1% water use for photosynthesis, while 99% of water transpire from plants surface in the form of vapours.

18. Guard cells act as multisensory hydraulic valve.

19. Stomata open due to active transport of K^+ into the guard cells from the surrounding epidermis.

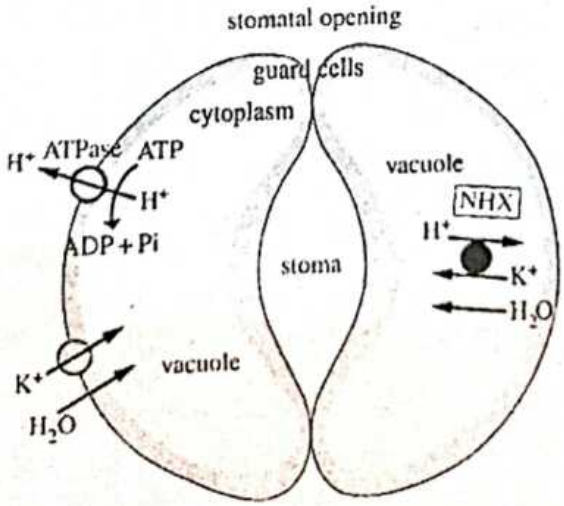
20. During day time when light fall of chloroplast of guard cells, it increases sugar concentration inside guard cells which decrease water potential and water enters from surrounding mesophyll cells by osmosis and turgidity of guard cells cause opening of stomata. At night due to absence of light no sugar formation and no entry of water inside guard cells which lead to closure of stomata.

21.



Stoma open Stoma closed

22.



23. Stomata are the openings in the leaves of all plants that are specialized for transpiration and gases exchange, while lenticels are the pores present on the stem of plants and roots of exchange of gases.

24. Sieve elements are thin-walled cells that are alive at maturity, although the protoplast is greatly changed, and they generally lack nuclei. Sieve elements are elongated and function as the basic photosynthate-conducting cell type in the phloem of vascular plants.

25. Water potential of pure water is zero. Water potential is represented by Ψ_w.

26. Composite of honey dew drop is 10-25% dry mater, 90% or more of it is made by sucrose and nitrogenous compounds are 1%.

27. Active transport is the uphill movement of material by using energy in the form of ATP, which synthesize by the process of cellular respiration.

28. Xerophytes face extreme scarcity of water so they are adapted to prevent water shortage. They have needle like leaves with waxy cuticle, stomata in lower epidermis and in depression.

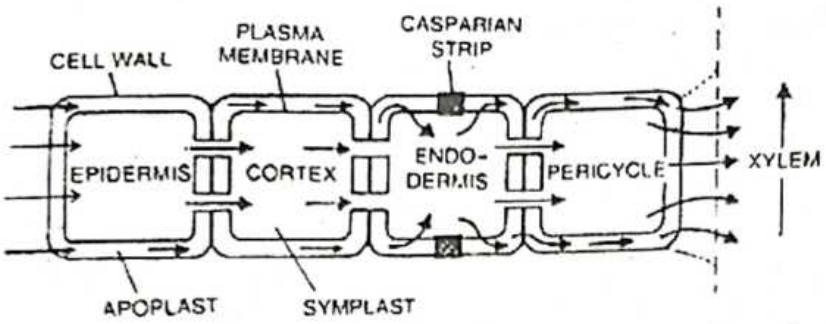
29. Xerophytes face extreme scarcity of water so they are adapted to prevent water shortage. They have needle like leaves with waxy cuticle, stomata in lower epidermis and in depression.

30. Xerophytes face extreme scarcity of water so they are adapted to prevent water shortage by reducing transpiration. During driest conditions, they shed their leaves to reduce rate of transpiration.

PAST PAPER MCQs

1. Cohesion or cohesive attraction or cohesive force is the action or property of like molecules sticking together, being mutually attractive.

2.



3. Rate of transpiration is directly proportional to light, temperature and wind, while it is inversely proportional to humidity in air.

4. Plants use carbohydrates to meet their respiratory activity and rest are transported in the form of sucrose.

5. Xerophytes face extreme scarcity of water so they are adapted to prevent water shortage by reducing transpiration. During driest conditions, they shed their leaves to reduce rate of transpiration.

9 TOPIC TRANSPORT IN HUMANS

PRACTICE EXERCISE

TOPIC-WISE MCQs

HEART

Q.1 Chordae tendinae are extension of:

A) Heart
B) Auricles
C) Ventricles
D) Sinus venosus

Q.2 Which one has the thickest walls than the others?

A) Right atria
B) Right ventricle
C) Left atria
D) Left ventricle

Q.3 The nature of valves in the heart is:

A) Membranous
B) Tendinous
C) Muscular
D) Ligamentous

Q.4 Oxygenated blood is supplied to all body parts from:

A) Right atrium
B) Right ventricle
C) Left atrium
D) Left ventricle

Q.5 Mitral valve prevent the flow of blood from:

A) Right atrium to rightventricles
B) Right atrium to left atrium
C) Left atrium to left ventricles
D) Leftventricles to left atrium

CARDIAC CYCLE, HEART BEAT, ECG AND B.P

Q.6 At start of ventricular contraction:

A) Bi and tricuspid valves are opened
B) Semilunar valves are closed
C) Bi and tricuspid valve are opened and semilunar valve are closed
D) Bi and tricuspid valves closed and semilunar valves are opened

Q.7 Ventricle depolarization is represented by:

A) P wave
B) T wave
C) QRS complex
D) PQRS complex

Q.8 There is a delay of _____ between atrial systole and ventricle systole.

A) 0.8 sec
B) 0.15 sec
C) 1.5 sec
D) 0.4 sec

Q.9 The most appropriate statement for atrial systole is:

A) A.V valves closed
B) A.V valves open
C) A.V valves open and semilunar valves closed
D) A.V valves closed and semilunar valves open

Q.10 At the end of ventricle contraction:

A) A.V valves open
B) Semilunar valves open
C) A.V valvesopen and semilunar valves are closed
D) Both A.V and semilunar valves are closed

Q.11 Lubb sound is produced when:

A) A.V valves open
B) A.V valves close
C) Semilunar valve close
D) Semilunar valve open

Q.12 **Heart cycle isnaturally initiated by:**
A) S.A node
B) Battery
C) A.V node
D) Henson node

Q.13 **Atrial depolarization is represented by:**
A) P wave
B) T wave
C) QRS Complex
D) PQRS

Q.14 **All events of cardiac cycle are completed in:**
A) 0.8 sec
B) 0.15 sec
C) 0.3 sec
D) 0.4 sec

Q.15 **Which of the following statement best describes the function of sinoatrial node?**
A) It sends out electrical impulses to ventricular muscles causing both ventricles to contract
B) It is present at upper end of left atrium
C) It consists of small number of diffusely oriented cardiac fibres
D) It sends out electrical impulses to atrial muscles causing both atria to contract

Q.16 **The portion of heart which is always ready to be the pacemaker if SA node stop working:**
A) Bundle branch
B) Ventricle Muscles
C) AV node
D) Atrial Muscles

Q.17 **Which valve allows blood to pass from heart to pulmonary artery?**
A) Right Semi lunar valve
B) Left Semi lunar valve
C) Left AV valve
D) Right AV valve

Q.18 **Myocardium of heart shows _____ characters.**
A) Smooth and involuntary
B) Striated and involuntary
C) Smooth and voluntary
D) Striated and voluntary

Q.19 **Ventricular systole requires about:**
A) 1 sec
B) 0.1 sec
C) 0.8 sec
D) 0.3 sec

Q.20 **The waves of ECG shows mainly:**
A) Blood pressure
B) Mechanical Events
C) Electrical Events
D) Chemical Events

Q.21 **The second heart sound is produced by:**
A) Closure of AV valves
B) Closure of Semilunar valves
C) Opening of AV valves
D) Opening of Semilunar valves

BLOOD VESSELS

Q.22 **First artery that arises from the base of aorta:**
A) Pulmonary artery
B) Renal artery
C) Coronary artery
D) Iliac arteries

Q.23 **Terminal branches of arterial pathway in human is/are:**
A) Aorta
B) Brachiocephalic artery
C) Coronary artery
D) Iliac arteries

Q.24 **Only vein that is distributary in nature:**
A) Aorta
B) Pulmonary trunk
C) Vena cava
D) Hepatic portal vein

Q.25 **Which vein has oxygenated blood?**
A) Renal vein
B) Subclavian vein
C) Pulmonary vein
D) Jugular vein

Q.26 In man, blood from alimentary canal to liver is transported by:
A) Hepatic portal vein
B) Pulmonary vein
C) Hepatic vein
D) Renal vein

Q.27 Arteriosclerosis is:
A) A metabolic disorder
B) An infectious disorder
C) A degenerative disorder
D) A genetic disorder

Q.28 In humans, only _____ systemic arch is present.
A) Left
B) Right
C) Superior
D) Inferior

Q.29 A vein differs from artery in having:
A) Valves to control direction of flow
B) Strong circular and muscular value
C) Narrow lumen
D) Dark pigmented wall

Q.30 The heart muscle are nourished by:
A) Chambers of the heart
B) Coronary artery
C) Right atrium
D) Left atrium

Q.31 Which one is continuation of iliac artery?
A) Renal Artery
B) Hepatic Artery
C) Femoral Artery
D) Intercostal Arteries

BLOOD

Q.32 All are plasma protein except:
A) Albumin
B) Fibrinogen
C) Globulin
D) Myoglobin

Q.33 Identify the anti-coagulant:
A) Thrombin
B) Platelets
C) Fibrin
D) Heparin

Q.34 If blood cells are removed from the blood, then the liquid left is called_____.
A) Lymph
B) Urine
C) Plasma
D) Interstitial fluid

Q.35 The erythrocytes are meant for:
A) Imparting red colour
B) Exchange of gases
C) Carrying oxygen
D) All A, B, and C

Q.36 In the fetus, RBC's are produced in:
A) Liver
B) Bone marrow
C) Kidney
D) Lymph nodes

Q.37 Which plasma protein mainly maintains colloidal osmotic pressure of the blood?
A) Albumin
B) Fibrinogen
C) Globulins
D) Prothrombin

Q.38 Average life span of red blood cells is about:
A) 2 months
B) 6 months
C) 3 months
D) 4 months

Q.39 Which salt is most abundant in blood plasma?
A) KCl
B) $MgCl_2$
C) NaCl
D) $CaCl_2$

Q.40 Which WBCs spend initial hours in blood and remaining whole life in tissues?
A) Eosinophils
B) Lymphocytes
C) Basophils
D) Monocytes

Q.41 **Antibodies are synthesized directly by the:**
A) Plasma clone cells
B) T-lymphocytes
C) B- Lymphocytes
D) Macrophages

Q.42 **Circulatory system consist of:**
A) Cardiovascular system only
B) Heart, Blood and Blood vessels
C) Lymphatic system only
D) Cardiovascular and lymphatic systems

Q.43 **The major organic constituent of plasma are:**
A) Water
B) Salts
C) Proteins
D) Wastes

Q.44 **If we remove the clotting proteins from plasma the remaining fluid is called_____.**
A) Water
B) Antibodies
C) Serum
D) Lymphocytes

Q.45 **The protein which acts as catalyst in blood clotting process?**
A) Histone
B) Immunoglobulin
C) Albumin
D) Prothrombin

Q.46 **The main reservoir of pro-inflammatory substance is:**
A) Platelets
B) Basophils
C) Monocytes
D) Lymphocytes

Q.47 **Which protein is not related to liver?**
A) Albumin
B) Fibrinogen
C) Prothrombin
D) Immunoglobulins

Q.48 **The 2nd most abundant cells among WBCs in blood are:**
A) Monocytes
B) Lymphocytes
C) Eosinophils
D) Neutrophils

Q.49 **Which of the following plasma protein act as anti-viral agent?**
A) Albumin
B) Prothrombin
C) Heparin
D) Interferon

Q.50 **In humans, blood circulatory system during embryonic development arises from:**
A) Blastopore
B) Mesoderm
C) Endoderm
D) Notochord

Q.51 **Blood can enter in ventricles during all of the following phases of cardiac cycle except:**
A) Ventricular diastole
B) Atrial systole
C) Atrial diastole
D) Ventricular systole

Q.52 **All of the following are the functions of blood except:**
A) Leukemia
B) Wound healing
C) Immunity
D) Buffer action

Q.53 **Liver breaks haemoglobin into a toxic waste called:**
A) Bilirubin
B) Cholesterol
C) Ammonia
D) Urea

Q.54 **Blood leaving lungs after pulmonary circulation is rich in:**
A) Oxygen
B) Carbon dioxide
C) Haemoglobin
D) Number of RBCs

Q.55 Which is phagocyte of blood?
A) Eosinophil
B) Basophil
C) Platelet
D) Neutrophil

Q.56 All of the following are related to blood clotting except:
A) Thrombin
B) Platelets
C) Fibrin
D) Immunoglobulin

Q.57 The group of proteins that comprises 7% of the plasma are:
A) Albumin, keratin, fibrinogen
B) Globulin, keratin, fibrinogen
C) Albumin, globulin, fibrinogen
D) Hemoglobin, keratin, fibrinogen

LYMPHATIC SYSTEM

Q.58 All are functions of lymphatic system except:
A) Transport fat
B) Blood filtration
C) Provide immunity
D) Filtration of urea

Q.59 Lymph is not present in:
A) Lacteal
B) Left thoracic lymphatic duct
C) Lymph node
D) Left subclavian vein

Q.60 Which one is more closely related to lymph?
A) CSF
B) Blood
C) Interstitial fluid
D) Urine

Q.61 Lymph nodes are drained by:
A) Single afferent vessel
B) Many afferent vessels
C) Single efferent vessel
D) Many efferent vessels

Q.62 Largest lymphoid mass is:
A) Thymus
B) Adenoid
C) Spleen
D) Tonsils

Q.63 Lymph flows in the lymph vessels due to:
A) Blood pressure
B) Presence of valve
C) Contraction and relaxation of heart
D) Gravity

Q.64 Flow of lymph is maintained by:
A) Skeletal muscles
B) Breathing movements
C) Visceral movements
D) All A, B, C

Q.65 Just as blood is filtered by spleen, the lymph is filtered by:
A) Spleen
B) Tonsils
C) Lymph nodes
D) Liver

Q.66 Lymph just before entering into sub-clavian vein always passes through:
A) Heart
B) Groin lymph nodes
C) Abdominal vessels
D) Thoracic lymphatic duct

Q.67 Return of lymph from lower leg is assisted by:
A) Lymph nodes
B) Calf muscles
C) Veinous valves
D) Cytokines

Q.68 After taking too much fat, the lymph consists of how many fat globules?
A) 10%
B) 20%
C) 1%
D) 8%

PAST PAPER MCQs

2009

Q.1 Which of the following statement best describes the function of sinoatrial node?
A) It sends out electrical impulses to ventricles to contract
B) It is present at upper end of the left atrium
C) It consists of small number of diffusely oriented cardiac fibers
D) It sends out electrical impulses to atrial muscles causing both atria to contract

Q.2 Arteriosclerosis is:
A) A metabolic disorder
B) A degenerative disorder
C)An infectious disorder
D) A nutritional deficiency disorder

Q.3 Heparin prevents blood clots and is released by:
A) Eosinophils
B) Monocytes
C) Neutrophils
D) Basophils

2010

Q.4 Which one of the following statements best describes the function of sinoatrial node?
A) It sends out electrical impulses to atrial muscles causing both atria to contract
B) It consists of small number of diffusely oriented cardiac fibers
C) It sends out electrical impulses to ventricular muscles causing both ventricles to contract
D) It is present at upper end of left atrium

Q.5 Granulocytes or white blood cells are produced in:
A) Lymph nodes
B) Red bone marrow
C) Tonsils
D) Spleen

Q.6 The flow of lymph in lymphatic vessels is maintained by:
A) Heart, activity of smooth muscles and valves
B) Activity of skeletal muscles, heart and breathing movements
C) Breathing movements, activity of skeletal muscles and valves
D) Exercise, breathing movements and heart

2011

Q.7 The right atrium of the heart usually receives the:
A) Deoxygenated Blood
B) Oxygenated Blood
C) Filtered Blood
D) Non-Filtered Blood

Q.8 The type of agranulocytes which stays in blood for a few hours and then enters tissues and become macrophages are:
A) Lymphocytes
B) Monocytes
C) Eosinophils
D) Basophils

Q.9 Which protein plays a major role in maintaining osmotic balance?
A) Albumin
B) Globulin
C) Fibrinogen
D) Pro-thrombin

Q.10 The largest lymph duct called thoracic lymph duct drains into:
A) Sub-clavian vein
B) Renal vein
C) Pulmonary vein
D) Hepatic portal vein

2012

Q.11 Which vein has oxygenated blood?
A) Renal vein
B) Sub-clavian vein
C) Pulmonary vein
D) Jugular vein

Q.12 **Mature mammalian red blood cells do not have:**
A) Nucleus
B) Red color
C) Fluids
D) Haemoglobin

Q.13 **In a normal person plasma constitutes about _____ by volume of blood.**
A) 50%
B) 60%
C) 45%
D) 55%

2013

Q.14 **Right atrium is separated from right ventricle by:**
A) Tricuspid valve
B) Bicuspid valve
C) Semilunar valve
D) Septum

Q.15 **The average life span of red blood cell is about:**
A) Four months
B) Two months
C) Five months
D) One month

Q.16 **Antibodies are produced against invading cells by:**
A) Lymphocytes
B) Monocytes
C) Basophils
D) Neutrophils

Q.17 **The lymphatic vessels of the body empty the lymph into blood stream at the:**
A) Abdominal vein
B) Sub-clavian vein
C) Jugular vein
D) Bile duct

2014

Q.18 **The oxygenated blood from lungs to heart is transported by the:**
A) Pulmonary artery
B) Coronary artery
C) Pulmonary vein
D) Hepatic artery

Q.19 **Histamine is produced by which one of the following cells?**
A) Basophils
B) Platelets
C) Monocytes
D) Eosinophils

Q.20 **Which one of the following is the most numerous / commonest of white blood cells?**
A) Eosinophils
B) Monocytes
C) Neutrophils
D) Lymphocytes

Q.21 **Which one of the following proteins takes part in blood clotting?**
A) Prothrombin
B) Fibrinogen
C) Immunoglobulin
D) Globulin

2015

Q.22 **Right atrium is separated from right ventricle by:**
A) Bicuspid Valve
B) Semilunar Valve
C) Tricuspid Valve
D) Interatrial Septum

Q.23 **One complete heart beat consists of one systole and one diastole and lasts for about:**
A) 0.8 sec
B) 0.2 sec
C) 0.4 sec
D) 0.5 sec

Q.24 **The flaps of tricuspid valves are attached to muscular extensions of right ventricle known as:**
A) Smooth Muscles
B) Papillary Muscles
C) Intercostal Muscles
D) Skeletal Muscles

Q.25 **The heart beat cycle starts when electric impulses are generated from:**
A) AV Node
B) SV Node
C) SA Node
D) PQ Node

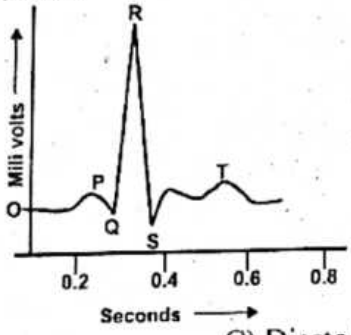
Q.26 **Granulocytes are:**
A) Monocytes, Eosinophils, Basophils
B) Basophils, Macrophages, Neutrophils
C) Neutrophils, Eosinophils, Basophils
D) Monocytes, Macrophages, Basophils

2016
Q.27 **In human the closed sac which surrounds the heart is:**
A) Endocardium
B) Myocardium
C) Pericardium
D) Epicardium

Q.28 **Chordae tendineae are the fibrous cords attached with:**
A) Cardiac end of stomach valve
B) Tricuspid valve of heart
C) Pyloric sphincter of stomach
D) Eyelid

Q.29 **Bicuspid valve controls the flow of blood from:**
A) Right atrium to right ventricle
B) Right ventricle to pulmonary artery
C) Left ventricle to aorta
D) Left atrium to left ventricle

2017
Q.30 **In ECG, QRS wave represents:**



A) Ventricular systole
B) Atrial systole
C) Diastole
D) Recovery systole

Q.31 **A type of blood cell that produces heparin is_____.**
A) Basophils
B) Neutrophils
C) Eosinophils
D) Monocytes

Q.32 **Thoracic lymph duct of the lymphatic system opens into_____.**
A) Superior vena cava
B) Sub-clavian vein
C) Inferior vena cava
D) Renal vein

2017 Re-Take

Q.33 **Bicuspid valve is present in which part of heart?**
A) Right atrium and right ventricle
B) Right atrium and left ventricle
C) Left atrium and left ventricle
D) Left atrium and right ventricle

Q.34 **Cardiac cycle lasts about:**
A) 0.4 sec
B) 0.8 sec
C) 0.01 sec
D) 0.5 sec

Q.35 **Which of the following is agranulocyte cell?**
A) Neutrophil
B) Eosinophil
C) Basophil
D) Lymphocyte

Q.36 **Percentage of protein in human blood is:**
A) 1-2
B) 7-10
C) 7-9
D) 6-9

2018

Q.37 The thickest chamber of human heart is:

A) Left atrium
B) Left ventricle
C) Right atrium
D) Right ventricle

Q.38 Which one of the following act as a pacemaker in heart?

A) Atria ventricular node
B) Atria ventricular bundles of fibers
C) Sino-atrial nod
D) Bundle of His

Q.39 Which statement is correct about atrial systole?

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.40 Which one of the following cells do not have nucleus?

A) Eosinophils
B) Platelets
C) Basophils
D) Neutrophils

2019

Q.41 Which of the following blood vessels contain semilunar valves?

A) Arteries
B) Veins
C) Arterioles
D) Capillaries

Q.42 The major function of basophils is to:

A) Destroy small particles by phagocytosis
B) Release heparin to prevent blood clotting
C) Inactivate inflammation producing substances
D) Transport oxygen

Q.43 Large lymph vessels ultimately form larger lymph duct, which drains its lymph into:

A) Carotid and Aorta
B) Sub-clavian artery
C) Sub-clavian Vein
D) Vena cava and Aorta

ANSWER KEY

TOPIC-WISE MCQs

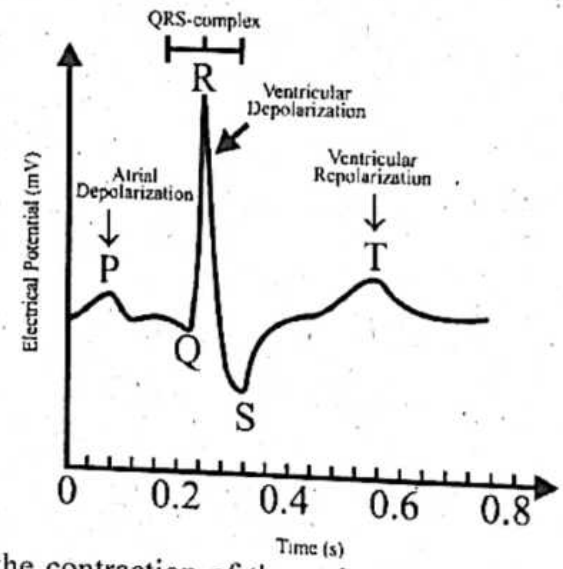
1	C	11	B	21	A	31	C	41	A	51	D	61	C
2	D	12	A	22	C	32	D	42	D	52	A	62	C
3	C	13	A	23	D	33	D	43	C	53	A	63	B
4	D	14	A	24	D	34	C	44	C	54	A	64	D
5	D	15	D	25	C	35	D	45	D	55	D	65	C
6	D	16	C	26	A	36	A	46	B	56	D	66	D
7	C	17	A	27	D	37	A	47	D	57	C	67	B
8	B	18	B	28	A	38	D	48	B	58	D	68	A
9	C	19	D	29	D	39	C	49	D	59	D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

PAST PAPERS MCQs

1	D	11	C	21	B	31	A	41	B
2	B	12	A	22	C	32	B	42	B
3	D	13	D	23	A	33	C	43	C
4	A	14	A	24	B	34	B		
5	B	15	A	25	C	35	D		
6	C	16	A	26	C	36	C		
7	A	17	B	27	C	37	B		
8	B	18	C	28	B	38	C		
9	A	19	A	29	D	39	D		
10	A	20	C	30	A	40	B		

EXPLANATORY NOTES

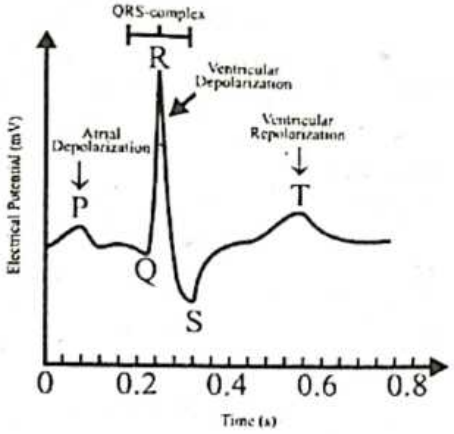
TOPIC-WISE MCQs

1. These flaps are attached with fibrous cords called *chordae tendinae*, to the *papillary muscles* which are extensions of the wall of the ventricles.
2. The wall of left ventricle is thicker (3 times) than that of right ventricle.
3. The nature of valves present in the heart is muscular and muscles ensure the unidirectional flow of blood in circulation.
4. 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.
5. Mitral valve is another name used for bicuspid valve and prevents the entry of blood from left ventricle to left atrium.
6. When ventricle contraction start, atrio-ventricular valve close to prevent back flow of blood and semilunar valve open to move blood out form heart.
7. 

8. The lag time between the contraction of the atria and ventricles results from a delay of about 0.15 seconds, imposed on the conduction system at the atrio-ventricular node.
9. During atrial systole, the atrio-ventricular valves remain open while semi-lunar valves remain closed because the pressure gradient between the atrium and ventricle is preserved during late ventricular diastole.
10. At the end of ventricular systole, atrio-ventricular and semilunar valves are closed.
11. 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 (S_1) and second heart sound (S_2), produced by the closing of the atrio-ventricular valves and semilunar valves, respectively.

12. 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.

13.



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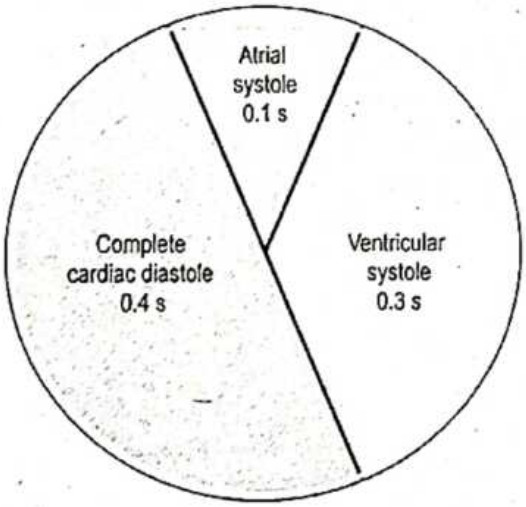


Total period of 1 cycle = 0.8 s

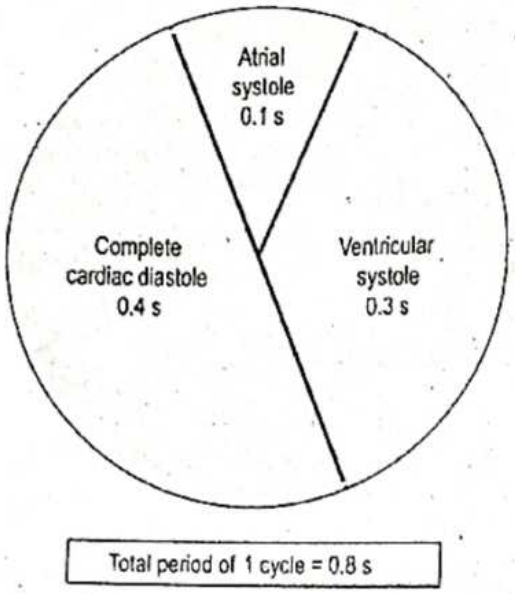
15. The main role of a sinoatrial node is to initiate action potentials, which spread throughout the heart and cause contraction.

16. 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.

17. 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.

18. Myocardium of heart has striations which show similarity with skeletal muscles but cardiac muscles are involuntary in action.

19.

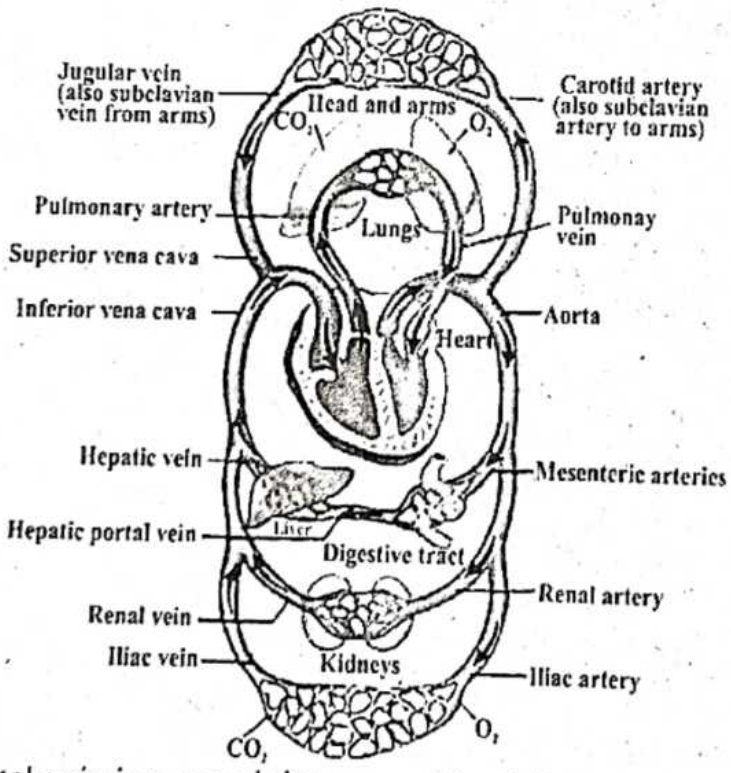


20. ECG is a test to check electrical events of heart that determined by the electrodes placing on body.

21. During ventricle contraction two heart sounds produce, 1st sound is "Lub" produce when AV-valves close while the 2nd heart sound is "Dub" which produce when semilunar valves close.

22. At the base of aorta, first pair of arteries, the coronary arteries arises and supply blood to heart.

23.



24. 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 he upper edge of the head of the pancreas.

25. The pulmonary vein carries oxygenated blood from the lungs to the left atrium.
26. 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.
27. 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.
28. In humans, only left systemic arch is present.
29. All the veins carry deoxygenated blood except pulmonary vein.
30. First artery that arises from base of aorta is coronary artery which supplies oxygenated blood to the heart.
31. Descending aorta is bifurcated into two iliac arteries which on further division form femoral artery that supply blood to thigh muscles of legs.
32. Myoglobin is muscle haemoglobin. It is responsible for oxygen storage in muscles.
33. Heparin acts as an anticoagulant, preventing the formation of clots and extension of existing clots within the blood.
34. Blood plasma is a yellowish colored liquid component of blood that normally holds the blood cells in whole blood in suspension. It makes up about 55% of the body's total blood volume.
35. The most important function of human erythrocytes is to transport respiratory gases within the body which is attributed due to the presence of haemoglobin.
36. In foetus, liver is also involved in the production of RBCs up to the age of 7 months.
37. To some extent, all the plasma proteins provide colloid osmotic pressure of the blood. Albumin, however, is the most abundant protein of blood plasma and play vital role in maintaining colloid osmotic pressure.
38. Average life-span of RBC's is about 120 days or 4 months, and after that they will be destroyed mainly in spleen.
39. The inorganic salts constitutes up to 0.9% in plasma and $2/3^{rd}$ is constituted by NaCl.
40. Monocytes are a type of a-granulocytes that stay from 10-20 hours in the blood, then enter tissues and become tissue macrophages, performing phagocytic function.
41. Antibodies are synthesized by the activated B-lymphocytes e.g. plasma clone cells.
42. Two systems are included under the heading of circulatory system: cardiovascular system and lymphatic system.
43. Plasma proteins that form 7-9% of blood plasma are albumin, globulin, prothrombin and immunoglobulin.
44. Serum is colored; it is plasma protein rich liquid which separates out when blood coagulates. Plasma without blood clotting proteins is termed as serum.
45. Prothrombin first change to thrombin by a clotting factor, it will convert fibrinogen to fibrin that will form blood clot.
46. Histamine is the inflammation producing substance synthesized and stored in basophils.
47. Albumin, fibrinogen and prothrombin are the plasma proteins synthesized by the liver while immunoglobulins are synthesized by the activated B-lymphocytes.

48.

WBCs	Percentage
Neutrophils	62%
Lymphocytes	32%
Monocytes	3%
Eosinophils	2%
Basophils	<1%

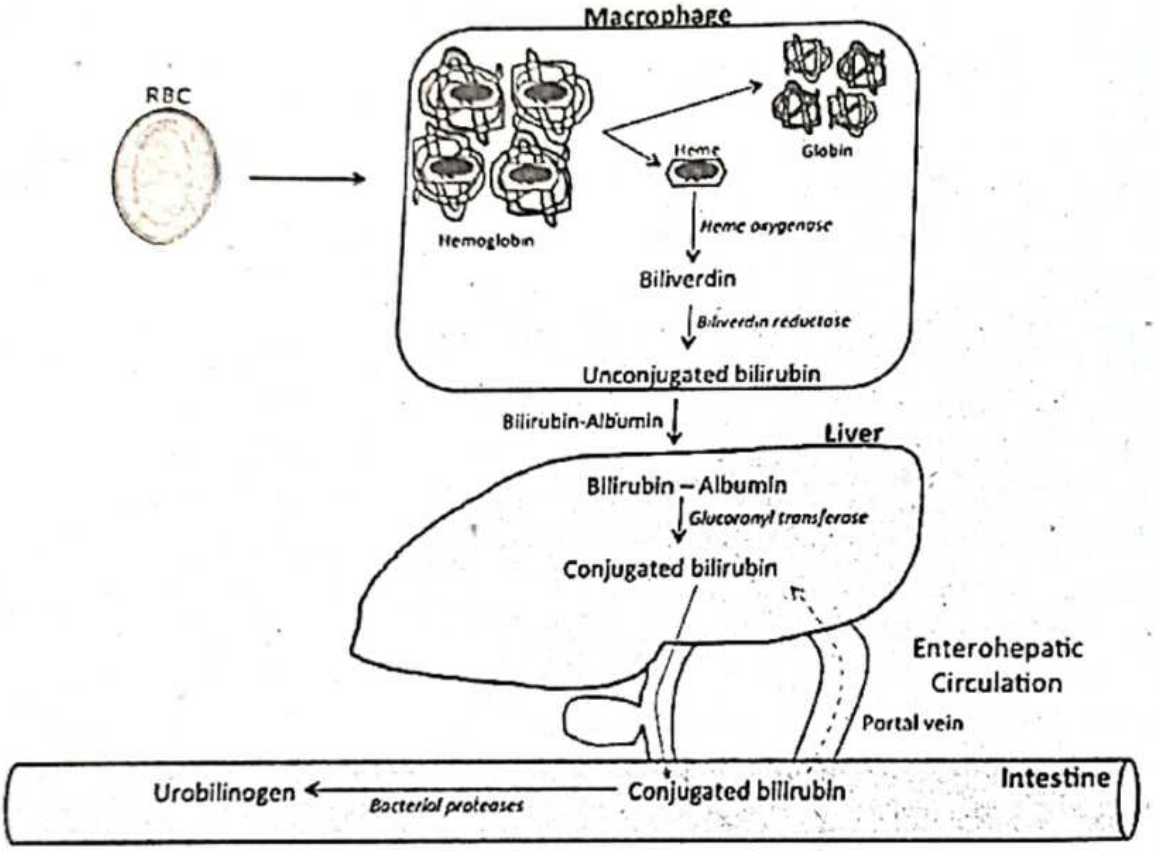
49. Interferon's are a group of signaling proteins made and released by host cells in response to the presence of several pathogens, such as viruses, bacteria, parasites, and also tumor cells.

50. At embryonic stage three germ layers are form (ectoderm, endoderm and mesoderm) mesoderm will form circulatory system.

51. During ventricle contraction heart pump blood outside from heart (toward body or lungs).

52. Leukemia is a blood disorder

53.



54. Deoxygenated blood from heart via pulmonary artery enter to lungs for oxygenation and return back through pulmonary vein to heart after carrying oxygen that contain oxygenated blood.

55. Neutrophils are the blood phagocytes because they involve in phagocytosis of small particles from blood.

56. Immunoglobulins are defense proteins.

57. Plasma proteins that form 7-9% of blood plasma are albumin, globulin, prothrombin and immunoglobulin.

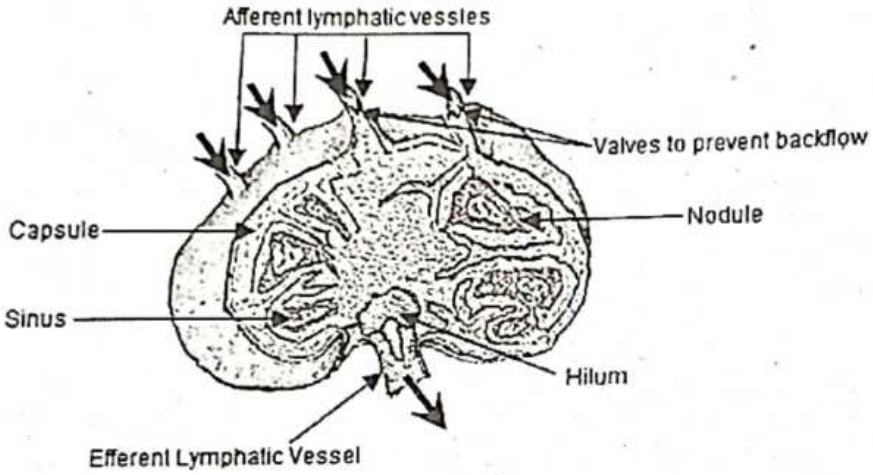
58. Transportation of absorbed lipids from small intestine, filtration of blood by spleen and immunity are related to the lymphatic system while filtration of urea is the function of kidneys.

59. Lymph is extra cellular fluid present in lymph vessels. Sub-clavian vein is a part of blood circulatory system.

60. The lymph is formed when the interstitial fluid (the fluid which lies in the interstices of all body tissues) is collected through lymph capillaries.

61.

Lymph Node Structure



62. The largest lymphoid structure present in the human body is spleen while thymus. adenoid and tonsils are relatively small structures.

63. Blood pressure, cardiac contraction and relaxation and gravity do not assist the flow of lymph in the body, while semilunar valves can assist in the flow of lymph.

64. Lymph flow from body parts assisted by the movement of viscera, breathing movement and skeletal muscles.

65. 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.

66. The thoracic duct is the largest lymphatic vessel within the human body. Lymph before entering into the blood passes through lymphatic duct.

67. Lymph movement control by the contraction of skeletal muscles, the calf muscles are skeletal muscles in lower limbs that will assist the movement of lymph.

68. After a fatty meal fat globules will form 1% of lymph that return to blood.

PAST PAPERS MCQs

1. The main role of a sinoatrial node is to initiate action potentials, which spread throughout the heart and cause contraction.
2. 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.
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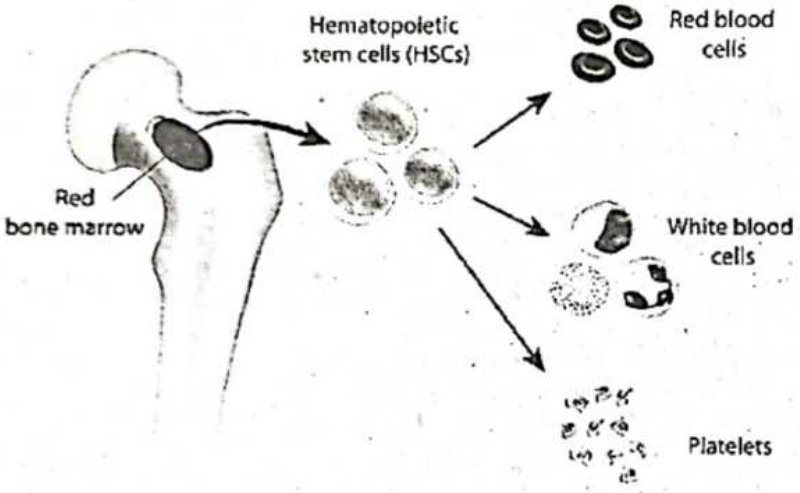
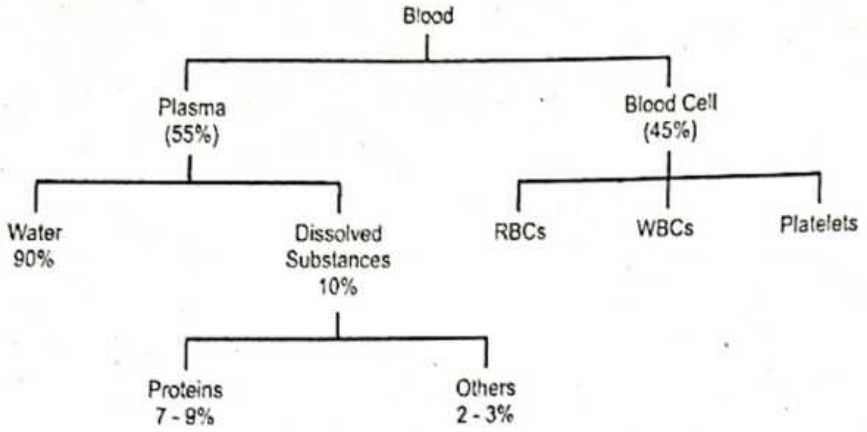
5. 

6. Lymph flow from body parts assisted by the movement of viscera, breathing movement and skeletal muscles.
7. Deoxygenated blood from body via superior and inferior vena cava is poured into right atrium.
8. Monocytes are a type of agranulocytes that stay from 10-20 hours in the blood, then enter tissues and become tissue macrophages, performing phagocytic function.
9. To some extent, all the plasma proteins provide colloid osmotic pressure of the blood. Albumin, however, is the most abundant protein of blood plasma and play vital role in maintaining colloid osmotic pressure.
10. The thoracic duct is the largest lymphatic vessel within the human body. Lymph before entering into the blood passes through lymphatic duct.
11. The pulmonary vein carries oxygenated blood from the lungs to the left atrium.
12. When red blood cells (erythrocytes) are produced in the bone marrow, they initially do contain a nucleus. In maturation the cell will extrude its nucleus, a process called enucleation.

13.



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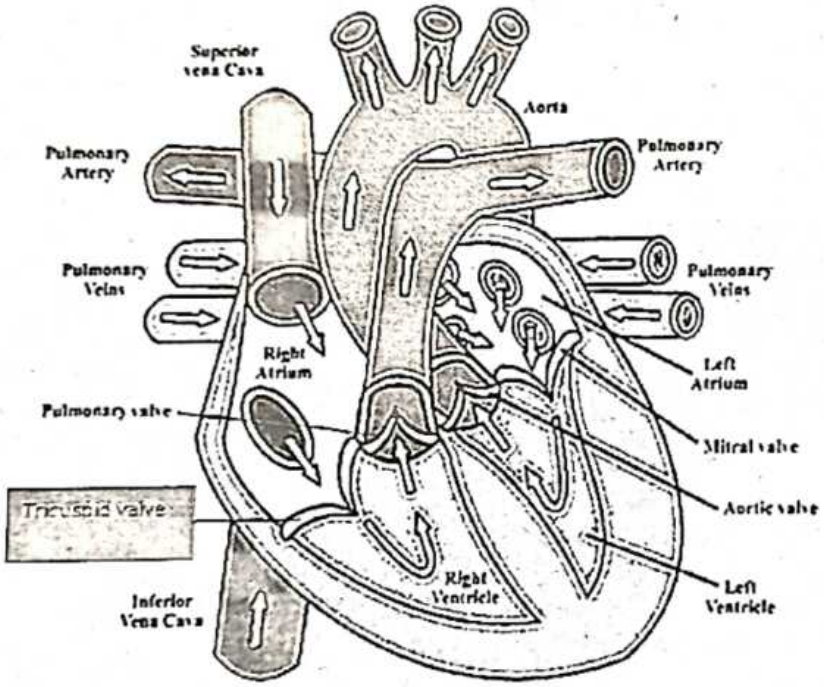

15. Average life-span of RBC's is about 120 days or 4 months, and after that they will be destroyed mainly in spleen.
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20.

WBCs	Percentage
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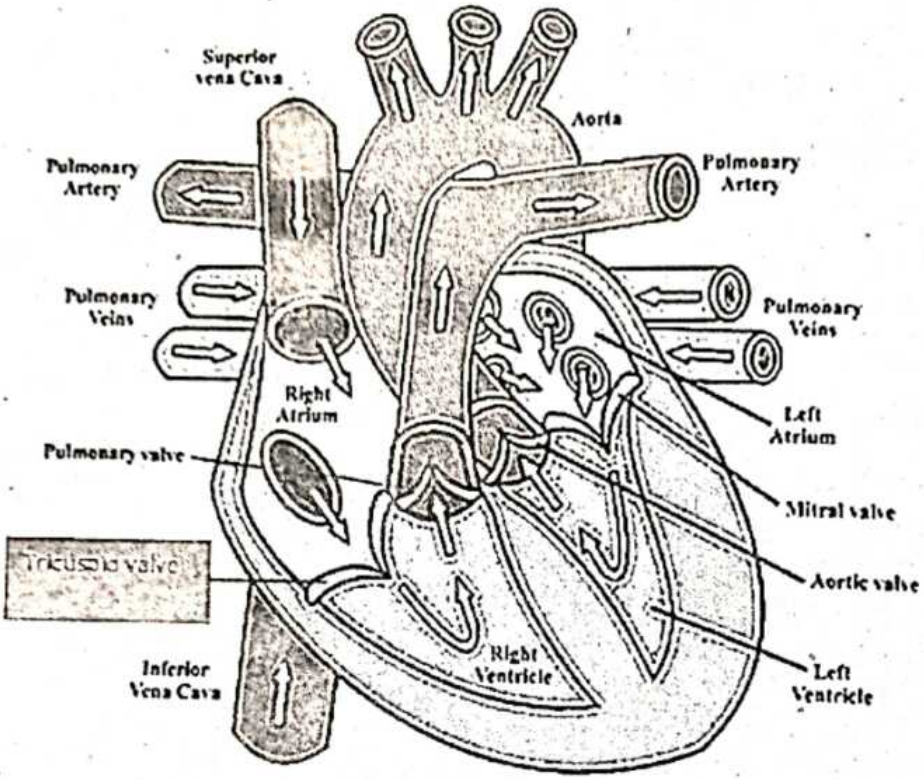
21. Thrombin acts as a catalyst in blood clotting process. Fibrinogen takes part in blood clotting process.

22.



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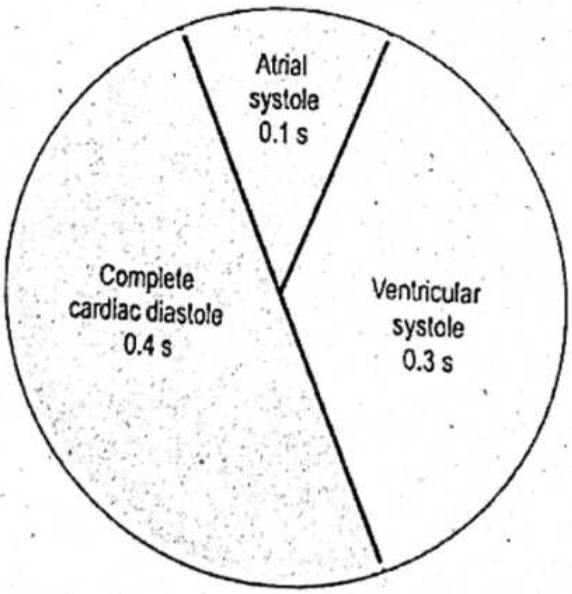
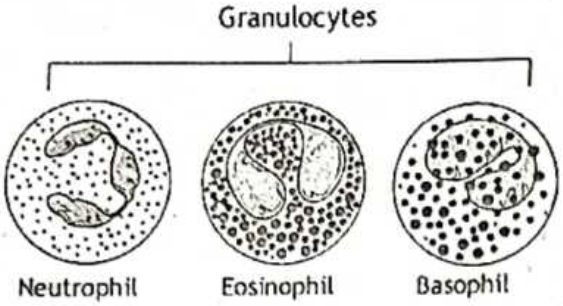


Total period of 1 cycle = 0.8 s

24. These flaps of heart valves are attached with fibrous cords called chordae tendinae, to the papillary muscles which are extensions of the wall of the ventricles.

25. 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.

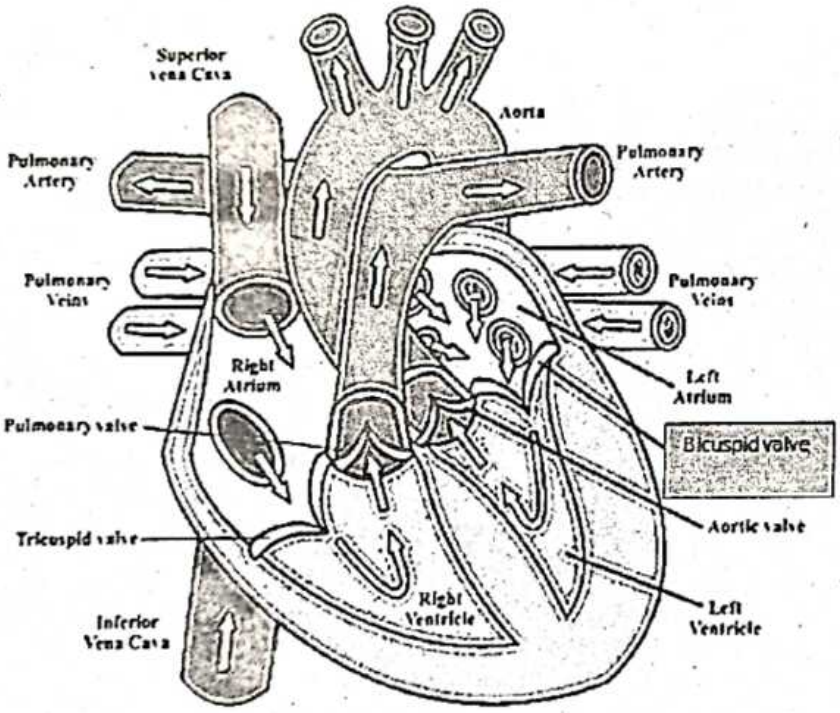
26.



27. The heart is enclosed in a double membranous sac – the pericardial cavity, which contains the pericardial fluid.

28. These flaps of heart valves are attached with fibrous cords called chordae tendinae, to the, papillary muscles which are extensions of the wall of the ventricles.

29.



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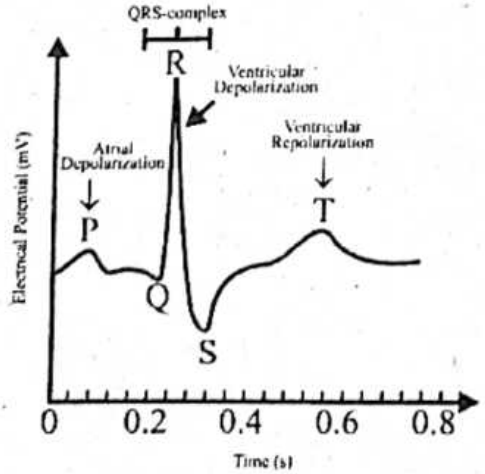
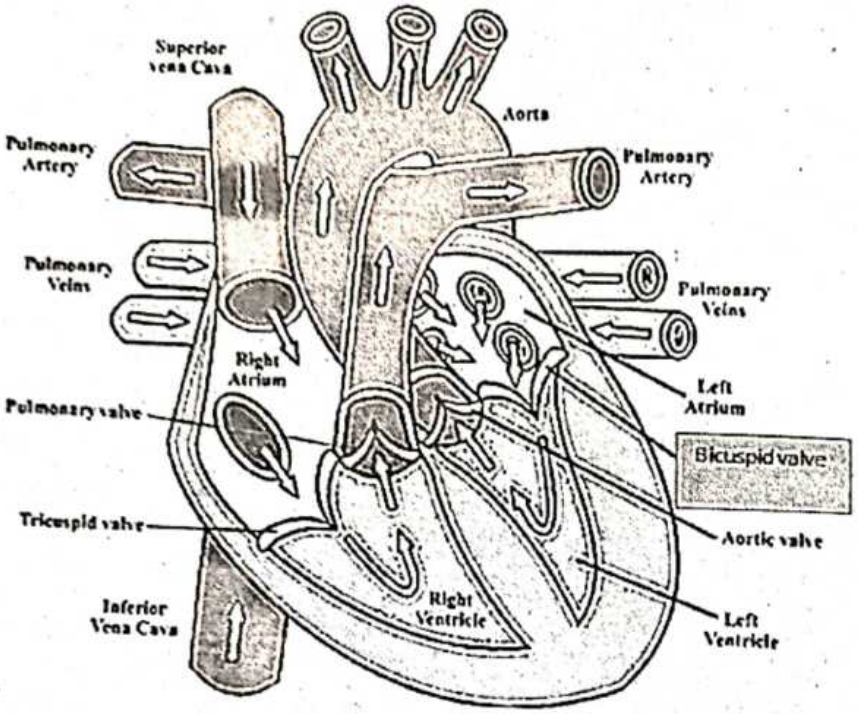


31. Basophil release heparin to prevent blood clots and histamine to cause inflammation.

32. The thoracic duct is the largest lymphatic vessel within the human body. Lymph enters into left sub-clavian vein through thoracic duct.

33.



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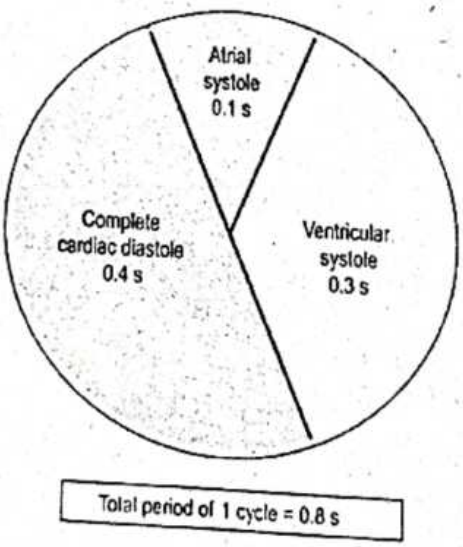

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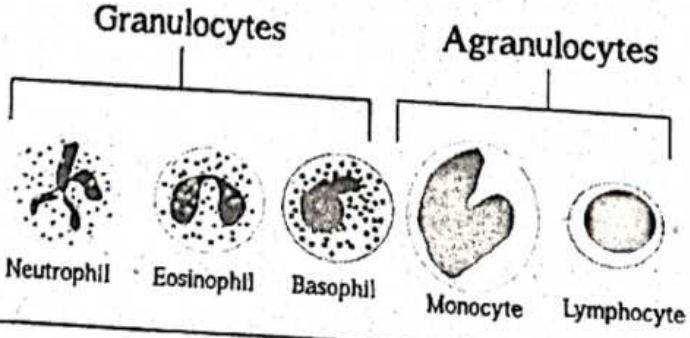


36. Plasma proteins that form 7-9% of blood plasma are albumin, globulin, prothrombin and immunoglobulin.

37. The wall of left ventricle is thicker (3 times) than that of right ventricle.

38. 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.

39. During atrial systole following event occur:

- AV valves open
- SL valves closed
- Muscles of atria contract and pump blood to ventricles
- Ventricles are relaxed and receive blood from atria.

40. Platelets are not cells, have no nucleus and membrane bounded Cytoplasmic fragments of large cells called megakaryocytes.

41. Semilunar valves are present in veins to prevent back flow of blood.

42. Basophil release heparin to prevent blood clots and histamine to cause inflammation.

43. The thoracic duct is the largest lymphatic vessel within the human body. Lymph enters into left sub-clavian vein through thoracic duct.

10 TOPIC IMMUNITY

PRACTICE EXERCISE

TOPIC-WISE MCQs

IMMUNE SYSTEM

Q.1 Common feature of cell humoral response and cell mediated response are:
A) Recognition of antigen
B) Production of antibodies
C) Tissue rejection
D) Plasma clone formation

Q.2 Phagocytes generally come into action when:
A) 1st defense line is breached
B) Parasites enter the body
C) Infection is over
D) Lymphocytes fail

Q.3 Largest lymphoid mass is:
A) Thymus
B) Adenoid
C) Spleen
D) Tonsils

Q.4 Study of mechanisms of body defense is called:
A) Immunology
B) Serology
C) Teratology
D) Microbiology

Q.5 Which one which is not involved in immunity?
A) T-lymphocytes
B) Antibodies
C) B-lymphocytes
D) Myoglobin

Q.6 Immune system is an example of:
A) 1st line of defense
B) 2nd line of defense
C) 3rd line of defense
D) 4th line of defense

Q.7 All are components of immune system except:
A) T- Lymphocytes
B) Antibodies
C) B-lymphocytes
D) Monocytes

Q.8 Stronger and specific immunity is found in:
A) All animals
B) Invertebrates only
C) Humans only
D) All vertebrates

Q.9 An antigen is:
A) Residue of antibody
B) Stimulus for antibody formation
C) Result of antibody
D) Opposite to an antibody

Q.10 Any foreign body that may activate immune system:
A) Antigen
B) Antibodies
C) Immunoglobulin
D) Plasmogen

Q.11 Fluid that is in transition between blood and lymph is:
A) Lymph
B) Serum
C) Interstitial fluid
D) Blood

Q.12 Immunity is the capacity of body for all except:
A) Recognize antigen
B) Increase antibodies production
C) Mobilize lymphocytes
D) Mobilize hemoglobin

Q.13 Immunity is generally destroyed in:
A) All infections
B) All inflammations
C) HIV infection
D) All diseases

Q.14 Specific immunity is the result of:

A) 1st line of defense
B) 2nd line of defense
C) 3rd line of defense
D) 4th line of defense

Q.15 Phagocytosis usually involves:

A) 1st line of defense
B) 2nd line of defense
C) 3rd line of defense
D) 4th line of defense

Q.16 All are examples of 1st line of defense except:

A) Skin
B) Stomach HCl
C) Mucous
D) Antibodies

ANTIBODIES

Q.17 Antibodies are involved in:

A) 1st line of defense
B) 2nd line of defense
C) 3rd line of defense
D) 4th line of defense

Q.18 Antibodies consist of:

A) One Heavy chain only
B) Two heavy and two light chain only
C) Two heavy chains only
D) Two light chains only

Q.19 Antibodies are an example of _____ protein.

A) Fibrous
B) Catalytic
C) Globular
D) Regulatory

Q.20 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.21 Antibodies consist of:

A) One chain
B) Three chains
C) Two chains
D) Four chains

Q.22 Disulfide bridge is present between all except:

A) Heavy –Heavy chains
B) Heavy- light chain
C) Light and heavy chain
D) Light and light chain

Q.23 Humoral immune response is generated by:

A) B lymphocytes
B) T lymphocytes
C) Basophils
D) Neutrophils

Q.24 B-lymphocytes originate in human from:

A) Blood cells
B) Bone marrow
C) Bursa of fabricious
D) Thymus

Q.25 Transplant rejection is:

A) Cell mediated response
B) Humoral response
C) Immune response
D) Auto immune response

Q.26 Cyclosporine is used to inhibit which type of response?

A) Cell mediated
B) Cell signaling
C) Cell humoral
D) Cell to cell

TYPES OF IMMUNITY

Q.27 Antibodies are injected in:

A) Artificial active immunity
B) Artificial passive immunity
C) Natural active immunity
D) Natural passive immunity

Q.28 Type of immunity that is present by birth is called:

A) Innate immunity
B) Acquired immunity
C) Adaptive immunity
D) Secondary immunity

Q.29 All are true about passive immunization except:

A) Antibodies are injected
B) Antitoxin are injected
C) Antisera are injected
D) Antibodies are produced

Q.30 Injection of anti-venom serum after snake bite is an example of:

A) Active artificial immunization
B) Active natural immunization
C) Passive natural immunization
D) Passive artificial immunization

VACCINATION

Q.31 Vaccination against specific disease like tetanus is an example of:

A) Artificial active immunity
B) Artificial passive immunity
C) Natural active immunity
D) Natural passive immunity

Q.32 Generally vaccination provides:

A) Artificial active immunity
B) Artificial passive immunity
C) Natural active immunity
D) Natural passive immunity

Q.33 A vaccine contains:

A) Antigens
B) Antibodies
C) Macrophages
D) All A, B, C

Q.34 Vaccination is not available for which of the following disease?

A) Bacterial
B) Viral
C) Fungal
D) Microbial

PAST PAPER MCQs

2009

Q.1 Tissue rejection is executed by:
A) Both B and T lymphocytes
B) Monocytes
C) B-lymphocytes
D) T-lymphocytes

2011

Q.2 Thymus gland is involved in maturation of:
A) Platelets
B) B-Lymphocytes
C) Eosinophils
D) T-Lymphocytes

Q.3 Mucous membranes are part of body defense system and they offer:
A) Physical Barriers
B) Mechanical Barriers
C) Chemical Barriers
D) Biological Barriers

Q.4 The immunity in which T-cells recognize the antigens or micro-organisms is known as:
A) Tissue Grafting
B) Phagocytosis
C) Cell Mediated Immunity / Response
D) Hormonal Immunity / Response

Q.5 In passive immunity which of the following component are injected into blood?
A) Antigens
B) Immunogens
C) Serum
D) Immunoglobulins

Q.6 Immediate protection is obtained from:
A) Passive Immunity
B) Active Immunity
C) Vaccination
D) Natural Active Immunity

2012

Q.7 Antigen is a foreign protein or any other molecule which stimulates the formation of:
A) MHC complex
B) Immunogen
C) Mucus
D) Antibodies

Q.8 Antibodies are produced by which of the following lymphocytes?
A) B-lymphocytes
B) A-lymphocytes
C) T-lymphocytes
D) B and T-lymphocytes

Q.9 T-lymphocytes become mature and competent under the influence of:
A) Liver
B) Bursa of fabricius
C) Thymus gland
D) Spleen

Q.10 Skin and mucous membranes are part of the body defense system and they form the:
A) Physical barrier
B) Mechanical barriers
C) Chemical barriers
D) Biological barriers

Q.11 Snake bite is treated with which type of immunization?
A) Active
B) Passive
C) Humoral
D) Specific

2013

Q.12 Which part of the antibody recognizes the antigen during immune response?
A) Heavy part
B) Variable part
C) Light part
D) Constant part

Q.13 Two identical light chains and two identical heavy chains in antibody molecule are linked by:
A) Disulphide bridges
B) Peptide bond
C) Glycerol bond
D) Ionic bond

Q.14 **In the structural diagram of an antibody molecule which portion is occupied by variable chains?**
A) Lower region
B) Upper region
C) Middle region
D) In between chains

Q.15 **In passive immunity which of the following components are injected into body?**
A) Antigens
B) Immunogens
C) Serum
D) Immunoglobulins

2014

Q.16 **Which part of antibody recognizes the antigen during immune response?**
A) Heavy part
B) Light part
C) Constant part
D) Variable part

Q.17 **Which one of the following glands is involved in the production of lymphocytes?**
A) Pineal
B) Pituitary
C) Thymus
D) Adrenal

Q.18 **Antibodies are proteins and made up of how many polypeptide chains?**
A) One
B) Two
C) Three
D) Four

Q.19 **T-lymphocytes recognize antigen and attack microorganisms or transplanted organ and tissues. This effect is called:**
A) Cell-mediated response
B) Humoral immune response
C) Active immunity
D) Passive immunity

Q.20 **What type of immunity is achieved by injecting antibodies, antiserum, anti-venom serum?**
A) Active immunity
B) Passive immunity
C) Artificially induced immunity
D) Naturally induced immunity

2015

Q.21 **B-lymphocytes are named due to their relationship with:**
A) Blood
B) Bursa of Fabricius
C) Bone Marrow
D) Bile Duct

Q.22 **The lymph vessel of villi is called:**
A) Epithelium
B) Afferent lymph vessel
C) Adrenals
D) Lacteal

Q.23 **In _____ response, β-cells produce plasma cells that synthesize antibodies and release in blood plasma and tissue fluid.**
A) Cell-Mediated
B) Hormonal
C) Humoral
D) Phototactic

Q.24 **Response of body against the transplanted organ is:**
A) Homeostatic Response
B) Behavioral Response
C) Primary Response
D) Cell-mediated Response

Q.25 **Passive immunity is used against:**
A) Malaria
B) Typhoid
C) Dengue
D) Tetanus

2016

Q.26 **In antibody molecule, two heavy and two light chains are bonded by:**
A) Disulphide Bond
B) Monosulphide bond
C) Hydrogen bond
D) Ionic bond

Q.27 **Variable amino acid sequences in antibody molecule are found in _____.**
A) Both light chains only
B) Both heavy chains only
C) One heavy and one light chain
D) Both heavy and light chains

Q.28 **B-cells release antibodies in blood plasma, tissue fluid and lymph. This kind of immune response is called:**
A) Cell Mediated Response
B) Humoral Response
C) Active Response
D) Compound Response

Q.29 **The type of immunity in which antibodies are passed from one individual to another is called:**
A) Passive Immunity
B) Artificial Active Immunity
C) Natural Active Immunity
D) Humoral Immunity

Q.30 **To combat the active infections of tetanus, rabies and snakes the _____ method of immunization is used.**
A) Active
B) Humoral
C) Active Artificial
D) Passive

2017

Q.31 **The antibody molecule consists of_____ polypeptide chains:**
A) Eight
B) Four
C) Six
D) Two

Q.32 **_____cells survive for a few days and secrete a huge no of antibodies in blood, tissue fluids or lymph.**
A) Memory cells
B) B-lymphocytes
C) T-lymphocytes
D) Plasma cells

Q.33 **The intermediate protection from infection of snake bite can be obtained by:**
A) Active Immunity
B) Natural active immunity
C) Passive immunity
D) Vaccination

2017 Re-Take

Q.34 **How many polypeptide chains are present in an typical antibody structure?**
A) 1
B) 2
C) 3
D) 4

Q.35 **Vaccination is:**
A) Natural active immunity
B) Natural passive immunity
C) Artificial active immunity
D) Artificial passive immunity

2018

Q.36 **In immunoglobulins/antibodies, two light chains and two heavy chains are linked to each other by?**
A) Covalent bonds
B) Hydrogen bonds
C) Disulphide bonds
D) Ionic bonds

Q.37 **Cell mediated immune response is given by:**
A) Neutrophils
B) T-lymphocytes
C) Macrophages
D) B-lymphocytes

Q.38 **Anti-venom given after a snake bite venom is an example of:**
A) Artificial active immunity
B) Natural active immunity
C) Artificial passive immunity
D) Natural passive immunity

2019

Q.39 **Now-a-days every new born gets regular shots of vaccine for polio. It contains _____ for polio to make a child immune against this disease.**
A) Antisera
B) Antibodies
C) Antibiotics
D) Antigens

Q.40 **A person got an infection, he became ill but then he survived. What do you think which type of immunity he would have developed?**
A) Naturally induced active immunity
B) Artificially induced active immunity
C) Active immunity
D) Passive immunity

ANSWER KEY

TOPIC-WISE MCQs

1	A	11	C	21	D	31	A
2	A	12	D	22	D	32	A
3	C	13	C	23	A	33	A
4	A	14	C	24	B	34	C
5	D	15	B	25	A		
6	C	16	D	26	A		
7	D	17	C	27	B		
8	D	18	B	28	A		
9	B	19	C	29	D		
10	A	20	C	30	D		

PAST PAPERS MCQs

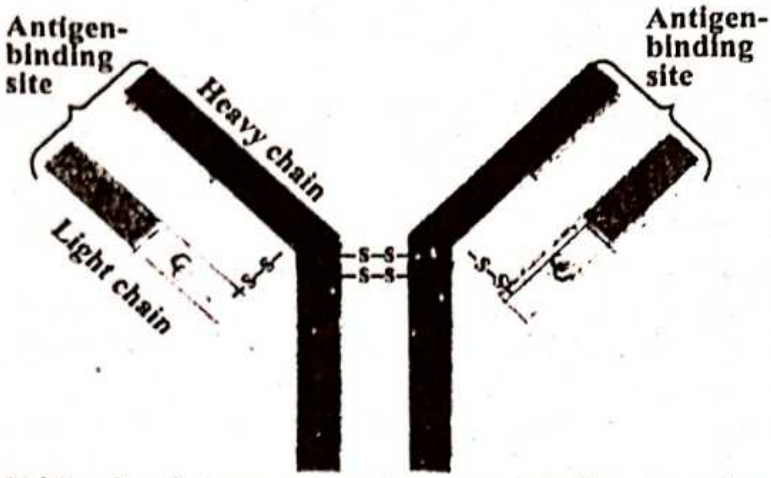
1	D	11	B	21	B	31	B
2	D	12	B	22	D	32	D
3	A	13	A	23	C	33	C
4	C	14	B	24	D	34	D
5	D	15	D	25	D	35	C
6	A	16	D	26	A	36	C
7	D	17	C	27	D	37	B
8	A	18	D	28	B	38	C
9	C	19	A	29	A	39	D
10	A	20	B	30	D	40	A

EXPLANATORY NOTES

TOPIC-WISE MCQs

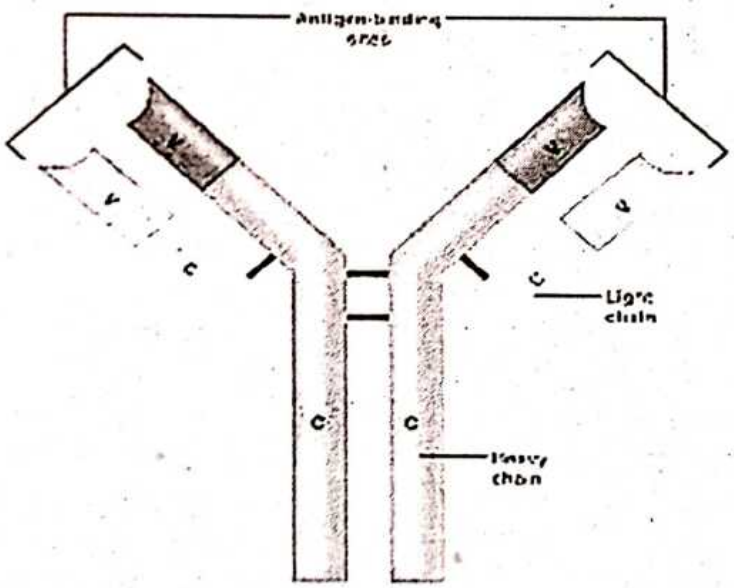
1. Recognition of antigen is important in both types of responses. However tissue rejection is a cell mediated response; on the other hand production of antibodies and plasma clone formation is achieved by cell humoral response.
2. Antigen entry to body restricted first by physical or chemical barrier, if barrier unable for this then 2nd line of defense (phagocytes) will activate to remove them.
3. Spleen is largest lymphoid organ in body.
4. Process of body that provides resistance to infectious agents or toxins is called immune system, while the study of body defense mechanism is called immunology.
5. Myoglobin is actually muscles haemoglobin use for oxygen storage and transformation to muscles. It has no role in immunity.
6. Immune system comprises of B and T-lymphocytes that provide immunity by producing antibodies or different types of other chemical substances that will form 3rd line of defense.
7. Immune system comprises of 3rd line of defense that forms by lymphocytes, and it is specific type of immunity because against specific antigen specific antibodies are produce by lymphocytes. Monocytes are included in 2nd line of defense, which produce nonspecific immune response.
8. For immunity purpose, antibodies or immunoglobulin are produced by all vertebrates which protect them against pathogens.
9. Any foreign substance which induces an immune response in the body of organism especially by producing antibodies
10. Antigen is a toxin or other foreign substance which induces an immune response in the body, especially the production of antibodies.
11. The main component of the extracellular fluid is the interstitial fluid that bathes cells. Extracellular fluid is the internal environment of all multi-cellular animals, and in those animals with a blood circulatory system a proportion of this fluid is blood plasma and interstitial fluid is also known as transition state between blood and lymph.
12. Hemoglobin mobilization is the function of blood and heart that comes under circulatory system.
13. HIV is dangerous because the virus destroys the cells of immune system. HIV replicates within helper T-lymphocytes and destroys them.
14. Specific immunity is the result of 3rd line of defense which includes lymphocytes.
15. Phagocytes are type of cell 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.
16. Skin, HCl and mucous are examples of barriers which constitute 1st line of defense while antibodies produced by lymphocytes which belongs to 3rd line of defense.
17. Immune system comprises of B & T –lymphocytes that provide immunity by producing antibodies or different types of other chemical substances that will form 3rd line of defense.

18.



19. An antibody (Ab), 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.

20. As we can see antigen binding sites are present on variable region of both heavy and light chains.



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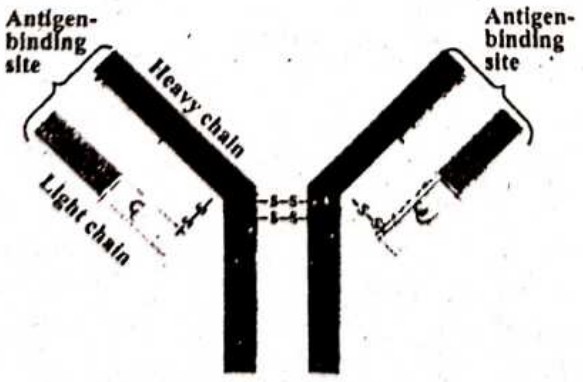

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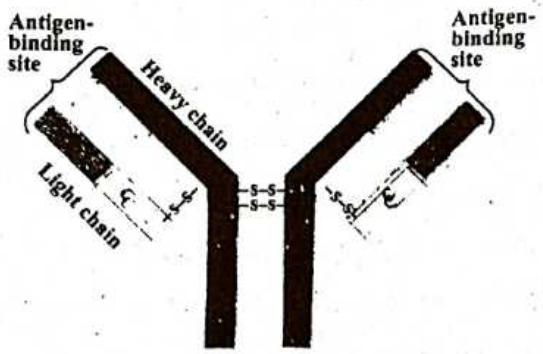

23. In humoral immune response B-lymphocytes proliferate and form plasma clone cell and memory cells. Plasma clone cells produce antibodies which phagocytose an antigen or neutralize toxins produced by pathogens.

24. 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.

25. Cell mediated immune response is a type of response in which antibodies does not involve. This type of immune response is actually due to involvement of T-lymphocytes and produce different types of chemical substance (cytokines) in response to antigen.

26. 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.

27. 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.

28. 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.

29. In passive immunization we inject antibodies in the body; body does not make its own antibodies.

30. Anti-venom serum is actually antisera, containing antibodies against specific type of antigens. These antibodies are injected to body after antigen entry, for immediate action. This type of immunity is called artificial passive immunity.

31. Tetanus vaccine, also known as tetanus toxoid, is an inactive vaccine used to prevent tetanus. It is considered as artificial active immunity.

32. Artificially acquired active immunity can be induced by a vaccine, (a substance that contains antigen). A vaccine stimulates a primary response against the antigen without causing symptoms of the disease.

33. Vaccine is prepared by using a microorganism that shows association to disease. Antigen use to prepare vaccine may be weakened or killed. It will provide active acquired immunity against a particular disease.

34. Vaccines have been prepared against different types of bacterial and viral infections, but there is not any vaccine against fungus still discovered.

PAST PAPER MCQs

1. Transplant rejection occurs when transplanted tissue is rejected by the recipient's T-cells, which destroys the transplanted tissue.

2. The function of the T-cells within the thymus is to undergo the selection and maturation process that turns them into immune system components.

3. The mucosal immune system provides three main functions: serving as the body's first line defense from antigens and infection, preventing systemic immune responses to commensal bacteria and food antigens, and regulating appropriate immune responses to pathogens encountered on a daily basis.

4. 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 antigens.

5. Passive immunity is provided when a person is given antibodies to a disease rather than producing them through his or her own immune system. A newborn baby acquires passive immunity from its mother through the placenta.

6. Passive immunization is used when there is a high risk of infection and insufficient time for the body to develop its own immune response, or to reduce the symptoms of ongoing or immune-suppressive diseases.

7. Antibodies are produced by specialized white blood cells called B-lymphocytes. When an antigen binds to the B-cell surface, it stimulates the B-cell to divide and mature into a group of identical cells called plasma cell clone. The plasma clone cells secrete millions of antibodies into the bloodstream and lymphatic system.

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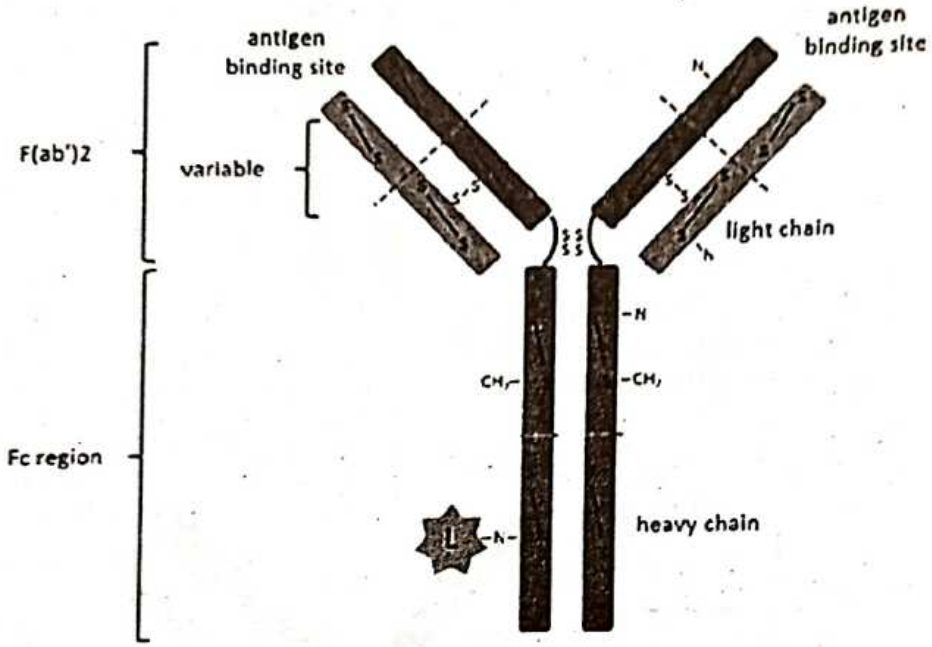
9. The function of the T-cells within the thymus is to undergo the selection and maturation process that turns them into immune system components.

10. The first line of defense includes physical and chemical barriers that are always ready and prepared to defend the body from infection. Physical barriers include skin, and mucous membrane while chemical barriers include Sweat, mucus, tears, and saliva all contain enzymes that kill pathogens.

11. Snake enter venome during its attack on humans, which may be fatal. So in order to save life, anti-snake venome antibodies are injected which provide passive immunity.

12.



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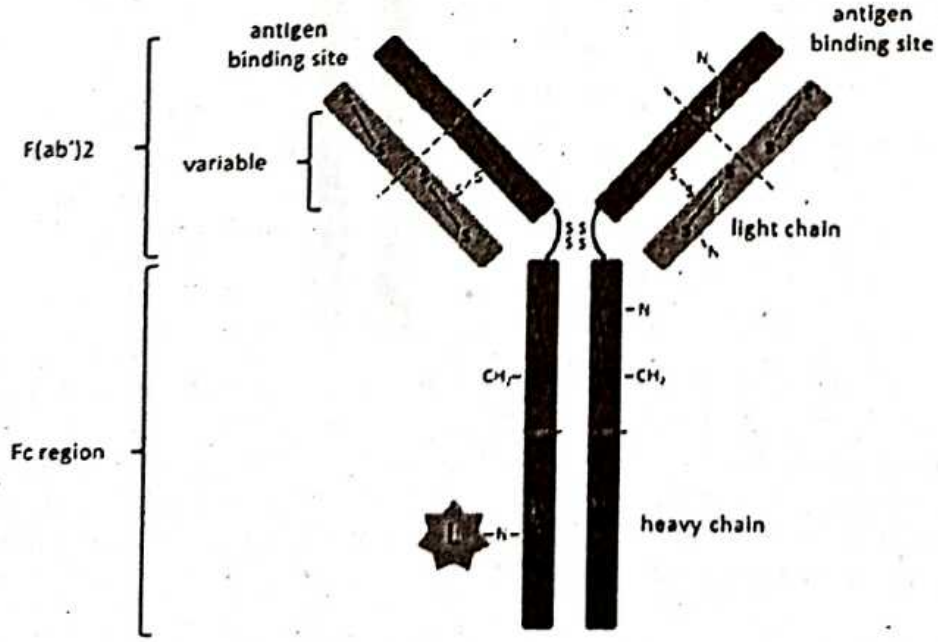

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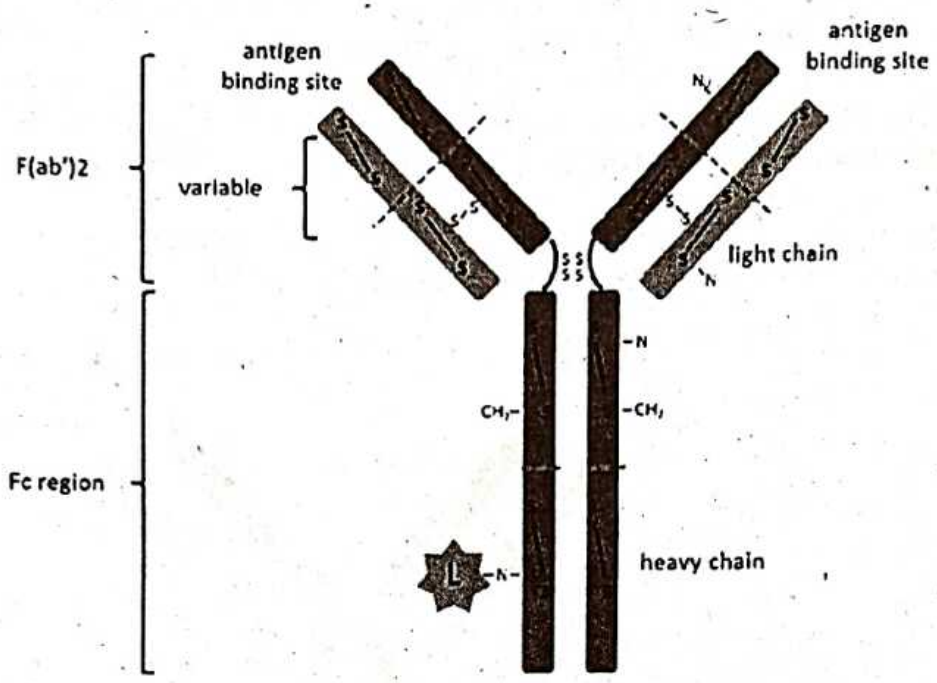
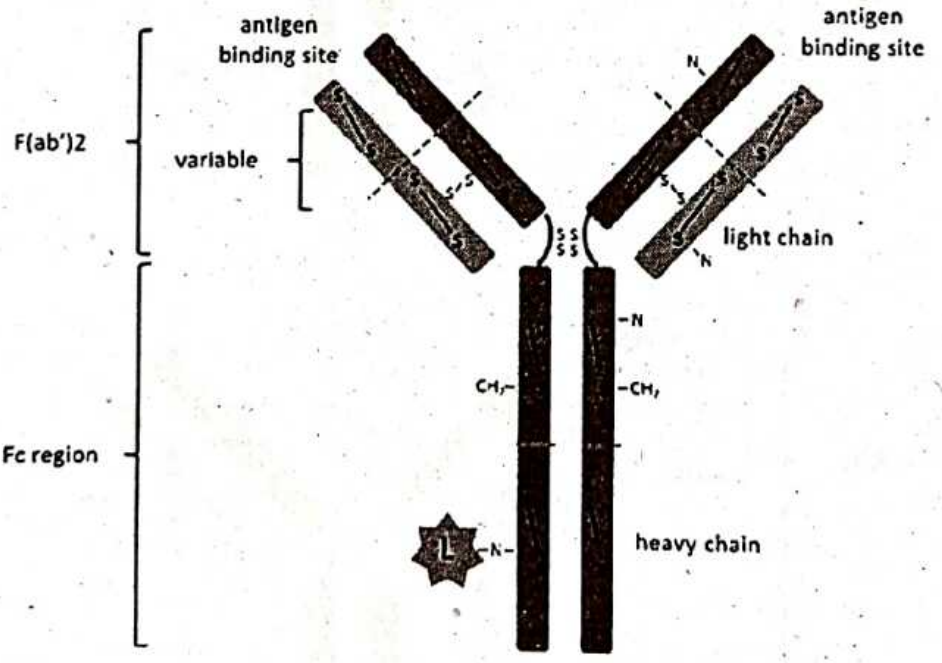


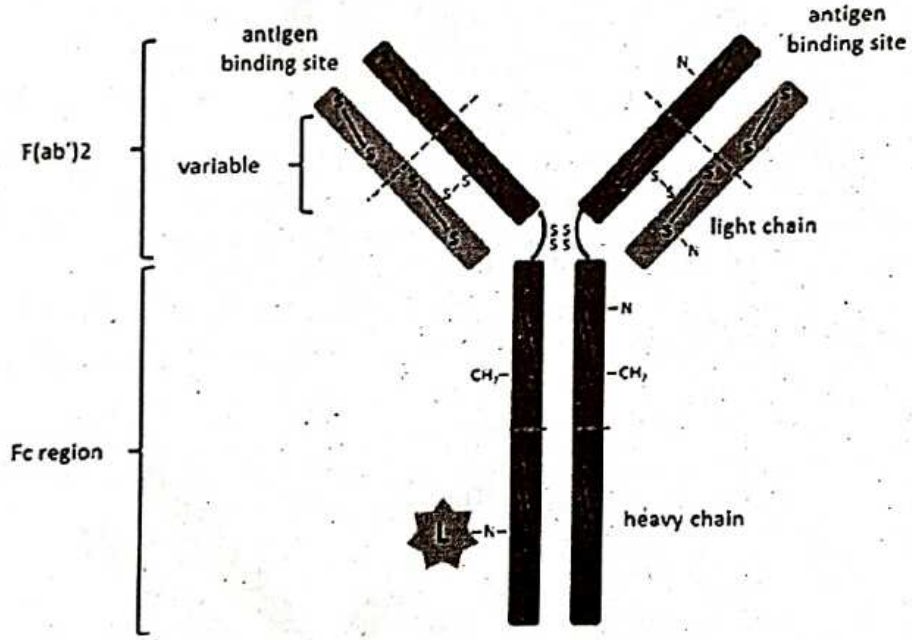
15. Passive immunity is provided when a person is given antibodies/immunoglobulins to a disease rather than producing them through his or her own immune system.

16.



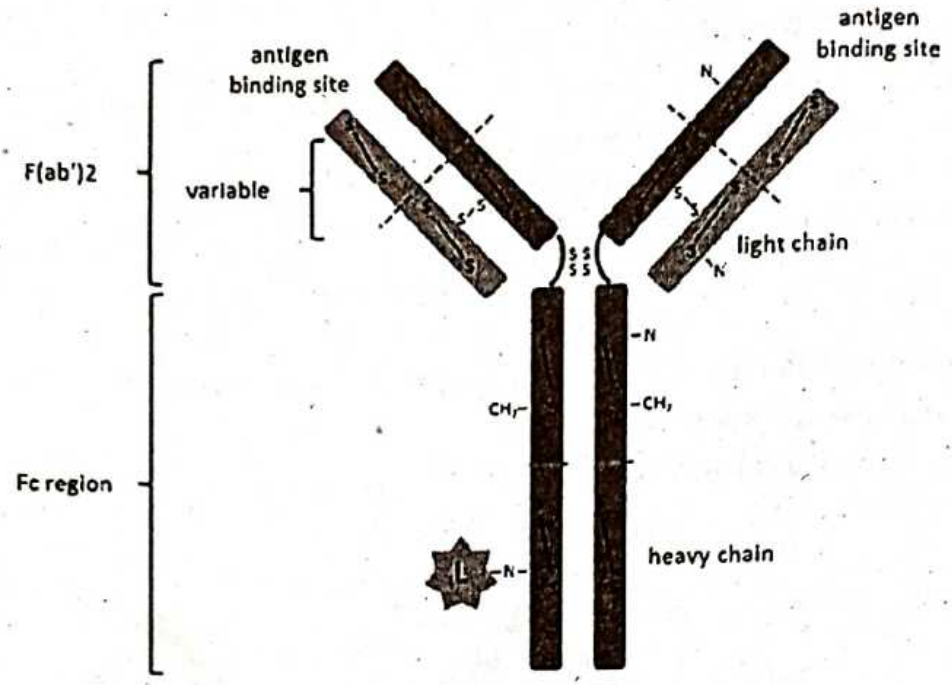
17. The thymus is a specialized primary lymphoid organ of the immune system. Within the thymus, T cells mature. The thymus is made up of immature T cells called thymocytes, as well as lining cells called epithelial cells which help the thymocytes develop.
18. Antibodies are globular proteins and are composed of four polypeptide chains.
19. Transplant rejection occurs when transplanted tissue is rejected by the recipient's T-cells. which destroys the transplanted tissue.

20. Passive immunity is provided when a person is given antibodies to a disease rather than producing them through his or her own immune system.
21. In birds, the bursa of Fabricius is the site of hematopoiesis, a specialized organ that is necessary for B cell development in birds.
22. The lymphatic vessels of the small intestine which absorb digested fats are called lacteals.
23. The humoral immune response is mediated by antibody molecules that are secreted by plasma cells. Antibodies bind to the pathogen and prevent and the pathogens are said to neutralize.
24. Transplant rejection occurs when transplanted tissue is rejected by the recipient's T-cells, which destroys the transplanted tissue.
25. Passive unity id used against tetanus.
26.



27. Variable number of amino acid sequences in an antibody molecule is found in both heavy and light chains.
28. Humoural 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.
29. Passive immunity is provided when a person is given antibodies to a disease rather than producing them through his or her own immune system.
30. To combat the active infections of tetanus, rabies and snakes the passive immunity method of immunization is used. It is used when there is a high risk of infection and insufficient time for the body to develop its own immune response, or to reduce the symptoms of ongoing or immunosuppressive diseases.

31.



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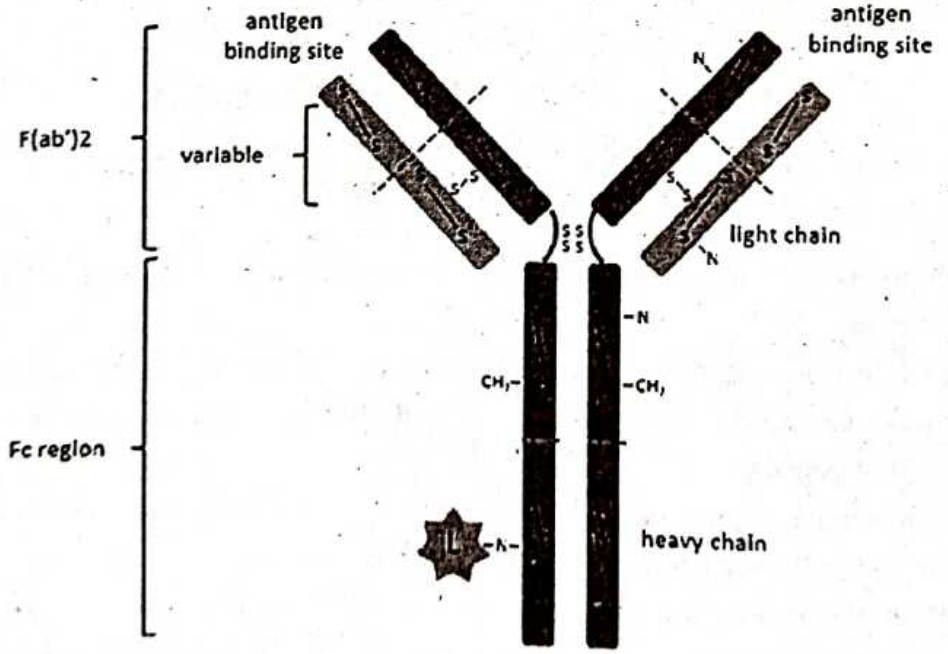
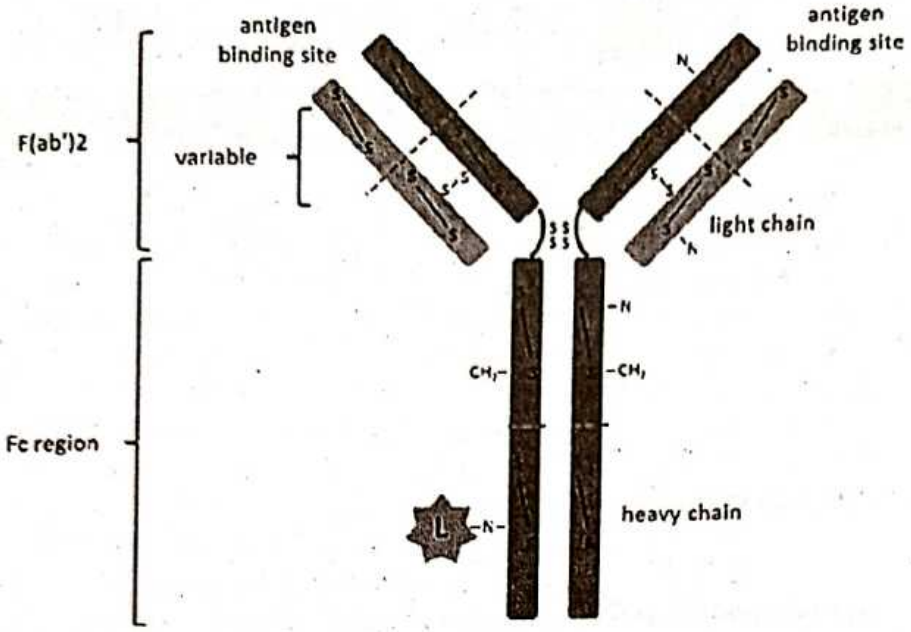


35. Vaccination, also called artificial active immunity, is one of the most effective ways to prevent diseases. A vaccine helps the body's immune system to recognize and fight pathogens.

36.



37. 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 antigen.

38. Snake enter venome during its attack on humans, which may be fatal. So in order to save life, anti-snake venome antibodies are injected which provide artificial passive immunity.

39. Now-a-days every new born gets regular shots of vaccine for polio. It contains antigens for polio to make a child immune against this disease.

40. If a person got an infection, he became ill but then he survived, then he/she will develop natural active immunity along with immune memory.

11 TOPIC HOMEOSTASIS

PRACTICE EXERCISE

TOPIC-WISE MCQs

HOMEOSTASIS

Q.1 Which of the following is homeostasis?

A) Osmoregulation
B) Maintenance of temperature
C) Elimination of wastes
D) All A,B,C

Q.2 Important components of mechanism of homeostatic regulation are:

A) Receptors, control center and effectors
B) Sensory, motor and associative neurons
C) CNS, peripheral nervous system and diffused nervous system
D) Cerebrum, cerebellum and pons

Q.3 Osmoregulation is the regulation of:

A) Water only
B) Organic solutes only
C) Inorganic solutes only
D) Water, organic and inorganic solutes

Q.4 Body functions which are controlled through feedback mechanism are mostly:

A) Negative
B) Delayed
C) Positive
D) Rapid

Q.5 Ability of an organism to regulate its fluid contents is:

A) Osmoregulation
B) Thermoregulation
C) Excretion
D) Homeostasis

Q.6 Ureotely and uricotely are actually adaptations to:

A) Conserve water
B) Remove ammonia
C) Conserve urea and uric acid
D) Remove water

THERMOREGULATION IN MAMMALS

Q.7 Decreasing body temperature due to cold surroundings stimulates hypothalamus that for the purpose of heat conservation causes:

A) Vasodilation at skin
B) Vasoconstriction at skin
C) Vasoconstriction at abdomen
D) No change to blood vessels

Q.8 Animals that produce least metabolic heat as compared to others are grouped under:

A) Endotherms
B) Ectotherms
C) Heterotherms
D) Homeotherms

Q.9 Thermorgulatory adaptation in baby mammals specifically associated with rapid heat generation is:

A) Shivering Thermogenesis
B) Non-shivering Thermogenesis
C) Vasodilation and vasoconstriction
D) Brown fat

Q.10 Shivering thermogenesis is which type of adaptations?

A) Structural
B) Behavioral
C) Physiological
D) Histological

Q.11 Which of the following is not a structural adaptation for temperature regulation in animals?

A) Skin
B) Pelage
C) Plumage fluffing
D) Modified lungs for panting

HUMAN URINARY SYSTEM

Q.12 Which blood vessel enters the kidney?
A) Afferent arteriole
B) Efferent arteriole
C) Renal artery
D) Aorta

Q.13 Nitrogenous wastes in our body are the metabolic products of:
A) Proteins
B) Vitamins
C) Carbohydrates
D) Lipids

Q.14 Urea is detoxified form of:
A) Proteins
B) Amino acids
C) Ammonia
D) Creatinine

Q.15 Initial filtering component of a nephron is:
A) Collecting duct
B) Renal corpuscle
C) Renal tubule
D) Renal pelvis

Q.16 Which of the following is occurring at Bowman's capsule?
A) Secretion of Na^+
B) Ultra-filtration
C) Counter current mechanism
D) Reabsorption of useful materials

Q.17 All nephrons have _____ in renal cortex.
A) Loop of Henle
B) Collecting duct
C) Renal corpuscle
D) Vasa recta

Q.18 System that has main role in filtering liquid waste from blood is:
A) Lymphatic system
B) Circulatory system
C) Urinary system
D) Digestive system

Q.19 In human kidneys,which of the following process does not occur?
A) Deamination
B) Ultrafiltration
C) Reabsorption
D) Tubular secretion

Q.20 Renal artery is the branch of:
A) Ascending aorta
B) Common iliac artery
C) Descending abdominal aorta
D) Arch of aorta

Q.21 Highly concentrated portion of the kidney is:
A) Inner medulla
B) Outer medulla
C) Inner cortex
D) Outer cortex

Q.22 When a person eats a meal with high contents of salts, then:
A) Dilute urine volume increases
B) Water reabsorption increases
C) Concentrated urine volume increases
D) Salt absorption increases

Q.23 When pH of blood is increased than normal value, nephron responds by:
A) H^+ secretion is increased
B) HCO_3^- secretion is decreased
C) Na^+ secretion is suppressed
D) H^+ secretion is suppressed

Q.24 Which of the following hormone is produced by kidneys?
A) Erythropoietin
B) Aldosterone
C) Epinephrine
D) ADH

Q.25 The reabsorption of water in collecting ducts is under the control of:
A) Parathormone
B) Cortisol
C) Oxytocin
D) ADH

Q.26 The ascending limb of loop of Henle is permeable for:
A) Ammonia
B) Na^+
C) Glucose
D) Water

Q.27 Which of the following is normal component of glomerular filtrate but absent in urine?
A) Water
B) Glucose
C) Salts
D) Urea

Q.28 Lower water level is detected by osmo-receptors in brain which results in the release of:
A) Aldosterone
B) ACTH
C) ADH
D) TSH

Q.29 The processing of filtrate takes place at/in:
A) Renal corpuscle
B) Renal hilus
C) Collecting duct
D) Renal tubule

Q.30 ADH is released into blood from:
A) Anterior pituitary lobe
B) Posterior pituitary lobe
C) Hypothalamus
D) Thalamus

Q.31 It is not involved in production of concentrated urine:
A) Counter-current flow
B) High medullary osmolarity
C) Juxtamedullary nephrons
D) Cortical nephron

Q.32 It is a sequence that correctly traces the path of urine after it leaves the kidneys:
A) Ureters→ urinary bladder→ urethra
B) Urinary bladder→ ureters→ urethra
C) Urethra→ urinary bladder→ ureters
D) Urinary bladder→ urethra→ ureters

Q.33 Outermost covering of kidney is:
A) Renal cortex
B) Renal medulla
C) Renal capsule
D) Renal hilus

Q.34 If body weight of a person is 70kg, then weight of a kidney will be:
A) 07Kg
B) 0.70Kg
C) 0.35Kg
D) 3.5Kg

Q.35 Sphincter muscles are located near the junction of:
A) Pelvis and ureter
B) Ureter and urinary bladder
C) Urinary bladder and urethra
D) Ureter and urethra

Q.36 It makes kidney interstitium more concentrated:
A) ADH
B) Aldosterone
C) Oxytocin
D) Cortisol

Q.37 Urine leaves the body from bladder through a tube called:
A) Collecting tube
B) Ureters
C) Urethral orifice
D) Urethra

Q.38 A desert animal will most probably excrete nitrogen in the form of:
A) Ammonia
B) Amino acids
C) Urea
D) Uric acid

Q.39 Maximum amount of water which can be conserved by the human kidneys is:
A) 90. 5%
B) 99.1%
C) 95.9%
D) 99.5%

Q.40 In nephron, highest concentration of amino acids can be found in:
A) Proximal tubule
B) Collecting tubule
C) Distal tubule
D) Loop of Henle

Q.41 Urinogenital duct is another name used for:
A) Ureter in male
B) Ureter in female
C) Urethra in female
D) Urethra in male

Q.42 All of the following functions are performed by kidneys except:

A) Help in blood cell formation
B) Hormone production
C) Maintaining acid base balance
D) Ammonia production

Q.43 Which part of the nephron is affected in renal failure?

A) Distal convoluted tubule
B) Proximal convoluted tubule
C) Collecting duct
D) Renal corpuscle

Q.44 It will stimulate ADH secretion:

A) Hypotonic environment
B) Isotonic environment
C) Hypo-osmotic environment
D) Hypertonic environment

Q.45 Trace the pathway of water reabsorbed by ADH:

A) Blood → kidney interstitium → lymph
B) Lymph → blood → kidney interstitium
C) Blood → lymph → kidney interstitium
D) Kidney interstitium → lymph → blood

Q.46 Four metabolic processes are listed below:

1- Synthesis of plasma proteins

2- Regulation of fat metabolism

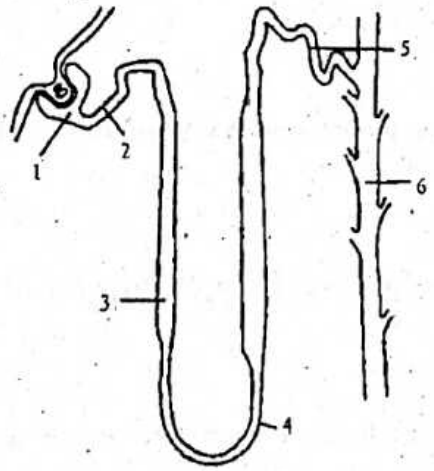
3- Storage of vitamin A

4- Synthesis of digestive enzymes

Which of these are functions of the liver?

A) 1, 2 and 3 only
B) 1, 3 and 4 only
C) 1, 3 and 4 only
D) 2, 3 and 4 only

Q.47 The diagram represents a nephron:



Where does ADH affect the permeability of membranes to reabsorb water?

A) 1 and 2
B) 2 and 3
C) 3 and 4
D) 5 and 6

Q.48 Podocytes are found in:

A) Glomerulus
B) Bowman's capsule
C) PCT
D) DCT

Q.49 Nitrogenous wastes in body are generally produced during metabolism of:

A) Long chain carbohydrates
B) Energy rich nutrients
C) Genetic material
D) Saturated fatty acids

Q.50 The reabsorption of glucose from the glomerular filtrate occurs at:

A) Bowman's capsule
B) Proximal convoluted tubule
C) Loop of Henle
D) Distal convoluted tubule

Q.51 Urine is collected in the central cavity of the kidney called:

A) Renal hilus
B) Ureter
C) Renal pelvis
D) Renal medulla

Q.52 Bowman's capsule is found around a ball of _____.

A) Arteriole
B) Nephron
C) Capillaries
D) Tubules

Q.53 Following is not a function of kidney:

A) pH balance
B) Control of blood pressure
C) Stimulation of RBC formation
D) Storage of wastes

Q.54 During urine formation, maximum water reabsorption occurs at:

A) Collecting tube
B) Loop of Henle
C) Proximal convoluted tubule
D) Distal convoluted tubule

Q.55 The process that pushes out water and other dissolved materials from blood in the glomerulus inside the Bowman's capsule:

A) Dialysis
B) Secretion
C) Filtration
D) Reabsorption

Q.56 Under normal conditions, which one is completely reabsorbed in the renal tubule?

A) Urea
B) Uric acid
C) Salts
D) Glucose

Q.57 Reabsorption of useful substances from glomerular filtrate mainly occurs in:

A) Collecting tube
B) Loop of Henle
C) Proximal convoluted tubule
D) Distal convoluted tubule

Q.58 Metabolism of which of the following mainly results in the production of urea?

A) Nucleic acids
B) Palmitic acid
C) Creatine phosphate
D) Amino acids

PAST PAPER MCQs

2009

Q.1 A central cavity of the kidney where urine is collected after filtration is known as:

A) Ureter
B) Pelvis
C) Urethra
D) Urinary Bladder

Q.2 Aldosterone plays role in:

A) Transport of water
B) Transport of K+ ions into kidney
C) Uptake of sodium in loop of Henle
D) Reabsorption of water

2010

Q.3 The muscles that control urine in bladder are known as:

A) Striated muscles
B) Smooth muscles
C) Sphincter muscles
D) Circular muscles

2011

Q.4 Reabsorption of water by counter current multiplier mechanism takes place at:

A) Proximal Tubule
B) Distal Tubule
C) Collecting Duct
D) Loop of Henle

Q.5 Antidiuretic hormone helps in reabsorption of water by changing permeability of:

A) Proximal Tubule
B) Distal Tubule
C) Collecting Duct
D) Loop of Henle

Q.6 Aldosterone helps in conservation or active absorption of:

A) Sodium
B) Calcium
C) Potassium
D) Bicarbonate ions

Q.7 Maximum reabsorption takes place in which part of the nephron?

A) Distal tubule
B) Villi
C) Cortical tissue
D) Proximal tubule

2012

Q.8 In nephron, most of the reabsorption takes place in the:

A) Distal tubule
B) Proximal tubule
C) Ascending limb
D) Descending limb

Q.9 Blood enters the glomerulus through:

A) Efferent arteriole
B) Afferent arteriole
C) Renal artery
D) Renal vein

Q.10 Which portion of nephron is under the control of ADH?

A) Bowman's capsule
B) Ascending arm
C) Distal and collecting ducts
D) Descending arm

Q.11 Detection of change and signaling for effector's response to the control system is a:

A) Negative feedback
B) Positive feedback
C) Inter-coordination
D) Feedback mechanism

Q.12 What are three components of mechanism of homeostatic regulations?

A) Receptors, control center and effectors
B) Sensory, motor and associative neurons
C) CNS, PNS and diffused nervous system
D) Cerebrum, cerebellum and pons

2013

Q.13 The process through which the body maintains the internal environment from the harms of fluctuations in an external environment is called as:

A) Behavior of organisms
B) Adaptation
C) Thermoregulation
D) Homeostasis

Q.14 Site of filtration in nephron is:
A) Glomerulus and Bowman's capsule
B) Proximal and distal end
C) Ascending and descending arm
D) Loop of Henle

Q.15 Antidiuretic hormone increases the reabsorption of:
A) Amino acids
B) Salts
C) Ammonia
D) Water

Q.16 Active uptake of_____ in the ascending limb or thick loop of Henle is promoted by the action of aldosterone:
A) K^+
B) Cl^-
C) Ca^{++}
D) Na^+

Q.17 Active pumping out of Na^+ occurs at which part of nephron?
A) Proximal tubule
B) Descending loop of Henle
C) Ascending loop of Henle
D) Collecting duct

2014

Q.18 Which one of the following is the main nitrogenous waste product in humans?
A) Urea
B) Ammonia
C) Salts
D) Uric acid

Q.19 Which one of the following is responsible for the production of concentrated urine?
A) Juxtamedullary nephrons
B) Cortical nephrons
C) Proximal tubule
D) Distal tubule

Q.20 Reabsorption of useful constituents normally takes place in which one of the following?
A) Proximal tubule
B) Distal tubule
C) Bowman's capsule
D) Glomerulus

Q.21 Which one of the following parts of excretory system in humans acts as countervcurrent multiplier?
A) Kidney
B) Cortex
C) Medulla
D) Loop of Henle

Q.22 Anti-Diuretic Hormone (ADH) is released from:
A) Anterior pituitary lobe
B) Posterior pituitary lobe
C) Hypothalamus
D) Thalamus

2015

Q.23 Those nephrons which are present along the border of the cortex and medulla are called:
A) Juxtamedullary nephrons
B) Cortical nephrons
C) Internal nephrons
D) Outer nephrons

Q.24 When water is in short supply, increased water retention occurs through the:
A) Cortical nephrons
B) Proximal convoluted tubule
C) Juxtamedullary nephrons
D) The tissue of cortex

Q.25 In nephrons, counter-current multiplier occurs at:
A) Loop of Henle
B) Collecting Duct
C) Bowman's capsule
D) Glomerulus

Q.26 Ascending loop of Henle does not allow outflow of:
A) Na^+ ions
B) K^+ ions
C) Cl^- ions
D) Water

Q.27 A larger quantity of dilute urine is produced in diabetes insipidus. This disease is due to the deficiency of:
A) Antidiuretic Hormone
B) Aldosterone
C) Thyroxin
D) Cortisol

2016

Q.28 The removal of metabolic wastes from the blood is called:
A) Thermoregulation
B) Osmoregulation
C) Kidney Failure
D) Excretion

Q.29 Bowman's capsule continues as an extensively convoluted portion known as:
A) Peritubular capillaries
B) Proximal convoluted tubules
C) Efferent arterioles
D) Afferent arterioles

Q.30 The concentration of sodium ions in body fluids is controlled by the hormone:
A) Renin
B) Aldosterone
C) Angiotensin
D) CPK

Q.31 A hormone released from posterior pituitary lobe acts to Actively transport water from filtratein collecting tubules back to kidney is shown as:
A) Renin
B) Antidiuretic hormone
C) Angiotensin
D) Growth Factor

Q.32 Humans have homeostatic thermostat present in a specified portion of the brain that is:
A) Lateral ventricle
B) Thalamus
C) Spinal Cord
D) Hypothalamus

2017

Q.33 Select the part of nephron which is not permeable to water and stops its outflow:
A) Glomerulus
B) Proximal Tubule
C) Ascending loop
D) Descending loop

Q.34 When water content in body becomes high, what will happen?
A) ADH release will be inhibited
B) ADH will be released in large amount
C) Aldosterone will be released
D) Anterior pituitary will produce ADH

Q.35 The major factor in producing hypertonic urine is:
A) Glomerulus
B) Influence of aldosterone
C) ADH influencing on collecting duct
D) Gradual increase in osmolarity from cortex to inner medulla

Q.36 What is the least selective process during urine formation?
A) Reabsorption
B) Pressure filtration
C) Secretion
D) Differential permeability

Q.37 Vessel which carry blood to the glomerulus is called:
A) Efferent arteriole
B) Renal vein
C) Vasa recta
D) Afferent arteriole

2017 Re-take

Q.38 The mechanism of regulation and its environment, of solute and the gain and loss of water is called:
A) Thermoregulation
B) Osmoregulation
C) Excretion
D) Relaxation

Q.39 All of the following are endotherms except:
A) Birds
B) Some fishes
C) Amphibians
D) Flying insects

2018

Q.40 The hormone which controls the uptake of the sodium ions in kidney and its maintenance in blood pressure:
A) Gonadotrophic hormone
B) Somatotropin hormone
C) Thyroxine hormone
D) Aldosterone hormone

Q.41 The capillaries of glomerulus rejoin to form a/an _____.
A) Collecting duct
B) Peritubular capillaries
C) Afferent arteriole
D) Efferent arteriole

Q.42 When nitrationfiltrationis completed the waste products through distal tube of nephrons empties to:
A) Proximal tubules
B) Efferent arterioles
C) Peritubular capillaries
D) Collecting tubules

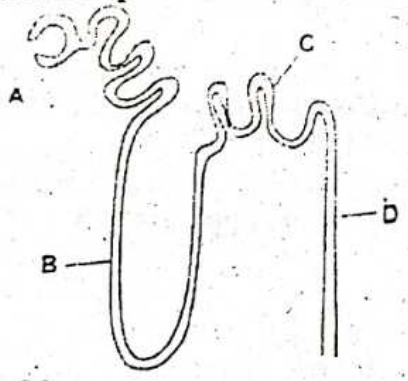
Q.43 Blood solute potential is controlled by following hormone:
A) Vasopressin
B) Thyroxine
C) Epinephrine
D) Estrogen

Q.44 Keeping correct balance of ions and water in our body is called as:
A) Excretion
B) Thermoregulation
C) Osmoregulation
D) Selective reabsorption

2019

Q.45 The main nitrogenous excretory product of humans is:
A) Uric acid
B) Ammonia
C) Urea
D) Ammonium

Q.46 Given below is the diagram of nephron without vascular supply.



What is the name of Part C?
A) Collecting tubule
B) Proximal tubule
C) Distal tubule
D) Loop of Henle

Q.47 The route of urine excretion from kidney to outside of body is:
A) Kidney → ureter → urinary bladder → urethra
B) Urinary bladder → kidney → ureter → urethra
C) Kidney → ureter → urethra → urinary bladder
D) Kidney → urethra → urinary bladder → ureter

Q.48 Substances responsible for increasing the set point of the hypothalamus are called:
A) Pepsin
B) Pyrogens
C) Prions
D) Androgens

ANSWER KEY

TOPIC-WISE MCQs

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

PAST PAPERS MCQs

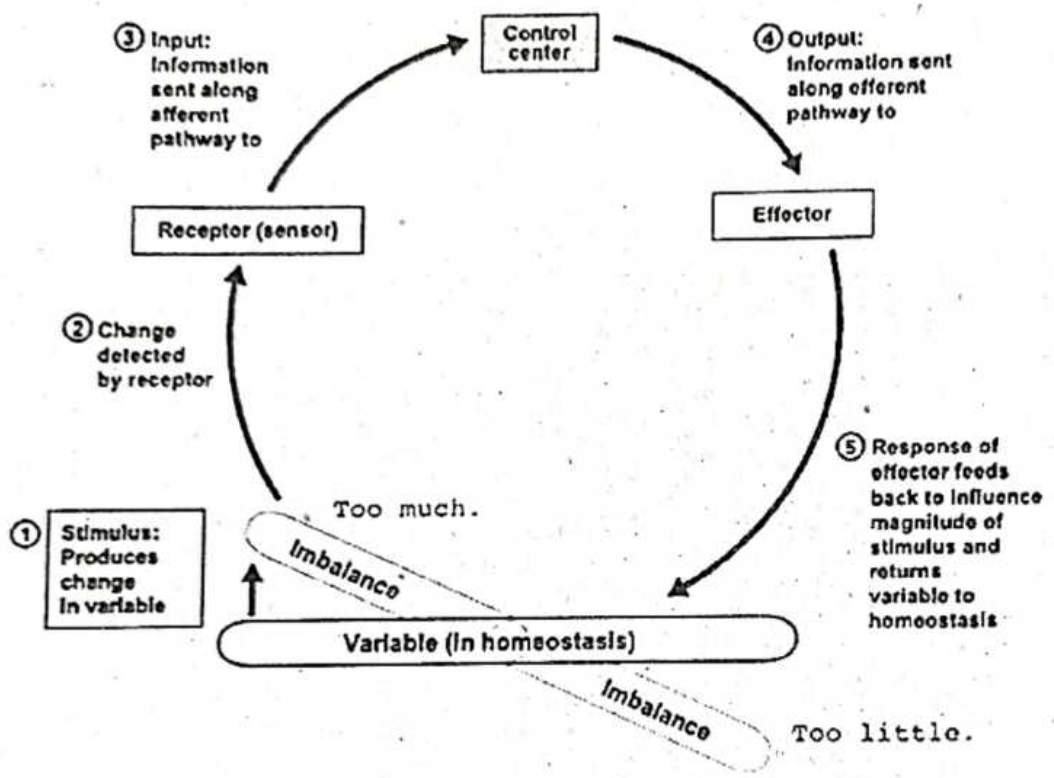
1	B	11	D	21	D	31	B	41	D
2	C	12	A	22	B	32	D	42	D
3	C	13	D	23	A	33	C	43	A
4	D	14	A	24	C	34	A	44	C
5	C	15	D	25	A	35	D	45	C
6	A	16	D	26	D	36	B	46	C
7	D	17	C	27	A	37	D	47	A
8	B	18	A	28	D	38	B	48	B
9	B	19	A	29	B	39	C		
10	C	20	A	30	B	40	D		

EXPLANATORY NOTES

TOPIC-WISE MCQs

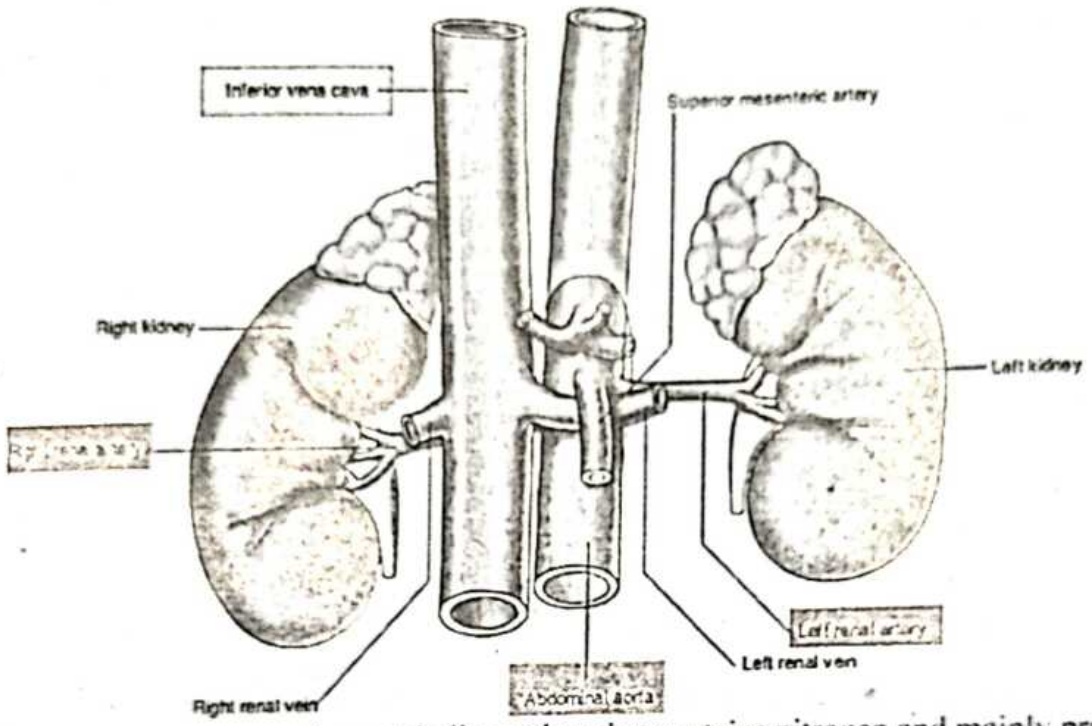
1. The protection of internal environment from the harms of fluctuations in external environment is termed as homeostasis. Most susceptible components of internal environment that may be affected by fluctuations in external environments are water, solutes and temperature.

2.

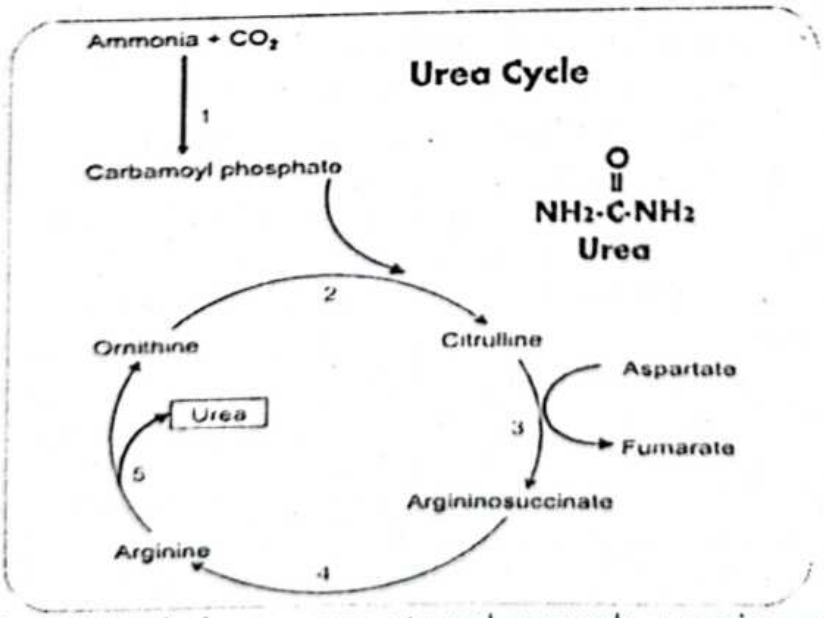


3. Osmoregulation is the regulation of body organic, inorganic solutes and solvent concentration.
4. Feedback mechanism is a type of interaction in which a controlling mechanism is itself controlled by the products of reactions it is controlling. Negative feedback is an inverse response to change in environment e.g. increase in body temperature will stimulate that system which lowers body temperature.
5. Osmoregulation is the regulation of body organic, inorganic solutes and solvent concentration.
6. One gram of nitrogen in the form of ammonia requires 500ml of water to be remove from the body. One gram of nitrogen in the form of urea requires 50ml of water to be removed. Similarly one gram of nitrogen in the form of uric acid requires 1ml of water to be removed from the body.
7. Vasoconstriction occurs at skin which reduces rate of blood flow and also the heat loss.
8. Animals which produce metabolic heat at low level (that is also exchanged with the environment quickly) and absorb heat from surroundings are called ectotherm e.g. most invertebrates, fish, amphibians and reptiles.
9. Some mammals have brown fat, which is specialized for rapid heat production.

10. The rate of heat production is increased by increased muscle contraction by movements or shivering so called shivering thermogenesis.
11. Plumage fluffing is physiological adaptation in animals for thermoregulation.
12.



13. Nitrogenous waste may be metabolic product that contains nitrogen and mainly produce by the metabolism of proteins and nucleic acids.
14.

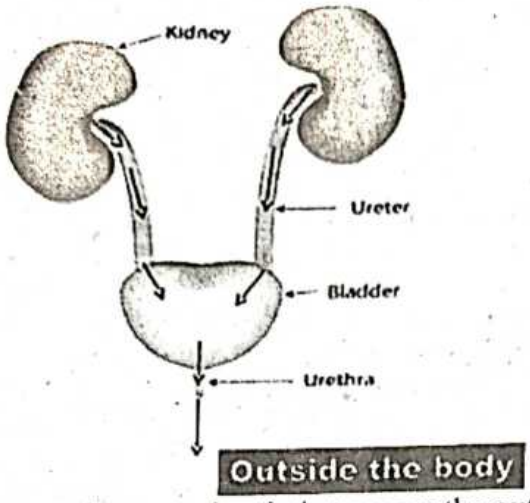


15. The filtration of blood plasma occurs at renal corpuscle comprises of glomerulus and Bowman's capsule, while processing of the filtrate is the function of renal tubules.

16. The Bowman's capsule is the cup-shaped structure that surrounds a cluster of capillaries called the glomerulus. The blood is put under high pressure. Ultra-filtration of the blood happens in which water, ions, glucose and other small molecules pass into the tubule.
17. Renal corpuscle of both types of nephrons e.g. cortical and juxtamedullary nephrons are present in renal cortex while loops of Henle of juxtamedullary nephrons are looping deep into inner medulla.
18. The urinary/renal system has the main role in filtering liquid waste from blood. Lymphatic system has main role in returning of interstitial fluid. Circulatory system is responsible for the transport of nutrients and digestive system has the role in digestion.
19. In human body, deamination primarily takes place in liver. It is the process by which amino acids are broken down if there is an excess of protein intake. This process allows the system to convert excess amino acids into usable resources such as hydrogen and carbon and also plays a vital role in removing nitrogen waste from the body.
20. The renal arteries normally arise off the left interior side of the abdominal aorta, immediately below the superior mesenteric artery, and supply the kidneys with blood.
21. Highly concentrated portion of mammalian kidney is the inner medulla. This hyper-osmotic condition is maintained by urea and Na^+ and helps in H_2O conservation.
22. When a person eats a meal with high salt contents, then absorption of salts from GIT increases, making blood plasma hyper-osmotic. As a result of that, reabsorption of H_2O from kidneys increases due to over-secretion of ADH from posterior pituitary.
23. When pH of blood is increased than normal value e.g. becomes more alkaline, then tubular secretion of H^+ will be suppressed in order to maintain the pH in a narrow range.
24. Erythropoietin is secreted by the kidney in response to cellular hypoxia. It stimulates red blood cell production in the bone marrow.
25. ADH increases reabsorption of water from collecting ducts of the nephrons. Secondly, ADH constricts arterioles and raises arterial blood pressure.
26. The ascending limb of loop of Henle is permeable for Na^+ which is promoted by the action of aldosterone. Ascending limb of loop of Henle is impermeable for water.
27. Glucose is present in normal glomerular filtrate and completely reabsorbed back at PCT.
28. Lower H_2O level is detected by the osmo-receptors located in hypothalamus and releases more ADH which in return reabsorbs more H_2O from nephrons to maintain osmoregulation.
29. The processing of urine is the function of entire renal tubular parts of nephron.
30. ADH is produced by the neuro-secretory cells of hypothalamus and transported to posterior pituitary for storage via axon terminal, from which it release into blood circulation to reabsorb H_2O.
31. Juxtamedullary nephrons are specifically used for the production of concentrated urine via counter current mechanism which uses high medullary osmolarity. Cortical nephrons are, however, used when body is well-hydrated.

32.

Path of urine



33. Renal capsule is a thin membranous sheath that covers the outer surface of each kidney.

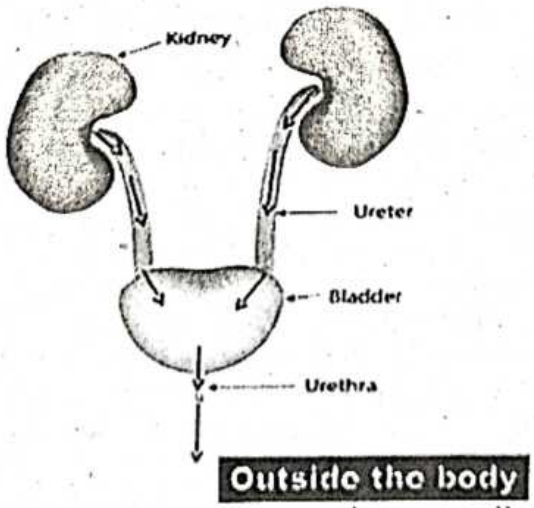
34. Average weight of human kidneys is less than 1% of the total body weight. If weight of human body is 70 Kg then 1% of 70 Kg would be 0.7 Kg for both kidneys and each kidney will be of 0.35 Kg.

35. Sphincter muscles are present near the junction of the urethra and the bladder and control the flow of urine from bladder to urethra.

36. Aldosterone is responsible for active transport of Na^+ from ascending limb of loop of Henle, making kidney interstitium more concentrated.

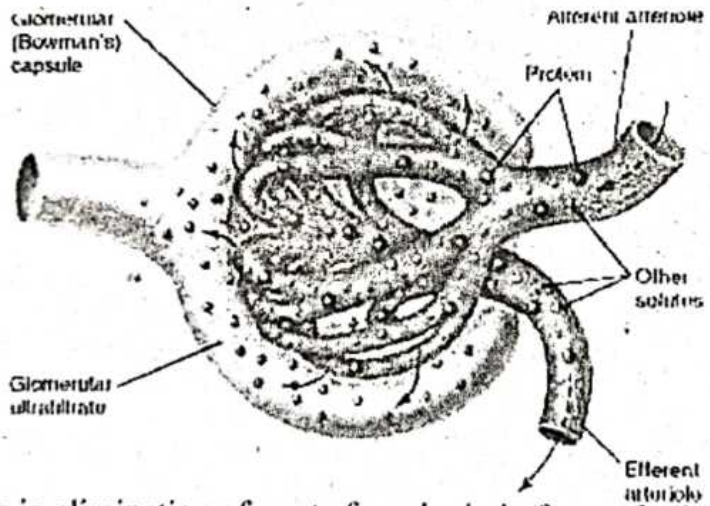
37.

Path of urine



38. As desert animals need to conserve water, so they are called uricotelic and excrete uric acid as main nitrogenous wastes. Because removal of uric acid requires least amount of water as compared to ammonia and urea.

39. Mammalian kidney including human is adapted to conserve water by over 99.5% reabsorption of glomerular filtrate.
40. The highest level of amino acids is found in proximal convoluted tubule and maximum reabsorption also takes place at the same point.
41. Urinogenital duct is another name used for urethra in males because it is common duct for the removal of urine and to transfer sperms into the female body.
42. Kidneys are involved in the production of RBCs via erythropoietin, maintain acid-base balance of the body. Urea/Ammonia production, however, is the function of liver.
43. Damage to the renal corpuscle can lead to renal failure or end stage renal disease.
44. ADH release from posterior pituitary will be stimulated if body fluids are hyperosmotic and ADH in return reabsorbs water from nephrons.
45. Water reabsorbed due to the action of ADH follows the path giving below:
Kidney interstitium → lymph → blood
46. Liver synthesis plasma proteins e.g. albumin, prothrombin and fibrinogen, it also involve in vitamin A storage and synthesis bile for the emulsification of fats in small intestine.
47. ADH release form posterior pituitary when blood osmotic balance is low. It acts on distal part of nephron to absorb H_2O.
48. Podocytes are cells in Bowman's capsule in the kidney that wrap around glomerulus.
49. Nitrogen wastes produce by deamination of amino acids as well as metabolism of nucleic acid.
50. Glucose from blood filtrated out in Bowman's capsule which completely reabsorbed at the level of proximal convulated tubules except diabetes mellitus patients.
51. Urine after formation is collected inside kidney in the central cavity called renal pelvis.
52.



53. Kidneys involve in elimination of waste from body in form of urine.
54. After filtration Bowman's capsule has glomerular filtrate that contains amino acids, glucose, salts, water and waste products. All useful substances including maximum H_2O reabsorb in PCT while remaining H_2O reabsorb in loop of Henle and distil tubule.
55. Filtration is a process in which waste substances come out from blood.
56. After filtration Bowman's capsule has glomerular filtrate that contains amino acids, glucose, salts, water and waste products. All useful substances including maximum H_2O reabsorb in PCT while remaining H_2O reabsorb in loop of Henle and distil tubule.
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58. Proteins after their complete hydrolysis in small intestine enters to blood and move to liver by hepatic portal vein, where de-amination of amino acid occur and form NH_3 which change to urea by urea cycle.

PAST PAPERS MCQs

1. Urine after formation collected inside kidney in the central cavity called renal pelvis.
2. The ascending limb of Loop of Henle is permeable for Na^+ which is promoted by the action of aldosterone. Ascending limb of loop of Henle is impermeable for water.
3. Sphincter muscles are present near the junction of the urethra and the bladder and control the flow of urine from bladder to urethra.
4. Juxtamedullary nephrons are specifically used for the production of concentrated urine via counter current mechanism which occurs at loop of Henle.
5. ADH release form posterior pituitary when blood osmotic balance is low. It acts on distal part of nephron to absorb H_2O.
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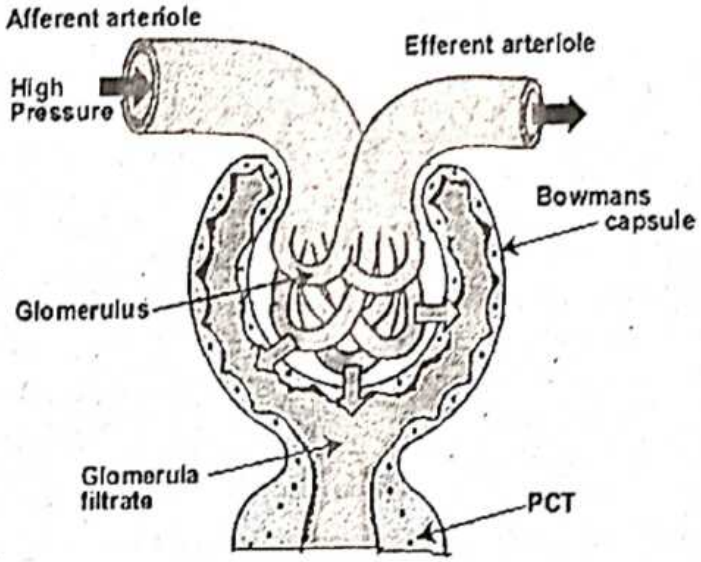
9. 

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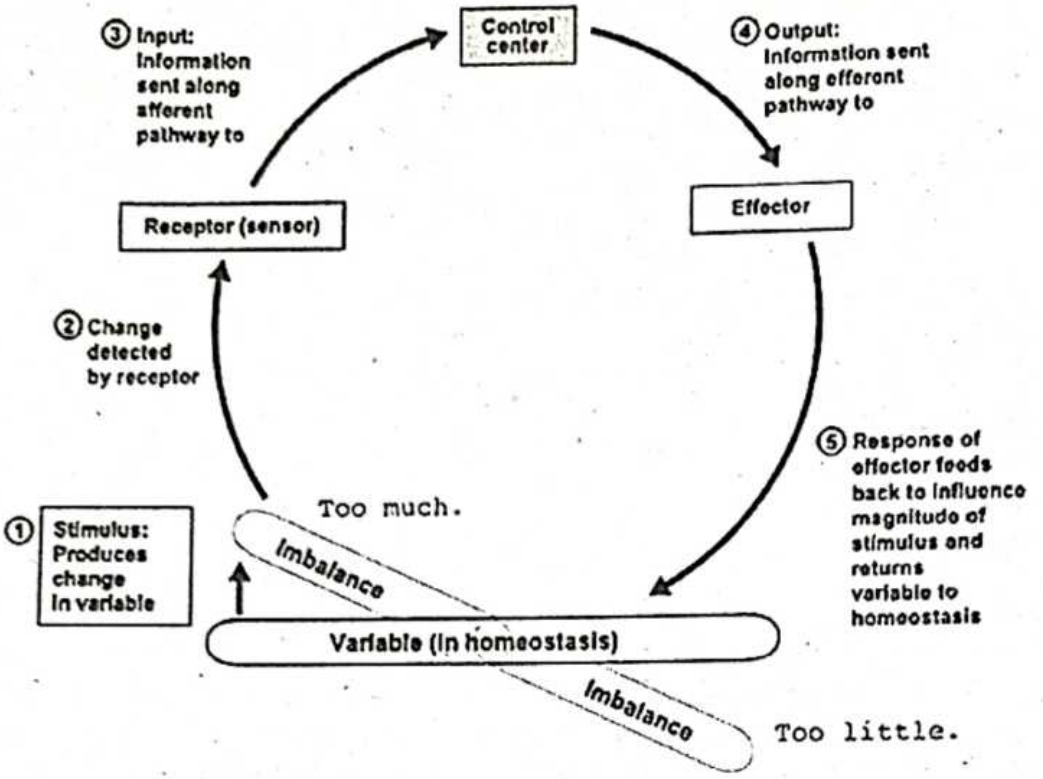

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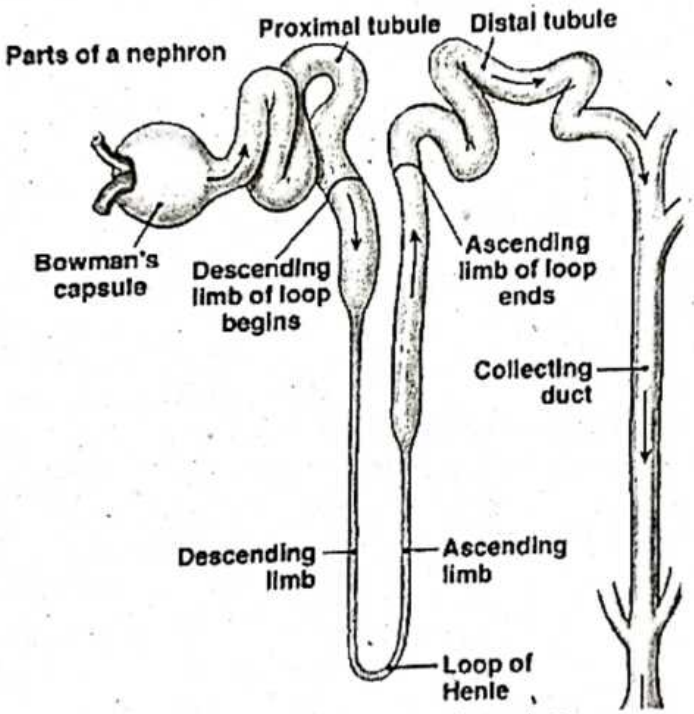
14. The filtration of blood plasma occurs at renal corpuscle comprises of glomerulus and Bowman's capsule, while processing of the filtrate is the function of renal tubules.
15. ADH increases reabsorption of water from collecting ducts of the nephrons. Secondly, ADH constricts arterioles and raises arterial blood pressure.
16. Aldosterone is responsible for active transport of Na^+ from ascending limb of loop of Henle, making kidney interstitium more concentrated.
17. Aldosterone is responsible for active transport of Na^+ from ascending limb of loop of Henle, making kidney interstitium more concentrated.
18. Humans are ureotelic. They excrete urea as the main nitrogen containing excretory product.
19. Juxtamedullary nephrons are specifically used for the production of concentrated urine via counter current mechanism which uses high medullary osmolarity. Cortical nephrons are, however, used when body is well-hydrated.
20. After filtration Bowman's capsule has glomerular filtrate that contains amino acids, glucose, salts, water and waste products. All useful substances including maximum H_2O reabsorb in PCT while remaining H_2O reabsorb in loop of Henle and distil tubule.
21. Juxtamedullary nephrons are specifically used for the production of concentrated urine via counter current mechanism which occurs at loop of Henle.
22. ADH is produced by the neuro-secretory cells of hypothalamus and transported to posterior pituitary for storage via axon terminal, from which it release into blood circulation to reabsorb H_2O.

23. Those nephrons that are present along the border of cortex and medulla, with tubular system looping deep in inner medulla are called juxtamedullary nephrons.
24. Juxtamedullary nephrons are specifically used for the production of concentrated urine via counter current mechanism which uses high medullary osmolarity. Cortical nephrons are, however, used when body is well-hydrated.
25. Juxtamedullary nephrons are specifically used for the production of concentrated urine via counter current mechanism which occurs at loop of Henle.
26. The ascending limb of Loop of Henle is permeable for Na^+ which is promoted by the action of aldosterone. Ascending limb of loop of Henle is impermeable for water.
27. If ADH is absent in the body, dilute urine is formed which causes great thirst and leads to dehydration. It is termed as diabetes insipidus.
28. Excretion is this process of removal of wastes that are produced within a body. There are various organs that help in excretion of such wastes from our body. They are kidney, lungs, skin etc.
29.

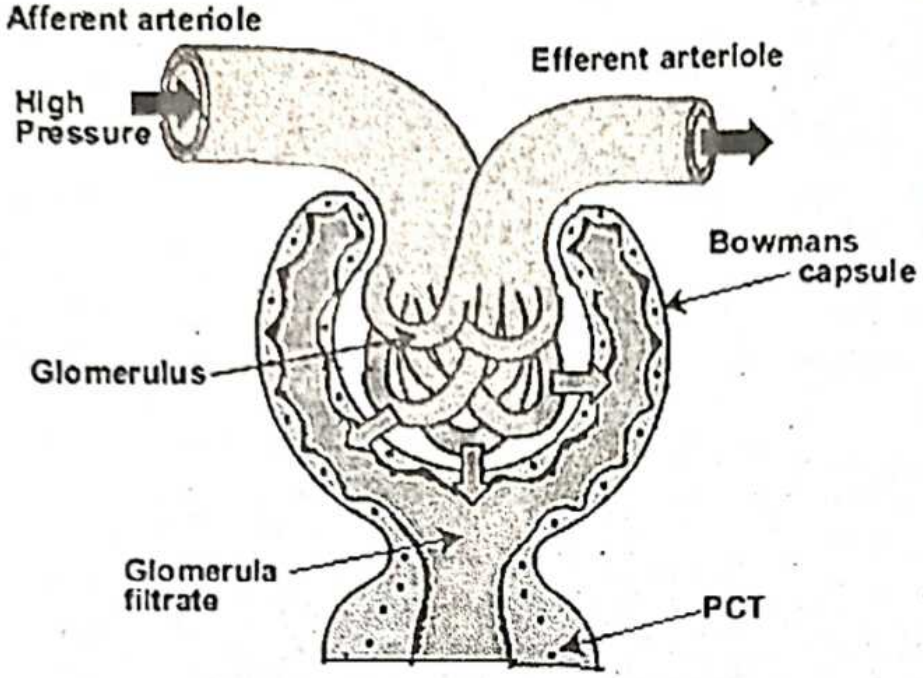


30. Aldosterone is responsible for active transport of Na^+ from ascending limb of loop of Henle, making kidney interstitium more concentrated.
31. ADH increases reabsorption of water from collecting ducts of the nephrons. Secondly, ADH constricts arteriolesand raises arterial blood pressure.
32. The body's temperature control center is the hypothalamus. The hypothalamus is a bit like a thermostat. It works with the autonomic nervous system to track body temperature and keep it in the appropriate range.
33. The ascending limb of Loop of Henle is permeable for Na^+ which is promoted by the action of aldosterone. Ascending limb of loop of Henle is impermeable for water.
34. ADH increases reabsorption of water from collecting ducts of the nephrons. If ADH is limited in quantity then less water will be reabsorbed. As a result dilute urine will be produced.

35. Juxtamedullary nephrons are specifically used for the production of concentrated urine via counter current mechanism which uses high medullary osmolarity.

36. Filtration is a process in which waste substances come out from blood from glomerulus to Bowman's capsule and it is said to be the least selective.

37.

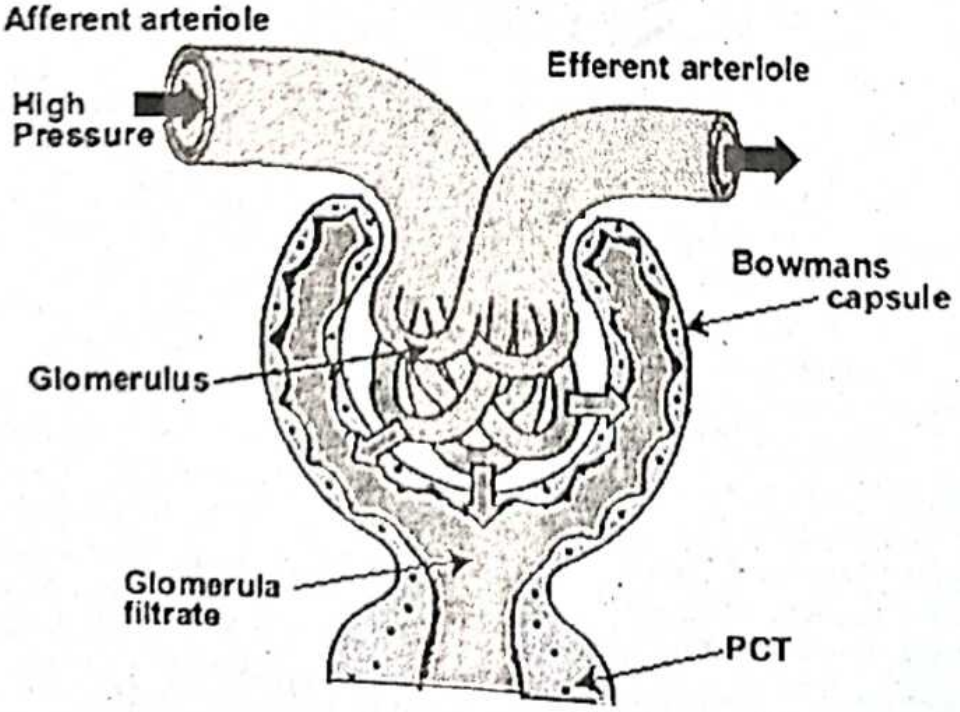


38. Osmoregulation is the regulation of body organic, inorganic solutes and solvent concentration.

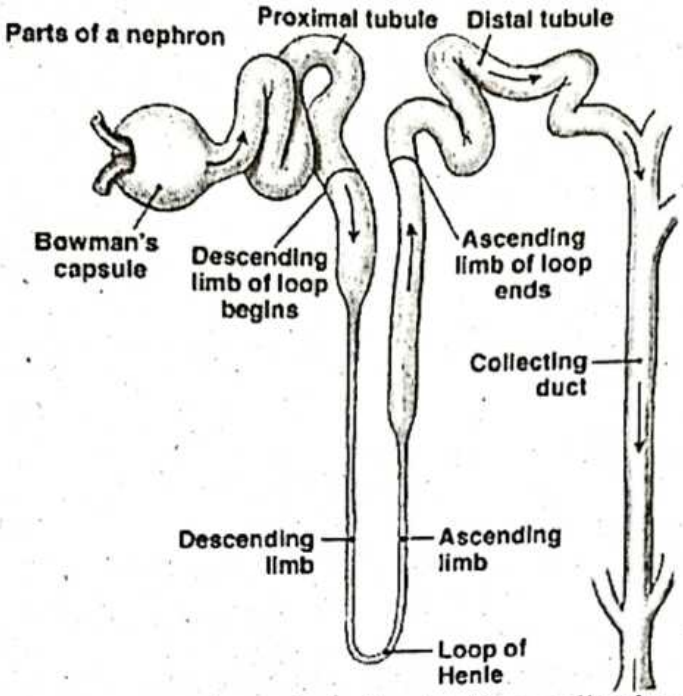
39. Most invertebrates, fish, amphibians and reptiles are ectotherms. Birds, some fish and flying insects are included in endotherms. Bats and humming birds are heterotherms.

40. The ascending limb of Loop of Henle is permeable for Na^+ which is promoted by the action of aldosterone. Ascending limb of loop of Henle is impermeable for water.

41.



42.

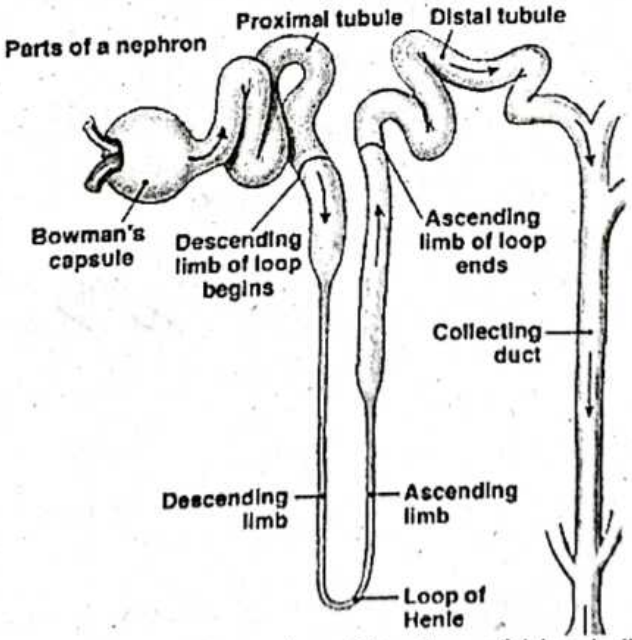


43. ADH/Vasopressin increases reabsorption of water from collecting ducts of the nephrons. Secondly, ADH constricts arteriolesand raises arterial blood pressure.

44. Osmoregulation is the regulation of body organic, inorganic solutes and solvent concentration.

45. Humans are ureotelic. Urea is excreted as waste product in humans.

46.



47. Urine is formed in the kidneys through a filtration of blood. The urine is then passed through the ureters to the bladder, where it is stored. During urination, the urine is passed from the bladder through the urethra to the outside of the body.

48. Pyrogens are the substances, typically produced by a bacterium, which produces fever when introduced or released into the blood.

12 TOPIC MUSCLES AND MOVEMENT

PRACTICE EXERCISE

TOPIC-WISE MCQs

STRUCTURE OF SKELETAL MUSCLES

Q.1 Muscles are the specialized type of tissues having _____ origin.

A) Ectodermal
B) Mesodermal
C) Endodermal
D) Hyperdermal

Q.2 Connective tissue wrapping around a muscle that is found continuous with tendons:

A) Perimysium
B) Epimysium
C) Endomysium
D) Perichondrium

Q.3 Sarcoplasmic reticulum is like:

A) Golgi bodies
B) Cytoskeletal fibers
C) Smooth endoplasmic reticulum
D) Ribosome

Q.4 Irregular striations and involuntary control is related to:

A) Smooth muscle cells
B) Skeletal muscle cells
C) Cardiac muscle cells
D) Fibroelastic cartilage cells

Q.5 Which one of the following is correct regarding ligaments and tendons?

A) Both are inelastic
B) Both are elastic
C) Both are specialized connective tissue fibrils
D) Both form joint capsule

Q.6 Brachioradialis:

A) Originates from radius
B) Is inserted into radius
C) Originates from ulna
D) Is inserted into ulna

Q.7 The main functional partners of bones is:

A) Tendon
B) Skeletal muscle
C) Ligament
D) Nerves

Q.8 The point of attachment of the nerve to the muscle is called a _____ junction.

A) Neuro-muscular
B) Chemical
C) Mechanical
D) Synaptic

Q.9 Sarcolemma is primarily made up of:

A) Lipoprotein
B) Glycoprotein
C) Glycolipids
D) Nucleoproteins

Q.10 Earliest form of muscles are:

A) Cardiac
B) Smooth
C) Skeletal
D) Striated

CONTRACTION MECHANISM

Q.11 All of the following are true regarding muscle contraction except:

A) I band shortens
B) Z-lines gets closer
C) A band remains unchanged
D) M-line disappears

Q.12 Contractile protein of skeletal muscle cells involving ATPase activity is:

A) Actin
B) Troponin
C) Myosin
D) Tropomyosin

Q.13 When muscle contracts, thick and thin filaments undergo:

A) Overlapping
B) Lengthening
C) Shortening
D) Contraction

Q.14 Which one of the following structures serves as a center of sarcomere?

A) H-Zone
B) M-line
C) Z-band
D) A-band

Q.15 Which one of the following is correct regarding A-band?

A) It is non-polarizing
B) It is isotropic
C) It contains only myosin
D) Myosin acts as a polarizer of light

Q.16 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.17 Cross bridges form between:

A) Troponin and tropomyosin
B) Calcium and sodium
C) Actin filaments and myosin heads
D) Sarcolemma and sarcoplasmic reticulum

Q.18 When a muscle is at rest, what blocks myosin from binding to actin?

A) Tropomyosin
B) Troponin
C) Tubulin
D) Sarcomere

Q.19 Which triggers the release of calcium ions from sarcoplasmic reticulum?

A) Formation of actin-myosin cross bridges
B) Sarcomere contraction
C) An action potential
D) An increase in calcium ion concentration

Q.20 T-tubules in human skeletal muscles are present at:

A) Z-line
B) A-I junction
C) M-line
D) H-zone

Q.21 Diameter of each myofibril is _____.

A) 2μm
B) 100 nm
C) 10μm
D) 100μm

Q.22 Which of the following is a true statement?

A) Muscle cell has many muscle fibers
B) Muscle cell has many myofibrils
C) Muscle fiber has many muscle cells
D) Sarcomere has bundles of muscle fibers

Q.23 Which of the following band allows most of the light to pass through it?

A) A-band
B) I-band
C) Muscle bundle
D) Muscle fiber

Q.24 A protein that is complex of three polypeptide chains is:

A) Actin
B) Myosin
C) Tropomyosin
D) Troponin

Q.25 Chief component of thin filaments is:

A) Actin
B) Myosin
C) Troponin
D) Fibrous proteins

Q.26 The sliding protein of muscle:

A) Tubulin
B) Myosin
C) Myoglobin
D) Actin

ENERGY FOR MUSCLE CONTRACTION

Q.27 In skeletal muscles, under anaerobic conditions ATP can be generated by:

A) Respiratory chain
B) Glycolysis
C) Pyruvic acid oxidation
D) Krebs cycle

Q.28 What is required for striated muscles to contract?

A) Release of calcium ions from troponin
B) Binding of calcium ions to troponin
C) Binding of calcium ions to tropomyosin
D) Release of calcium ions from tropomyosin

Q.29 The pigment which stores oxygen in muscle is:

A) Haemoglobin
B) Myoglobin
C) Myosin
D) Actin

Q.30 Immediate source of energy for muscle contraction is:

A) Glucose
B) Glycogen
C) Creatine phosphate
D) ATP

Q.31 Which one yields ATP required for muscle contraction?

A) Myoglobin
B) Creatine phosphate
C) Creatinine
D) Phosphate

PAST PAPER MCQs

2010

Q.1 During muscle contraction:

A) I-band shortens
B) Myosin filaments shorten
C) Actin filaments shorten
D) Z-line disappears

2011

Q.2 Muscle is made up of many cells which are referred to as:

A) Myofilaments
B) Myofibrils
C) Sarcolemma
D) Muscle Fibers

Q.3 The pigment which stores oxygen in muscles is:

A) Hemoglobin
B) Myoglobin
C) Myosin
D) Actinomyosin

Q.4 The length of myofibril from one Z-band to the next is known as:

A) Sarcomere
B) Sarcolemma
C) Sarcoplasm
D) Muscle Fiber

Q.5 Calcium ions released during a muscle fiber contraction attach with:

A) Myosin
B) Actin
C) Tropomyosin
D) Troponin

2012

Q.6 Each muscle fiber is surrounded by membrane which is called:

A) Sarcomere
B) Sarcolemma
C) Twitch fiber
D) Capsule

Q.7 When calcium ions are released from the sarcoplasmic reticulum they bind with _____ during muscle contraction.

A) Tropomyosin
B) Sarcolemma
C) Cytosol's ions
D) Troponin

2013

Q.8 Where can we find H zone in the figure of fine structure of skeletal muscle's myofibril?

A) In the mid of A-band
B) In I-band
C) Besides the Z-line
D) Along the I-band

Q.9 The length of myofibril from one Z-band to the next is described as:

A) Sarcolemma
B) Sarcoplasm
C) Sarcomere
D) Muscle fiber

Q.10 The Ca^{++} ions released during a muscle fiber contraction attach with:

A) Myosin
B) Actin
C) Troponin
D) Tropomyosin

2014

Q.11 The repeated protein pattern of myofibrils is called:

A) Sarcomere
B) Zyomere
C) Sarcolemma
D) Cross bridges

Q.12 When more energy is required in muscle contraction then that energy can also be produced by _____ as a secondary source.

A) Glucose
B) Phosphocreatine
C) Fructose
D) Lactic acid

2015

Q.13 A sarcomere is the region of a myofibril between two successive:

A) M-lines
B) Z-lines
C) I-bands
D) T-tubules

Q.14 The sarcolemma of muscle fiber folds inwards and forms a system of tubes which runs through the sarcoplasm called:

A) Myofilaments
B) Sarcoplasmic reticulum
C) Z-lines
D) Transverse tubules

Q.15 According to sliding filament theory, when muscle fibers are stimulated by nervous system, which of the following changes occurs?

A) I-bands shorten
B) H-zone becomes more visible
C) Z-lines move further apart
D) A-bands shorten

2016

Q.16 Each muscle fiber is surrounded by a modified cell membrane called:

A) Sarcolemma
B) Sarcomere
C) Myosin Filament
D) Myofilament

2017

Q.17 Each muscle fiber is surrounded by a modified cell membrane called:

A) Sarcolemma
B) Sarcomere
C) Myosin Filament
D) Myofilament

2017 Re-Take

Q.18 Over lapping of thick filament occurs in:

A) A-Band
B) I-Band
C) M-line
D) Z-line

2019

Q.19 Thin filaments of muscles contain _____ chains of actin molecules.

A) Four
B) One
C) Three
D) Two

Q.20 The thick filaments in a myofibril of muscles are made of _____.

A) Haemoglobin
B) Myoglobin
C) Actin
D) Myosin

Q.21 The function of calcium ions in muscle contraction is to:

A) Bind to troponin molecule and cause them to move
B) Aid in the transmission of nerve impulse
C) Polarize visible light
D) Bind to tropomyosin molecule and cause them to form cross bridges

ANSWER KEY

TOPIC-WISE MCQs

1	B	11	D	21	A	31	B
2	B	12	C	22	B		
3	C	13	A	23	B		
4	C	14	B	24	D		
5	C	15	D	25	A		
6	B	16	B	26	D		
7	B	17	C	27	B		
8	A	18	A	28	B		
9	A	19	C	29	B		
10	B	20	B	30	D		

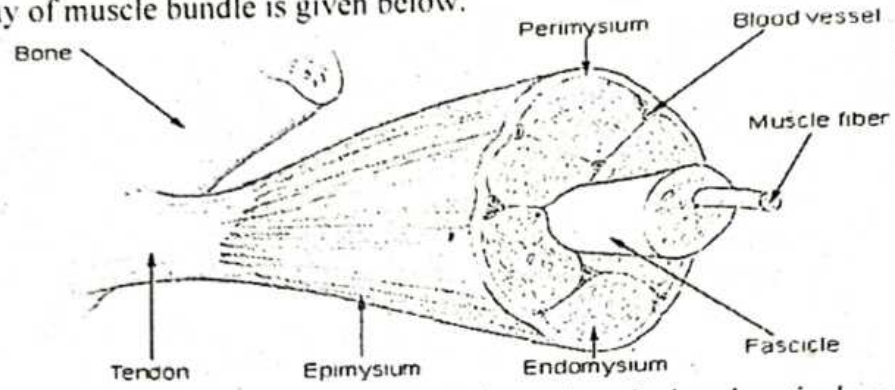
PAST PAPERS MCQs

1	A	11	A	21	A
2	D	12	B		
3	B	13	B		
4	A	14	D		
5	D	15	A		
6	B	16	A		
7	D	17	A		
8	A	18	A		
9	C	19	D		
10	C	20	D		

EXPLANATORY NOTES

TOPIC-WISE MCQs

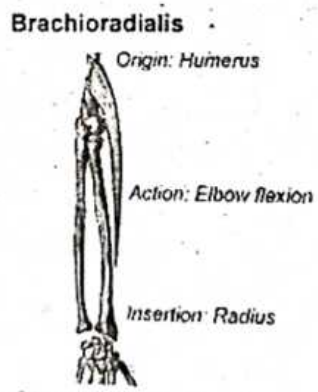
1. Mesoderm gives rise to many tissues of the body, including the dermis of the skin, the heart, muscle system, urogenital system, bones, and bone marrow and therefore the blood.
2. Anatomy of muscle bundle is given below:



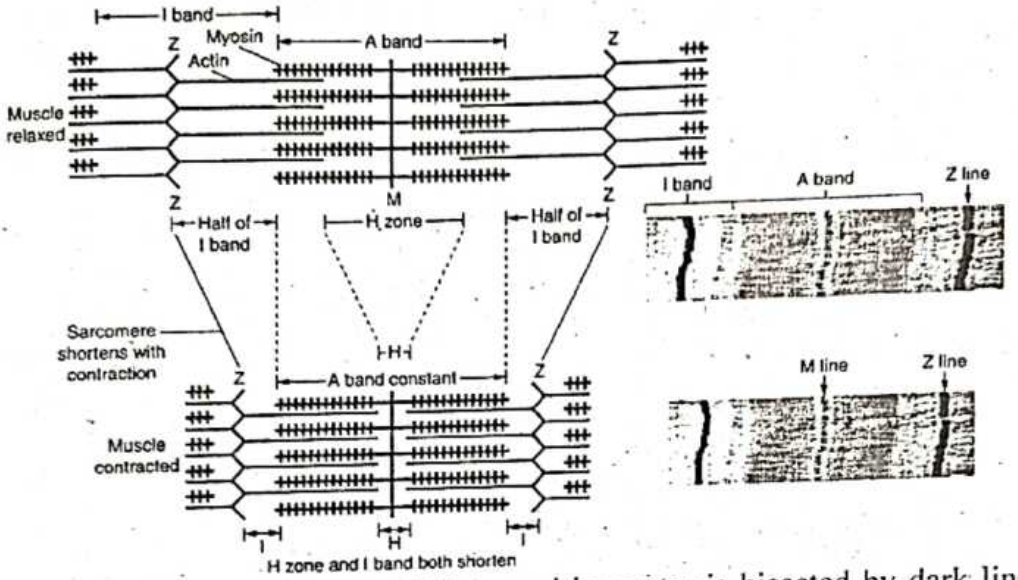
3. Sarcoplasmic reticulum is the modified form of smooth endoplasmic reticulum as they devoid of ribosomes and found in muscles. It regulates Ca^{++} ions concentration in sarcoplasm.
4. Skeletal muscle cells have regular striation, while smooth muscle cells do not have striation. Cardiac muscle cells, however, have irregular striations with involuntary control.
5.

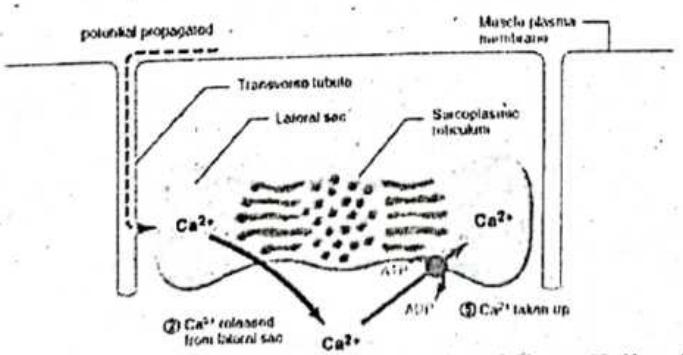
Tendon	Ligament
Inelastic, tough fibrous tissue	Strong, elastic fibrous tissue
Connects bone with muscle	Connects bone with bone (form joint)

6.



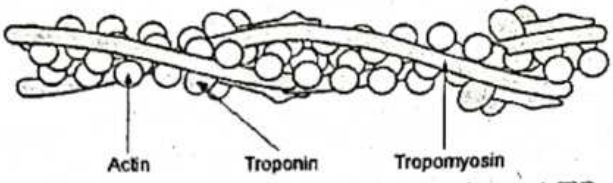
7. The main functional partner of bones is skeletal muscles. Both these can work together to bring about movement in the body.
8. The point of attachment of the nerve to the muscle is called neuromuscular junction. All the fibres innervated by a single motor neuron are a motor unit and contract simultaneously in response the action potential fired by motor neurons.
9. Since sarcolemma is the membrane of muscle cells, so its chemical composition is lipoproteins.
10. Smooth muscles are found both in invertebrates and vertebrates while cardiac and skeletal muscles are found only in vertebrates and are most developed.

11. During muscle contraction, I-band shortens, Z-lines get closer to each other and H-zone disappears. A-band and M- line remains unchanged.
12. In muscle, myosin is found abundantly. Its head region has ATPase activity and involves in ATP hydrolysis during muscle contraction.
13. 

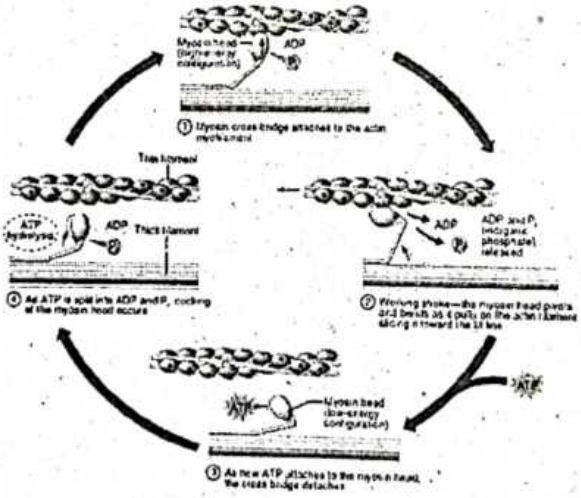
14. A sarcomere is bounded by two Z-lines and its center is bisected by dark line called M line.
15. Each dark band in the skeletal muscles is called A-band because it is anisotropic i.e. it can polarize visible light. This polarization of light is due the presence of myosin. It also contains overlapping actin.
16. 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.
17. Cross bridges formed when globular heads of myosin attached with specific sites present on actin.
18. 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 becomes attached.
19. 

20. T tubule is found at A-I junction in skeletal muscle while at Z-line in cardiac muscle.
21. Diameter of myofibrils is 2μm.
22. When viewed in high magnification, each muscle fibre is seen to contain large number of myofibrils 1-2μm in diameter that run in parallel fashion and extend entire length of the cell.

23. 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.
24. Thin filament contains three types of protein; actin (having 2 polypeptide chains), tropomyosin (having 2 polypeptide chains) and troponin (having 3 polypeptide chains).
25. Most abundant protein in thin filament is actin, while most abundant protein found in thick filaments is myosin.
26.



27. If skeletal muscle is facing anaerobic conditions, then ATP molecules are produce by glycolysis. If oxygen become available, the muscle will shift itself to aerobic respiration which involve glycolysis, pyruvate oxidation, Krebs cycle followed by ETC.
28. When the muscle is at rest, the tropomyosin is disposed in such a way that it covers the myosin binding site. When the muscle is required to contract, Ca^{2+} bind with the troponin molecule and cause them to move slightly and expose the binding site.
29. Myoglobin is hemoglobin like iron containing protein pigment occur the muscle cell. It serves as an intermediate compound for the transfer of O_2 from hemoglobin to acrobic metabolic processes of muscle cells. It can also store some O_2.
30.



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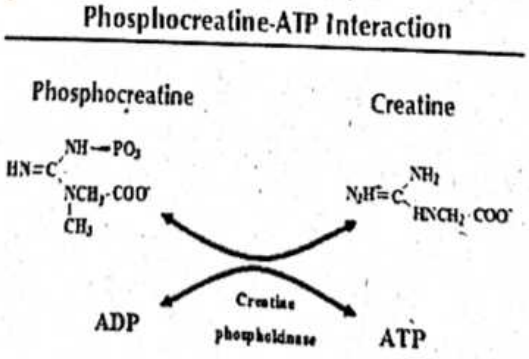
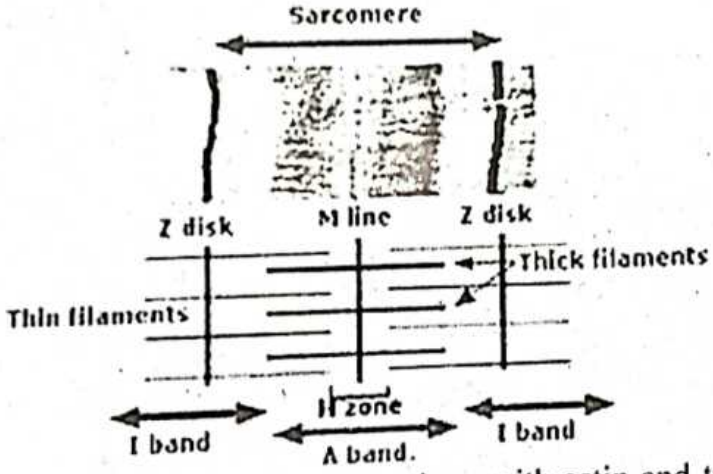
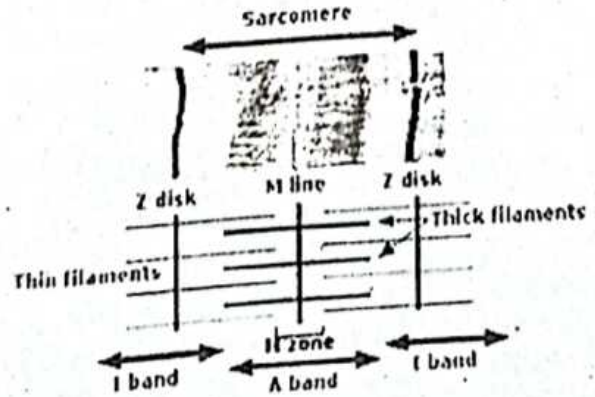
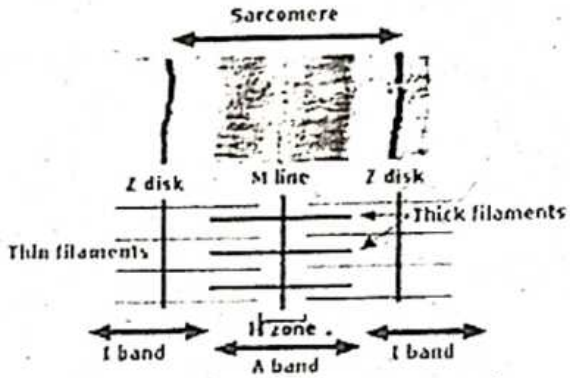


PAST PAPER MCQs

1. During muscle contraction;
   - Z-lines come brought closer together
   - I-band shortens
   - H-zone disappears
2. Muscles are made up of large number of cells called muscle fibers. These are cylindrical shaped and have more than one nucleus. They also have multiple mitochondria to meet energy needs.
3. Myoglobin is an iron- and oxygen-binding protein found in the muscle tissue of vertebrates in general and in almost all mammals. Its function is to store oxygen in muscles.
4. 

5. Troponin is a component of thin filaments along with actin and tropomyosin, and is the protein complex to which calcium binds to trigger the process the muscle contraction.
6. 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.
7. Troponin is a component of thin filaments along with actin and tropomyosin, and is the protein complex to which calcium binds to trigger the process the muscle contraction.
8. The H zone is the central region of the A zone and contains only thick filaments (myosin) and is shortened during contraction.
9. 

10. Troponin is a component of thin filaments along with actin and tropomyosin, and is the protein complex to which calcium binds to trigger the process the muscle contraction.
11. 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.
12. **Phosphocreatine**, also known as creatine phosphate, is a phosphorylated creatine molecule that serves as a rapidly mobilizable reserve of high energy phosphates in skeletal muscle, myocardium and the brain to recycle ATP.
13. 

14. T-tubules are extensions of the cell membrane that penetrate into the centre 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.
15. 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
16. 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.
17. 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.
18. Thick filaments occur only in the A band of a myofibril. The region at which thick and thin filaments overlap 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.
19. 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.
20. 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.
21. 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.

13 TOPIC COMMUNICATION

PRACTICE EXERCISE

TOPIC-WISE MCQs

NERVOUS COORDINATION IN MAMMALS

Q.1 Ectoderm mainly gives rise to:

A) Musculo-skeletal system
B) Respiratory system
C) Nervous system
D) Cardiovascular system

Q.2 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

NEURONS AND ITS TYPES

Q.3 Non-neuronal cells encapsulating mainly axons of peripheral neurons are:

A) Microglia
B) Astrocytes
C) Oligodendrocytes
D) Schwann's cell

Q.4 Myelinated, single and long fiber that takes message towards the cell body is:

A) Dendron
B) Dendrite
C) Axon
D) Soma

Q.5 A motor nerve carries impulses from:

A) Spinal nerves to effectors
C) Effectors to CNS
C) Effectors to cranial nerves
D) CNS to effectors

Q.6 The largest number of the cell bodies of neurons are found in:

A) Brain
B) Sensory organs
C) Spinal cord
D) Effectors

Q.7 Which of the following is not correct about myelin sheath?

A) Composed of specialized lipids
B) Conduct impulses
C) Responsible for saltatory conduction
D) Absent on nodes of Ranvier

Q.8 Myelin sheath:

A) Is found in all axons
B) Speeds up conduction
C) Is found in all dendrons
D) Is proteinaceous

Q.9 Which one of the following are also known as efferent neurons?

A) Sensory
B) Motor
C) Associative
D) Mixed

Q.10 Regeneration is possible in all parts of neurons except:

A) Dendron
B) Dendrites
C) Axon
D) Cell body

Q.11 Grey matter is composed of:

A) Schwann cells
B) Cell bodies of neuron
C) Neuron fibres
D) Nissl's granules

Q.12 It is not true about cell body of neuron:

A) Main nutritional part
B) Biosynthesis of materials
C) It contains axoplasm
D) Regenerate axonal and dendrite fibre

Q.13 Which organelle cannot be found in synaptic knob of a neuron?
A) Mitochondria
B) Secretory vesicles
C) Ribosomes
D) Nucleus

Q.14 Which of the following is most abundant type of neurons in CNS?
A) Sensory neurons
B) Motor neurons
C) Associate neurons
D) Neuroglial cells

Q.15 Which one of the following gives a tree-like appearance to neurons?
A) Dendron
B) Dendrites
C) Soma
D) Axons

Q.16 Which of the following is not a part of neuron?
A) Axon
B) Nissl's granules
C) Dendrons
D) Synapse

REFLEX ACTION

Q.17 Which of the following is not a component of reflex arc?
A) Afferent nerve
B) Efferent nerve
C) Brain
D) Effectors

Q.18 The primary function of spinal cord is to:
A) Produce CSF
B) Communicate two hemispheres
C) Produce hormones
D) Communicate brain with rest of body

Q.19 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

NERVE IMPULSE

Q.20 Depolarization is the result of:
A) Influx of K^+
B) Efflux of K^+
C) Influx of Na^+
D) Efflux of Na^+

Q.21 Nerve impulse transmission is:
A) Mechanical process
B) Biological process
C) Chemical process
D) Physical process

Q.22 Which of the following causes the hyperpolarization across neurolemma?
A) Distribution of charge
B) Late closing of K^+ channels
C) Influx of Na^+
D) Outward diffusion of Na^+

SYNAPSE

Q.23 Microscopic gap between the neurons is called:
A) Synapse
B) Collapse
C) Synaptic cleft
D) Pre-synapse membrane

Q.24 Which ion is involved in release of Acetylcholine from pre-synaptic fibre into extracellular fluid?
A) Calcium
B) Sodium
C) Potassium
D) Magnesium

Q.25 Which one of the following sets of ion is necessary for transmission of nerve impulse?
A) Na^+ and K^+
B) Ca^{2+} and K^+
C) Ca^{2+} and Na^+
D) Na^+ and Mg^{2+}

Q.26 Neurotransmitter molecule binds to receptors that are located on:
A) Synaptic knob
B) Post synaptic membrane
C) Pre-synaptic membrane
D) Synaptic cleft

Q.27 After the depolarization of post synaptic neurolemma, neurotransmitters are mostly:
A) Taken up by Schwann cells
B) Degraded by enzymes
C) Remain in synaptic cleft
D) Taken up by post synaptic membrane

Q.28 Which of the following will restore original ion gradients and RMP after hyperpolarization in neurons?

A) K^+ channels
B) Na^+ channels
C) Na^+/K^+ pumps
D) Ca^{++} channels

Q.29 Which of the following acts as a messenger in both chemical and nervous coordination?

A) Acetylcholine
B) Dopamine
C) Nicotine
D) Epinephrine

HORMONES AND ITS TYPES

Q.30 The incorrect statement regarding hormones is:

A) Endocrine secretion
B) Organic in nature
C) Initiate biochemical reaction
D) Transported by blood

Q.31 Which one of the following gland produces steroidal hormones?

A) Pancreas
B) Hypothalamus
C) Gut
D) Testes

Q.32 Cholesterol serves as precursor of:

A) Proteins hormones
B) Adenoid hormones
C) Steroid hormones
D) Glucoid hormones

Q.33 Pick the system which transports hormone in the body:

A) Endocrine system
B) Circulatory system
C) Nervous system
D) Muscular system

Q.34 Normal serum level of hormones are controlled by:

A) Target site
B) Effector's response
C) Feedback mechanism
D) Precursor activation

HORMONES OF ISLETS OF LANGERHANS

Q.35 Most portion of pancreas acts as:

A) Endocrine
B) Mesocrine
C) Exocrine
D) Autocrine

Q.36 Which of the following statement is incorrect regarding insulin?

A) Inhibit glycogenhydrolysis
B) Convert glucose to protein
C) Increase glycolysis
D) Increase lipolysis

Q.37 Major endocrine cells in pancreas are:

A) Alpha cells
B) Gamma cells
C) Beta cells
D) Delta cells

Q.38 Release of hormones from islets of Langerhans is under the influence of:

A) STH
B) Blood glucose level
C) ACTH
D) All A, B, C

ROLE OF ADH IN OSMOREGULATION

Q.39 What results in production of large quantities of urine and great thirst?

A) Lack of aldosterone
B) Lack of ADH
C) Lack of oxytocin
D) Over-secretion of oxytocin

PLANT HORMONES

Q.40 Auxins promote cell division in:

A) Apical meristem
B) Intercalary meristem
C) Lateral meristem
D) All of these

Q.41 Synthetic auxins are more active than natural auxins because of:

A) High rate of action
B) Absence of enzymes against them
C) More functionality
D) Chemical difference

Q.42 All of the following cause delay in leaf senescence except:

A) Auxins
B) Cytokinins
C) Gibberellins
D) Abscisic acid

Q.43 Commercially gibberellins are obtained from:

A) Plants
B) Fungi
C) Bacteria
D) Made chemically

Q.44 Flowering in pineapple is promoted by:

A) Gibberellins
B) Ethene
C) Abscisic Acid
D) Cytokinins

Q.45 Main source of auxins in plants are:

A) Apices
B) Germinating seeds
C) Cambium
D) Flower

Q.46 Hormone involved in closing of stomata is/are:

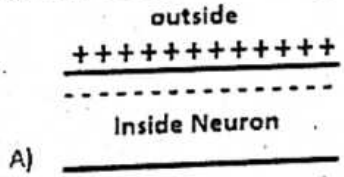
A) Auxins
B) Cytokinins
C) Gibberellins
D) Abscisic acid

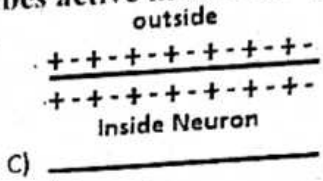
PAST PAPER MCQs

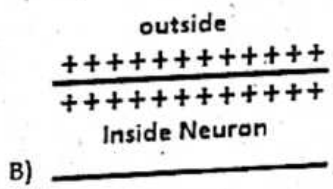
2008
Q.1 **Which of the following promotes both leaf and fruit growths?**
A) Auxins
B) Gibberellins
C) Abscisic acid
D) Ethane

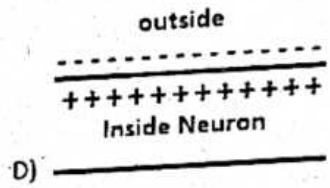
Q.2 **Which of the following receptors produce sensation of pain?**
A) Mechanoreceptor
B) Nociceptors
C) Chemoreceptors
D) Thermoreceptors

2009
Q.3 **Which one of the following conditions best describes active membrane potential?**

A)


C)


B)


D)


Q.4 **Which of the following neurotransmitters lies outside the central nervous system?**
A) Serotonin
B) Dopamine
C) Acetylcholine
D) Adrenaline

2010
Q.5 **A typical neuron at rest:**
A) Is more positive outside than inside
B) Is more negative outside than inside
C) Has no charge on either side
D) Has an equal charge on either side

Q.6 **Which one of the following is a precursor of steroid hormones?**
A) Glycerol
B) Sterol
C) Amino acids
D) Cholesterol

Q.7 **Hormones are the organic compounds of varying structural complexity. Which of the following is not a function or property of these compounds?**
A) They initiate new biochemical reactions
B) They are poured directly into blood
C) They may be proteins
D) They affect target cells

2011
Q.8 **Which group of hormones is made up of amino acids and their derivatives?**
A) Vasopressin and ADH
B) Epinephrine and Non-Epinephrine
C) Estrogen and Testosterone
D) Insulin and Glucagon

Q.9 **Which of the following is the function of glucagon hormone?**
A) Glycogen to Glucose
B) Glucose to Glycogen
C) Glucose to Lipids
D) Glucose to Proteins

2012
Q.10 **The part of neuron fiber which conducts nerve impulses from the cell body is:**
A) Dendron
B) Dendrites
C) Axon
D) Peripheral branch

Q.11 Ductless glands are known as:
A) Endocrine gland
B) Exocrine gland
C) Salivary glands
D) Bile glands

Q.12 Vasopressin and Oxytocin are released from the:
A) Placenta
B) Ovary
C) Anterior pituitary
D) Posterior pituitary

Q.13 β-cells of pancreassecrete a hormone that is called:
A) Insulin
B) Glucagon
C) Antidiuretic hormone
D) Gastrin

2013

Q.14 Alpha cells of Islets of Langerhans secrete hormone called:
A) Glucocorticoid
B) Insulin
C) Glucagon
D) Aldosterone

Q.15 Which of the following is the function of glucagon hormone?
A) Glucose to lipids
B) Glucose to proteins
C) Glucose to glycogen
D) Glycogen to glucose

Q.16 Chemically, insulin and glucagon are:
A) Carbohydrates
B) Proteins
C) Lipids
D) Nucleic acids

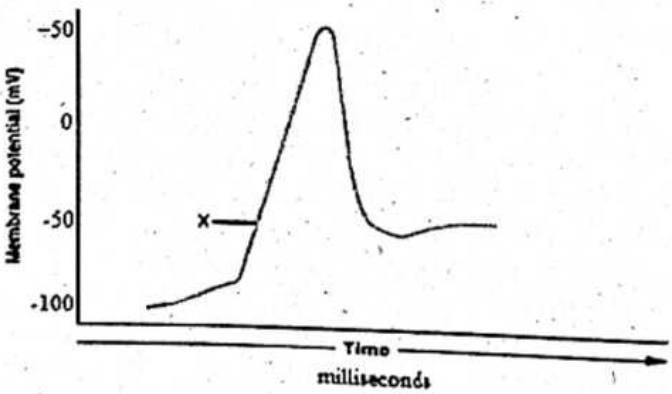
2014

Q.17 Which one of the following is a steroid hormone?
A) Glucagon
B) Thyroxin
C) Epinephrine
D) Estrogen

2015

Q.18 Conduction of action potentials from one node of Ranvier to another in myelinated neurons is through:
A) Hyperpolarization
B) Resting Membrane Potential
C) Depolarization
D) Saltatory Conduction

Q.19 In the following diagram of action potential in a neuron, 'x' depicts:



A) Depolarization
B) Polarization
C) Repolarization
D) Hyperpolarization

Q.20 Neurotransmitter secreted at synapse outside the central nervous system is:
A) Dopamine
B) Polypeptide
C) Androgen
D) Acetylcholine

Q.21 α-cells of pancreas secrete a hormone known as:
A) Glucagon
B) Insulin
C) Gastrin
D) Rennin

2016

Q.22 _____hormone is antagonistic to insulin and causes increase in blood glucose level.

A) Glucagon
B) Nor-epinephrine
C) Calcitonin
D) Thyroxin

Q.23 Beta cells of islets of Langerhans produce _____ hormone.

A) Glucagon
B) Insulin
C) Pancreatic Juice
D) Parathormone

2017

Q.24 The nerve impulse which jumps from node to node in myelinated neurons is called as:

A) Resting membrane potential
B) Saltatory nerve impulse
C) Threshold stimulus
D) Initial nerve impulse

2017 Re-Take

Q.25 Pick out the pressure receptors:

A) Chemoreceptors
B) Mechanoreceptors
C) Photoreceptors
D) Thermoreceptors

Q.26 Which of the following produce response?

A) Effectors
B) Stimulators
C) Nerve
D) Brain

2018

Q.27 Taste buds on the tongue are example of:

A) Thermoreceptors
B) Photoreceptors
C) Pressure receptors
D) Chemoreceptors

Q.28 When a nerve impulse jumps from one node of Ranvier to the next in a myelinated neuron, it is called _____.

A) Saltatory conduction
B) Synapses
C) Resting potential
D) Membrane potential

Q.29 **How many sodium ions are pumped out in response to two potassium ions transported into the membrane?**

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

Q.30 **In nervous system, chemical messengers are called _____.**

A) Enzymes
C) Chemoreceptors
B) Neurotransmitters
D) Hormones

Q.31 **_____hormone is released from posterior lobe of pituitary gland.**

A) Thyroid stimulating hormone
C) FSH
B) Adrenaline
D) Antidiuretic hormone

2019

Q.32 **The reflex action is the phenomena which only involves:**

A) Brain, receptors, spinal cord
C) Receptors, neurons, brain
B) Receptors, effectors and spinal cord
D) Receptors and effectors

Q.33 **In an action potential, the permeability of sodium ions in the neuron increases due to:**

A) Repolarization
C) The action of the acetylcholinesterase enzyme
B) The opening of sodium channels/gates
D) Sodium ions forming an ionic bonding

Q.34 **If stimulation is above _____, impulses travel to the brain along the sensory neuron.**

A) Action Potential
C) Resting Potential
B) Threshold
D) Recovery Period

Q.35 **Acetylcholine and nor-adrenalin are two types of _____ used in our nervous system.**

A) Hormones
B) Channel and carrier proteins in the cell membrane of a neuron
C) Enzymes
D) Neurotransmitters

Q.36 **The main neurotransmitter for synapses is _____ which lie outside the CNS.**

A) Choline
C) Acetaldehyde
B) Acetylcholine
D) Phosphatidylcholine

ANSWER KEY

TOPIC-WISE MCQs

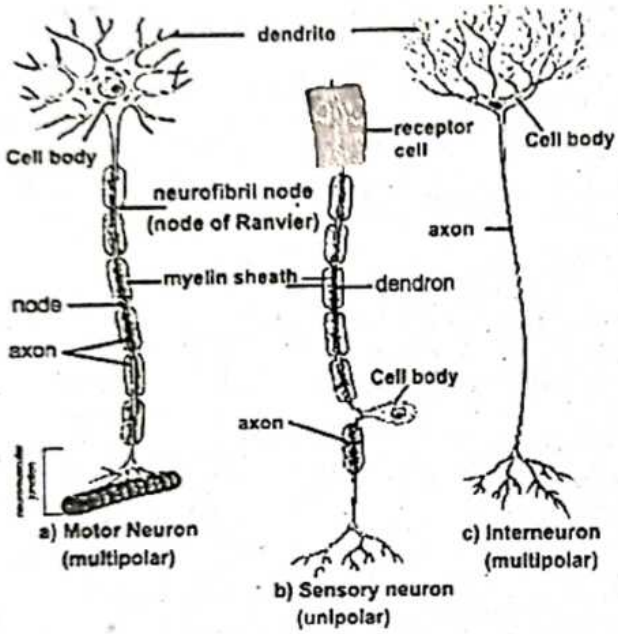
1	C	11	B	21	B	31	D	41	B
2	B	12	C	22	B	32	C	42	D
3	D	13	D	23	A	33	B	43	B
4	A	14	C	24	A	34	C	44	B
5	D	15	B	25	A	35	C	45	A
6	A	16	D	26	B	36	C	46	D
7	B	17	C	27	B	37	C		
8	B	18	D	28	C	38	D		
9	B	19	B	29	D	39	B		
10	D	20	C	30	C	40	C		

PAST PAPERS MCQs

1	B	11	A	21	A	31	D
2	B	12	D	22	A	32	B
3	D	13	A	23	B	33	B
4	C	14	C	24	B	34	B
5	A	15	D	25	B	35	D
6	D	16	B	26	A	36	B
7	A	17	D	27	D		
8	B	18	C	28	A		
9	A	19	A	29	D		
10	C	20	D	30	B		

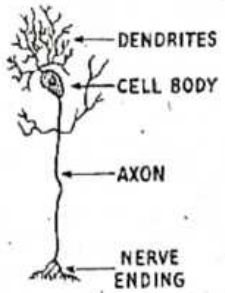
EXPLANATORY NOTES

TOPIC-WISE MCQs

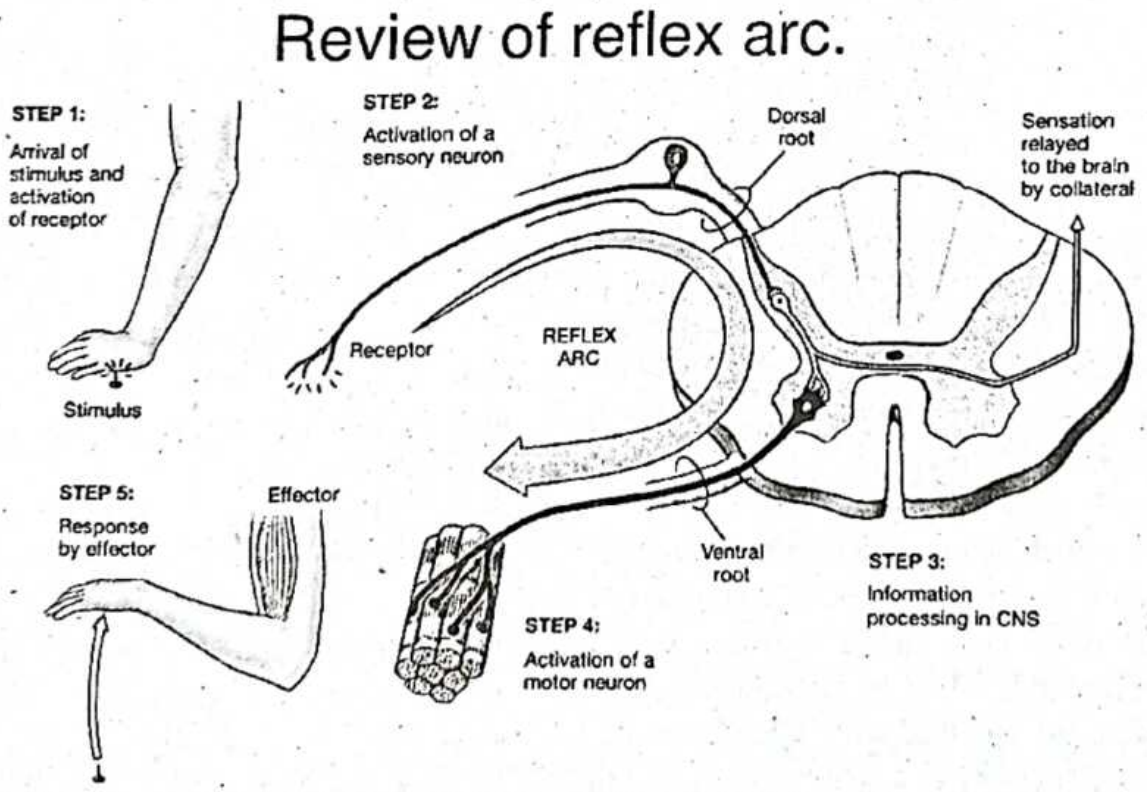
1. Ectoderm mainly gives rise to nervous system and integumentary systems while mesoderm give rise to all other tissues of the body, including heart, the muscle system, the urogenital system, bones, and bone marrow (and therefore the blood).
2. Stimuli are always detected by specific receptors present 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.
3. 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.
4. 

5. Efferent neurons are meant to conduct messages from CNS to the effectors as they are emerging from CNS that's why they are known as motor neurons.
6. Number of neurons present in body varies, brain contains the highest number and spinal cord comes on second number.
7. 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.
8. 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
9. Efferent neuron is another name used for motor neurons which are meant for the conduction of messages from CNS to the effectors
10. 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.
11. Grey matter is mainly composed of cell bodies of neurons while white matter is composed of myelin sheath.

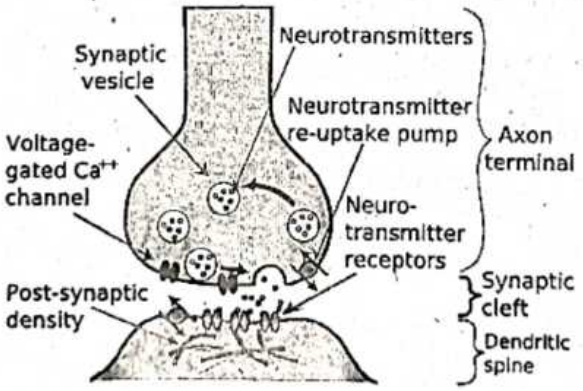
12. Cell body of a neuron is main nutritional part. It is the part where biosynthesis of required materials is taking place. It also provides the genetic information for the regeneration of neuronal processes. Axoplasm is the cytoplasm of nerve axon.
13. Mitochondria, ribosomes and secretary vesicles are found in synaptic knob while nucleus is present in the cell body of neuron.
14. Associated neurons, also called inter-neurons or relay neurons are neurons that 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.
15.



16. 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.
17. 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.
18. 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 coordinating many reflexes and contains reflex arcs that can independently control reflexes.
19.



20. 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.
21. Nerve impulse is a wave of electrochemical changes, which travels along the length of neurons involving movement of ions across the membrane and chemical reactions.
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. 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.
24. 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.
25. Sodium and potassium plays key role in the conduction of nerve impulse by their respective movement across the membrane.
26.

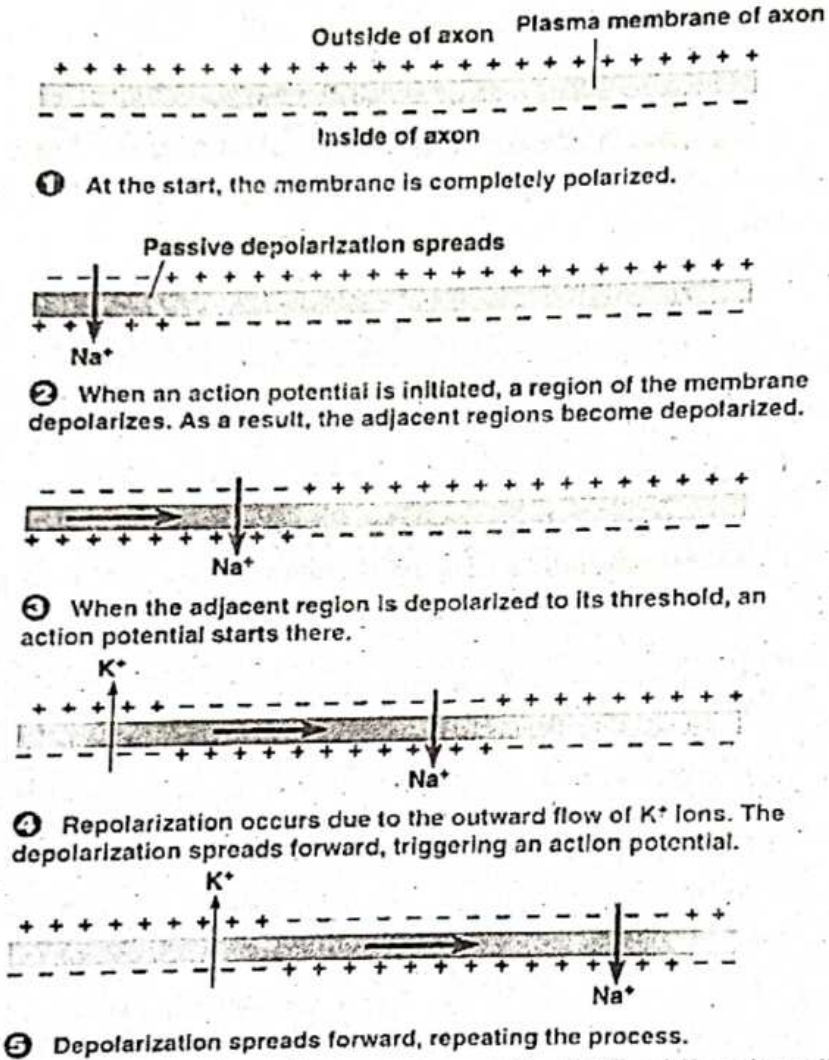


27. After the depolarization of post synaptic neurolemma, neurotransmitters are mostly degraded by the enzymes or taken up actively by pre-synaptic neurolemma. For example, acetylcholinestrase is an enzyme that degrades acetylcholine after synaptic transmission.
28. In neurolemma, a specialized ATP dependent Na^+-K^+ pump is present which will restore original ion gradient and hence the resting membrane potential.
29. Epinephrine or adrenaline produced both by adrenal gland as well as by brain and it will act both as a hormone and neurotransmitter.
30. Hormones 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.

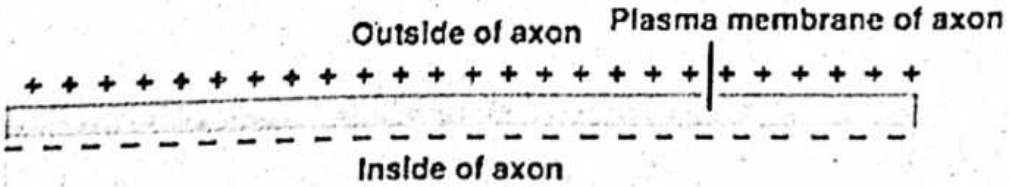
31. Mammalian testes produce testosterone which is steroid in nature. Pancreas produces insulin and glucagon which are protein hormones. Hypothalamus produces neuro-secretions which are polypeptide in nature.
32. Cholesterol is the precursor of the five major classes of steroid hormones: progestagens, glucocorticoids, mineralocorticoids, androgens, and estrogens. These hormones are powerful signaling molecules that regulate many functions.
33. Endocrine glands are ductless glands and release their secretions into blood. They reach the target site through bloodstream.
34. 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.
35. 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.
36. Insulin is responsible to decrease glucose by the conversion of glucose into glycogen. It is also responsible for increase glucose uptake by the cell and converts glucose into lipids and proteins.
37. 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.
38. 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.
39. 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.
40. Cell division in lateral meristem is controlled by auxins.
41. Natural auxins when produced are degraded by enzymes while synthetic auxins cannot be broken down by these enzymes.
42. Auxins, gibberellins and cytokinins can delay leaf senescence while abscisic acid is the one which can promote it.
43. On commercial scale, gibberellins are mainly produced by fungal cultures.
44. Ethene is artificially used to promote flowering in pineapple.
45. Indole Acetic Acid is the natural Auxins hormone produced in plants. It is synthesized in the stem apexes. Though other parts such roots and shoots also contain auxins but it has been studied that stem apexes contain the highest level of auxins.
46. Cytokinins promote opening of stomata while abscisic acid is the best-known stress hormone that closes the stomata.

PAST PAPERS MCQs

1. Gibberellins promotes both leaf and fruit growth.
2. Nociceptors, also called pain receptor, is a undifferentiated nerve ending that responds to damaging or potentially damaging stimuli by sending "possible threat" signals to the spinal cord and the brain.
3.



4. Acetylcholine is neurotransmitter for synapse outside CNS while adrenalin, nor-epinephrine, serotonin and dopamine in are the neurotransmitter involved in synaptic transmission within the CNS.
5.



6. Cholesterol is the precursor of the five major classes of steroid hormones: progestagens, glucocorticoids, mineralocorticoids, androgens, and estrogens. These hormones are powerful signaling molecules that regulate many functions.

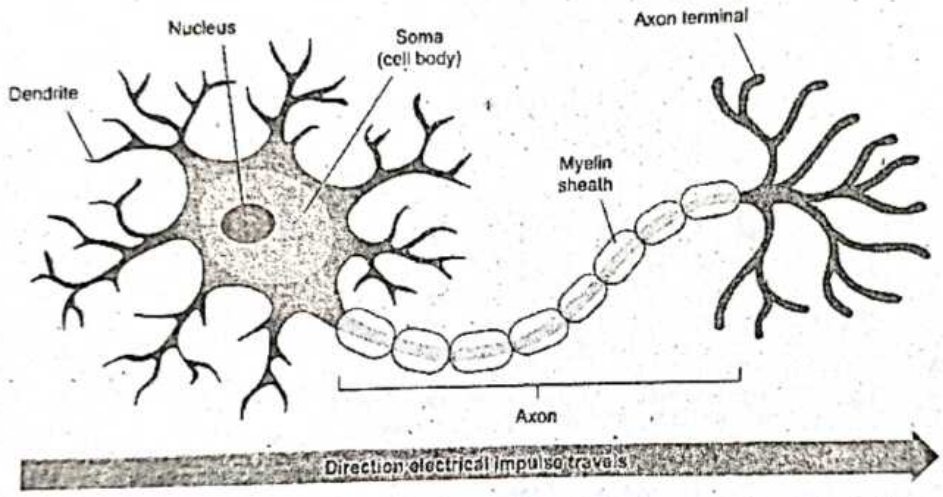
7. Hormones the organic secretion produced by the endocrine glands which are transported to the target tissue via blood stream and they cannot initiate a chemical reaction, but they can only regulate the biochemical reactions.

8.

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.

9. 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.

10.



11. Endocrine glands are ductless glands and release their secretions into blood. They reach the target site through blood.
12. ADH and oxytocin are secreted by neurosecretory cells of hypothalamus. They are temporarily stored in nerve endings in posterior lobe of pituitary gland.
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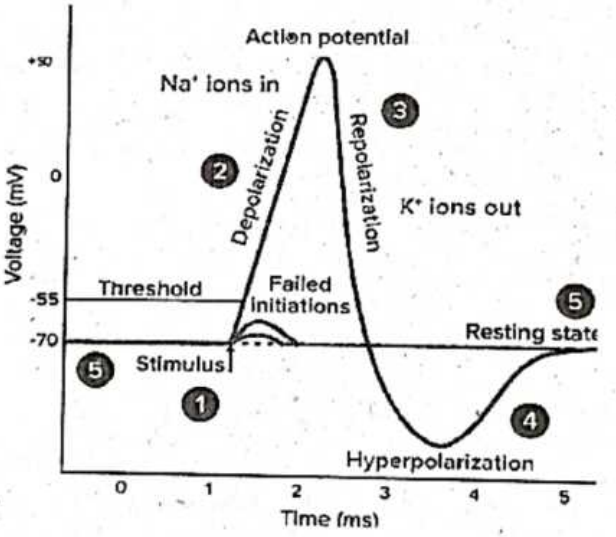

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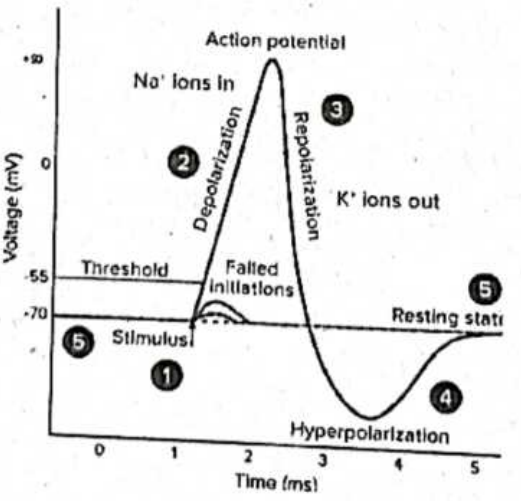

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24. The nerve impulse is conducted from node to node in jumping manner. This kind of jumping nerve impulse is called saltatory impulse.

25. Mechanoreceptors are receptors 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.

26. Effector 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.

27. The taste receptors are located around the small structures known as papillae found on the upper surface of the tongue, these are chemoreceptors.

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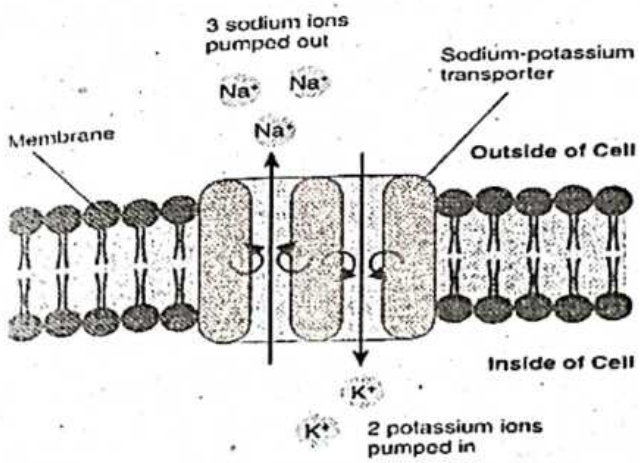
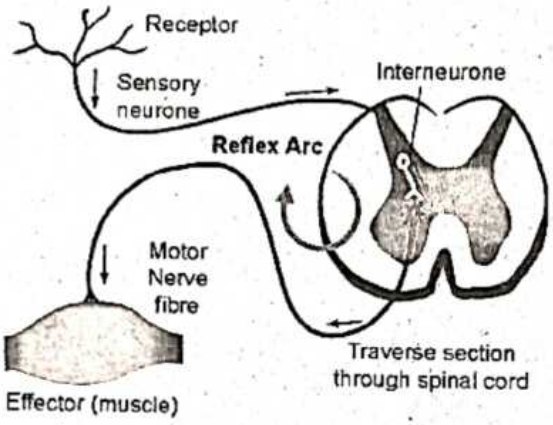
29.



30. Neurotransmitters are endogenous chemicals acting as signaling molecules that enable the transmission of nerve impulse.

31. ADH and oxytocin are secreted by neuromuscular cells of hypothalamus. They are temporarily stored in nerve endings in posterior lobe of pituitary gland. Then they are released from posterior lobe of pituitary into blood.

32.



33. 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.

34. Minimum intensity of stimulus that is required to initiate a nerve impulse is called threshold stimulus.

35. Neurotransmitters are endogenous chemicals acting as signaling molecules that enable the transmission of nerve impulse. Acetylcholine is neurotransmitter for synapse outside CNS while adrenalin, nor-epinephrine, serotonin and dopamine in CNS.

36. 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.

14 TOPIC REPRODUCTION

PRACTICE EXERCISE

TOPIC-WISE MCQs

SPERMATOGENESIS

Q.1 Which one of the following is a diploid structure?
A) Secondary spermatocyte
B) Primary spermatocyte
C) Spermatid
D) Spermatozoa

Q.2 Spermatozoa are formed from spermatids as a result of:
A) Mitosis
B) Meiosis I
C) Differentiation
D) Meiosis II

Q.3 Human sperm and ova show similarities in following respect:
A) Both are haploid
B) Both are having approximately same size
C) Both carry identical genetic makeup
D) Both possess good mobility

Q.4 Production of slightly acidic fluid with citrate as a main nutrient source is the function of:
A) Bulbourethral gland
B) Seminal vesicles
C) Prostate gland
D) Cowper's gland

Q.5 Structure that undergoes meiosis I is:
A) Primary spermatocyte
B) Secondary spermatocyte
C) Spermatid
D) Spermatogonium

Q.6 Site for the occurrence of spermatogenesis within testes:
A) Leydig cells
B) Sertoli cells
C) Granulosa cells
D) Seminiferous tubules

Q.7 Which one of the following structure is least differentiated?
A) Spermatid
B) Spermatogonium
C) Spermatocyte
D) Spermatozoa

Q.8 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.9 Main function performed by bulbourethral gland in humans is/are:
A) Sperm maturation
B) Sperm production
C) Neutralization of urethra
D) Semen formation

Q.10 How many spermatozoa and ova are produced from 50 primary spermatocytes and 50 primary oocytes?
A) 200 spermatozoa and 100 ova
B) 100 spermatozoa and 50 ova
C) 200 spermatozoa and 50 ova
D) 100 spermatozoa and 100 ova

Q.11 Motile and completely mature cell with flagellum is:
A) Spermatid
B) Spermatogonium
C) Spermatocyte
D) Spermatozoa

Q.12 Process of spermatogenesis in males continuously occurs from:
A) Birth to death
B) Birth to puberty
C) Puberty to adulthood
D) Puberty to death

Q.13 Division in germinal epithelium directly produces:
A) Spermatids
B) Spermatocytes
C) Sperms
D) Spermatogonia

Q.14 Sertoli cells are found:
A) Outside of seminiferous tubules
B) In Vas deferens
C) Inside seminiferous tubules
D) In interstitium

OOGENESIS

Q.15 Fertilization of a secondary oocyte by sperm takes place at:
A) Proximal part of cervix
B) Proximal part of uterine tube
C) Distal part of oviduct
D) Distal part of cervix

Q.16 Oogenesis in human females start:
A) At puberty
B) Before puberty
C) Before birth
D) After puberty

Q.17 First polar body is formed as a result of:
A) Differentiation of oocyte
B) Mitotic cell division in spermatocytes
C) 1st meiotic division in primary oocyte
D) 2nd meiotic division in primary oocyte

MENSTRUAL CYCLE

Q.18 Progesterone production within ovaries is accomplished by following structure:
A) Primary follicle
B) Graffian follicle
C) Ruptured follicle
D) Corpus albican

Q.19 The layer of uterus that is shed with each reproductive cycle is:
A) Mesometrium
B) Myometrium
C) Endometrium
D) Perimetrium

Q.20 Maximum chances of fertilization in human females exist usually during ____ of reproductive cycle.
A) 11th to 14th day
B) 14th to 16th day
C) Immediately after menstruation
D) 6th to 9th day

Q.21 After fertilization, embryo implants itself to the _____ part of uterus.
A) Endometrium
B) Mesometrium
C) Myometrium
D) Perimetrium

Q.22 In a menstrual cycle of 45 days, what would be the most probable day of ovulation?
A) 14th
B) 40th
C) 31th
D) 20th

Q.23 Endometrium shows maximum thickness during:
A) Start of proliferative phase
B) End of Proliferative phase
C) Secretary phase
D) Menstruation

Q.24 Menstruation is the discharge of:
A) Blood, water and cellular debris
B) Lymph, mucous and solid debris
C) Blood, mucous and cellular debris
D) Lymph, blood and cellular debris

Q.25 The development of secondary oocyte into ovum is completed in:
A) Uterine tube
B) Uterus
C) Ovary
D) Graffian follicle

Q.26 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) Duration will be less than 28 days
C) Menstrual cycle stops completely
D) Menstrual cycle remains unaffected

Q.27 Menstruation usually continues:
A) 3–7 days
B) 1–3 days
C) 20–22 days
D) 15–17 days

Q.28 In young females, ovulation occurs at _____ day of reproductive cycle.
A) 18^{th}
B) 28^{th}
C) 14^{th}
D) 24^{th}

HORMONAL CONTROL

Q.29 Layer of uterus that is under control of estrogen:
A) Mesometrium
B) Myometrium
C) Endometrium
D) Perimetrium

Q.30 Which one of the following causes growth and development of germinal epithelium of the testes?
A) Inhibin
B) Testosterone
C) LH
D) FSH

Q.31 Placental hormone that prepares mammary glands for lactation is:
A) Estrogen
B) Lactogen
C) LTH
D) Progesterone

Q.32 During estrous cycle, estrogen production:
A) Prepares the uterus for conception fully
B) Does not prepares uterus for conception either partly or fully
C) Prepares uterus for conception partly
D) Gets stopped permanently before conception

Q.33 Enlargement of mammary glands at the onset of puberty is under the control of:
A) Estrogen
B) Oxytocin
C) Prolactin
D) Placental lactogen

Q.34 Estrogen is the dominant hormone during _____ phase of menstrual cycle.
A) Secretary phase
B) Proliferative phase
C) Luteal phase
D) Menstrual phase

Q.35 Stimulus for the release of LH from pituitary is/are:
A) Decrease in FSH
B) Increase in estrogen
C) Both A & B
D) Increase in progesterone

Q.36 Ruptured follicle serves as a source of _____ hormone.
A) Estrogen
B) Progesterone
C) Inhibin
D) Oxytocin

Q.37 Major hormonal change associated with ovulation is:
A) Peak level of FSH
B) Peak level of Progesterone
C) Peak level of LH
D) Peak level of Oxytocin

Q.38 Rapid increase in the level of estrogen in menstrual cycle signifies that:
A) Ovulation has occurred
B) Ovulation is occurring
C) Ovulation is about to occur
D) Ovulation cannot occur

Q.39 Which two hormones exhibit positive feedback during normal menstrual cycle?
A) FSH and Inhibin
B) Estrogen and Progesterone
C) Estrogen and LH
D) Progesterone and GnRH

Q.40 Which one of the following stops ovulation during pregnancy?
A) Estrogen
B) Thyroxin
C) Progesterone
D) LTH

Q.41 Release of FSH and development of primary follicles starts:
A) During foetal development
B) Before birth
C) Right after birth
D) At puberty

Q.42 LH in males mainly acts on:
A) Epididymis
B) Interstitial cells
C) Sertoli cells
D) Germinal epithelium

PAST PAPER MCQs

2009

Q.1 Which of the following will happen if fertilization does not occur?

A) Menopause starts
B) Corpus luteum degenerates
C) FSH secretion is increased
D) Progesterone secretion is increased

2010

Q.2 Which of the following sequence is correct?

A) LH → FSH → Estrogen →Progesterone
B) FSH → LH → Progesterone → Estrogen
C) FSH → Estrogen → Progesterone → LH
D) FSH → Estrogen → LH → Progesterone

Q.3 The first cells produced by the repeated cell division of germinal epithelium of testis are:

A) Interstitial cells
B) Spermatogonia
C) Secondary spermatocytes
D) Spermatids

2011

Q.4 A type of cell in human testes which produces testosterone is called:

A) Interstitial Cells
B) Germ Cells
C) Sertoli Cells
D) Spermatocytes

Q.5 Breakdown of endometrium during menstruation is due to:

A) Increase in Level of LH
B) Decrease in Level of Progesterone
C) Increase in Level of Progesterone
D) Increase in Level of Estrogen

Q.6 Luteinizing hormone triggers:

A) Cessation of Oogenesis
B) Breakdown of Oocyte
C) Ovulation
D) Development of Zygote

Q.7 Oogonia are produced in the germ cells:

A) Both Uterus and Cervix
B) Cervix
C) Uterus
D) Ovary

2012

Q.8 Second meiotic division in the secondary oocyte proceeds as far as:

A) Metaphase
B) Prophase
C) Anaphase
D) Telophase

Q.9 Discharge of ovum or secondary oocyte from ovary or from Graafian follicle is called:

A) Fertilization
B) Pollination
C) Follicle formation
D) Ovulation

Q.10 Which one of the following differentiates directly into mature sperm?

A) Primary spermatocyte
B) Secondary spermatocyte
C) Spermatogonia
D) Spermatid

2013

Q.11 What is the location of interstitial cells in testes?

A) Inside the seminiferous tubules
B) Between the seminiferous tubule
C) Among the germinal epithelial cells
D) Around the testes

Q.12 A type of cells in human testes which produce testosterone are called?

A) Germ cells
B) Sertoli cells
C) Interstitial cells
D) Spermatocytes

Q.13 The hormone produced from corpus luteum is:

A) Prolactin
B) FSH
C) Progesterone
D) LH

Q.14 **Spermatogonia differentiate directly into?**
A) Primary spermatocytes
B) Secondary spermatocytes
C) Spermatozoa
D) Spermatids

2014
Q.15 **Testosterone is produced by which one of the following?**
A) Sertoli cells
B) Germinal epithelium
C) Interstitial cells
D) Spermatogonia

Q.16 **The oocyte released during ovulation is in:**
A) Anaphase I
B) Prophase I
C) Metaphase I
D) Metaphase II

Q.17 **Yellowish glandular structure formed after the release of egg from follicle is called:**
A) Corpus callosum
B) Graafian follicle
C) Corpus luteum
D) Follicle atresia

Q.18 **On puberty, the development of primary follicles is stimulated by:**
A) ICSH
B) FSH
C) LH
D) Estrogen

2015
Q.19 **In females, FSH stimulates the ovary to produce:**
A) Progesterone
B) Prolactin
C) Estrogen
D) Oxytocin

Q.20 **In which phase of human female menstrual cycle, endometrium prepares for the implantation of embryo?**
A) Proliferative phase
B) Menstrual phase
C) Secretory phase
D) Ovulation phase

2016
Q.21 **Events of menstrual cycle are regulated by the:**
A) Ethylene
B) Gonadotrophins
C) Auxins
D) Gibberellins

Q.22 **Decrease of FSH and increase of estrogen cause pituitary gland to secrete:**
A) Somatotropin
B) Luteinizing hormone
C) Testosterone
D) Spermatogonium

2017
Q.23 **FSH stimulates the production of estrogen hormone which has two targets_____ and _____.**
A) Uterus, posterior pituitary
B) Ovaries, uterus
C) Uterus, anterior pituitary
D) Ovaries, hypothalamus

Q.24 **Ovulation is suppressed by progesterone via:**
A) Inhibition of LH only
B) Inhibition of FSH & stimulation of LH
C) Inhibition of LH & stimulation of FSH
D) Inhibition of both FSH & LH

Q.25 **Which of the following directly develops into sperms:**
A) Primary spermatocytes
B) Spermatids
C) Secondary spermatocytes
D) Spermatogonia

2017 Re-Take
Q.26 **Which of the following hormone suppresses ovulation?**
A) Progesterone
B) Insulin
C) F.S.H
D) Prolactin

Q.27 Which of the following hormone causes ovulation?

A) LH
B) Progesterone
C) Estrogen
D) FSH

Q.28 Meiosis occurs in human females during:

A) Ovulation
B) Gametogenesis
C) Spermatogenesis
D) Spermiogenesis

2018

Q.29 Which hormone is released in female in response to FSH from pituitary gland?

A) Oxytocin
B) ADH
C) Estrogen
D) Progesterone

Q.30 Which of the following hormone acts on the uterus wall for thickening?

A) Zona pellucida
B) Progesterone
C) Oxytocin
D) Follicle stimulating hormone

2019

Q.31 Which hormonal pair would maintain the endometrium and make it receptive for implantation of embryo?

A) Luteinizing Hormone and Progesterone
B) Estrogen and Follicle Stimulating Hormone
C) Luteinizing Hormone and Follicle Stimulating Hormone
D) Estrogen and Progesterone

Q.32 Which of the following hormone stimulates the ovulation from the follicle into oviduct?

A) Luteinizing hormone
B) Follicle stimulating hormone
C) Estrogen
D) Progesterone

Q.33 During spermatogenesis, the _____, which are haploid cells eventually mature into spermatozoa/mature sperms?

A) Secondary spermatocytes
B) Primary spermatocytes
C) Spermatogonia
D) Spermatids

ANSWER KEY

TOPIC-WISE MCQs

1	B	11	D	21	A	31	B	41	D
2	C	12	A	22	C	32	C	42	B
3	A	13	D	23	C	33	A		
4	C	14	C	24	C	34	B		
5	A	15	B	25	A	35	C		
6	D	16	C	26	D	36	B		
7	B	17	C	27	A	37	C		
8	C	18	C	28	C	38	C		
9	C	19	C	29	C	39	C		
10	C	20	B	30	D	40	C		

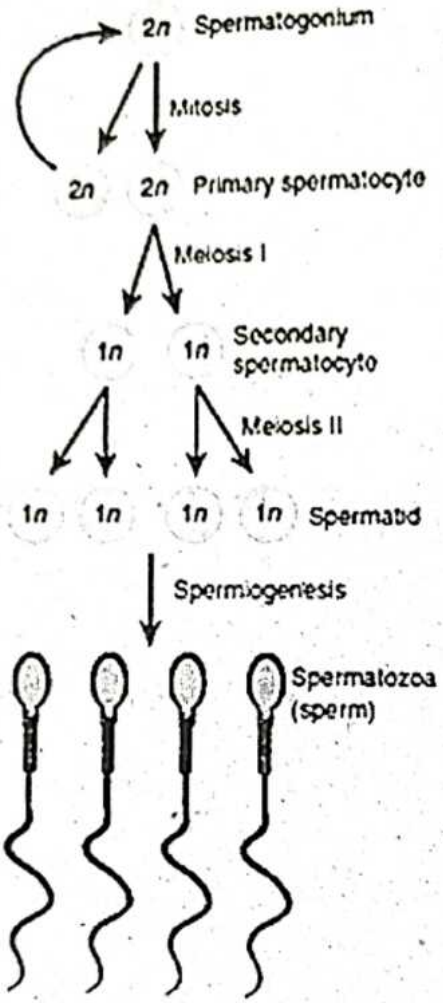
PAST PAPERS MCQs

1	B	11	B	21	B	31	D
2	D	12	C	22	B	32	A
3	B	13	C	23	C	33	D
4	A	14	A	24	A		
5	B	15	C	25	B		
6	C	16	D	26	A		
7	D	17	C	27	A		
8	A	18	B	28	B		
9	D	19	C	29	C		
10	D	20	C	30	B		

EXPLANATORY NOTES

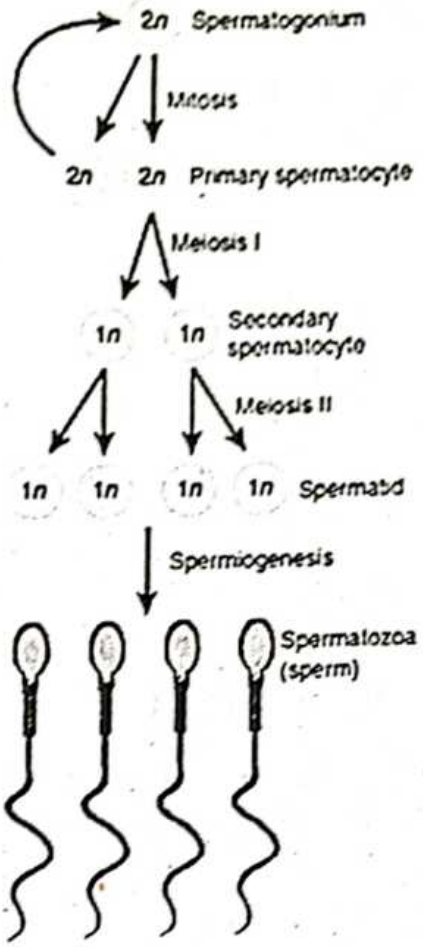
TOPIC-WISE MCQs

1.



2. Spermatid is spherical, non-motile cell. Through differentiation, it is changed into spermatozoa where it forms tail and becomes motile.
3. Both the sperm and ova are formed as a result of meiosis and are haploid cells. All others are dissimilarities.
4. The prostate gland is a male reproductive part whose main function is to secrete prostate fluid (acidic fluid with citrate), one of the components of semen.

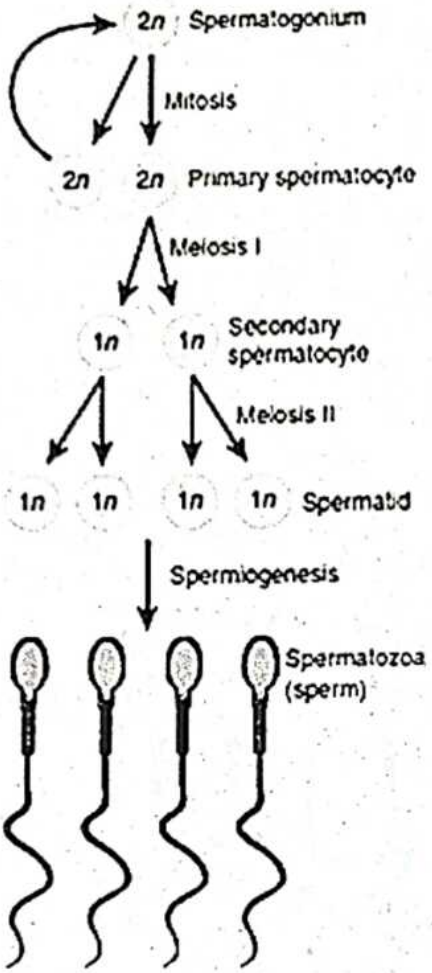
5.



6. The site where the process of spermatogenesis takes place is the seminiferous tubules which contain germinal epithelium.

7. Spermatogonium cell produced at an early stage in the formation of spermatozoa, formed in the wall of a seminiferous tubule and is said to be least differentiated.

8.



9. 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.

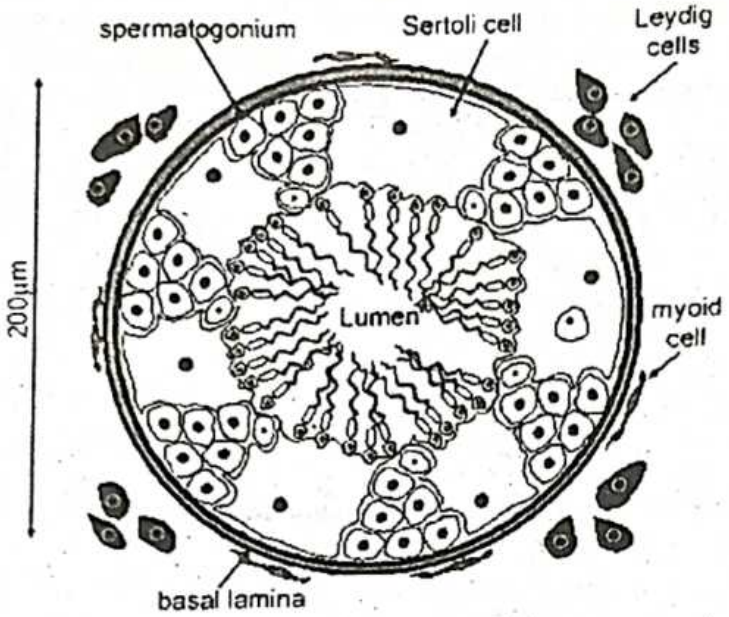
10. Each primary spermatocyte produces four sperms while each primary oocyte gives rise to one ovum (secondary oocyte) and three polar bodies.

11. The mature motile male sex cell of an animal, by which the ovum is fertilized, typically having a compact head and one or more long flagella for swimming is said to be the spermatozoa/sperm.

12. In males, the process of sperm formation is not cyclic; it continues to occur throughout the life.

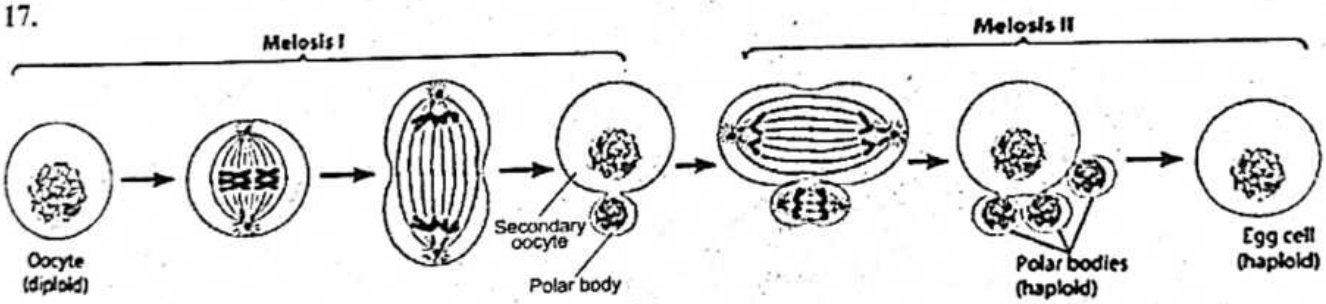
13. Spermatogonia is the cell produced at an early stage in the formation of spermatozoa. formed in the wall of a seminiferous tubule and is differentiated into spermatocytes.

14.



15. Oviduct is also called as uterine tube. Its proximal end is important for fertilization.
16. In human female, the first part of meiosis begins in the embryo, and the signal to resume meiosis is not given until roughly 12 years later at puberty.

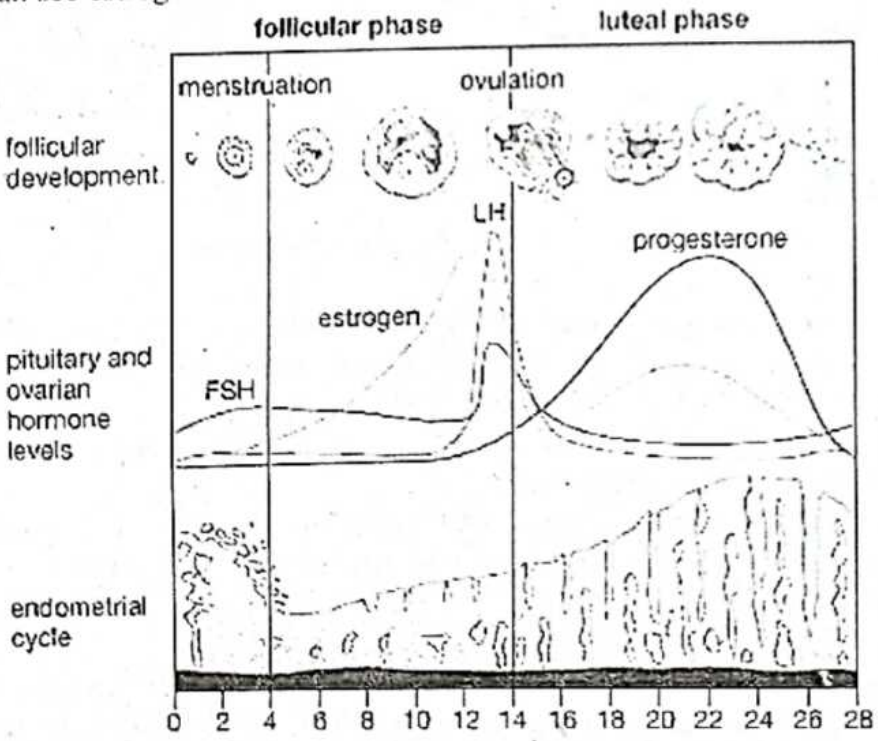
17.



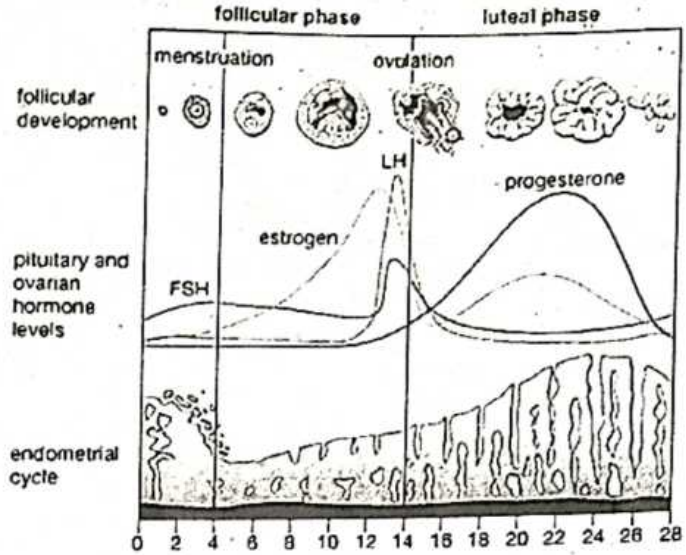
(b) Gamete formation in the female

18. Progesterone is secreted from corpus luteum which contains ruptured follicles during luteal phase.
19. 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.
20. Normally 14th day is the day of ovulation and according to the life span of egg and sperms option B is the most appropriate one.
21. 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 conception, the embryo finally reaches the uterus, where it implants itself in the endometrium.
22. 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 C is the right answer.
23. 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.

24. 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.
25. Secondary oocyte proceeds to ovum if it is fertilized. The site of fertilization is uterine tube.
26. 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.
27. The menstrual cycle is governed by hormonal changes. It takes 3-7 days to regain original form of uterus for next cycle.
28. In normal menstrual cycle, ovulation usually occurs at mid cycle, i.e. 14th day.
29. Thickness of endometrium changes in different phases of menstrual cycle. Estrogen and progesterone make it more thick and spongy.
30. Follicle stimulating hormone is one of the hormones essential to pubertal development and the function of women's ovaries and men's testes.
31. Placental lactogen prepares mammary glands for lactation. LTH releases from pituitary not from placenta.
32. During estrous cycle, estrogen production prepares uterus for conception partly but in menstrual cycle completely.
33. One of the functions of estrogens is development of female secondary sexual characteristics. These include development of breasts, endometrium, regulation of the menstrual cycle etc.
34. As we can see estrogen is dominant during proliferative phase.



35. As we can see LH is released when level of FSH decreases and that of estrogen increases.



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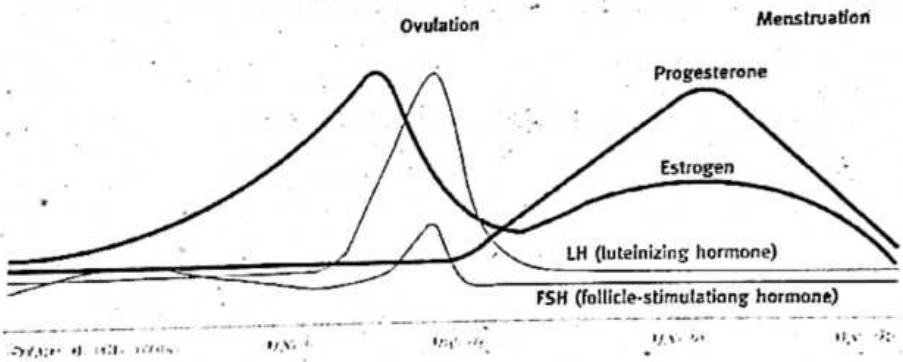

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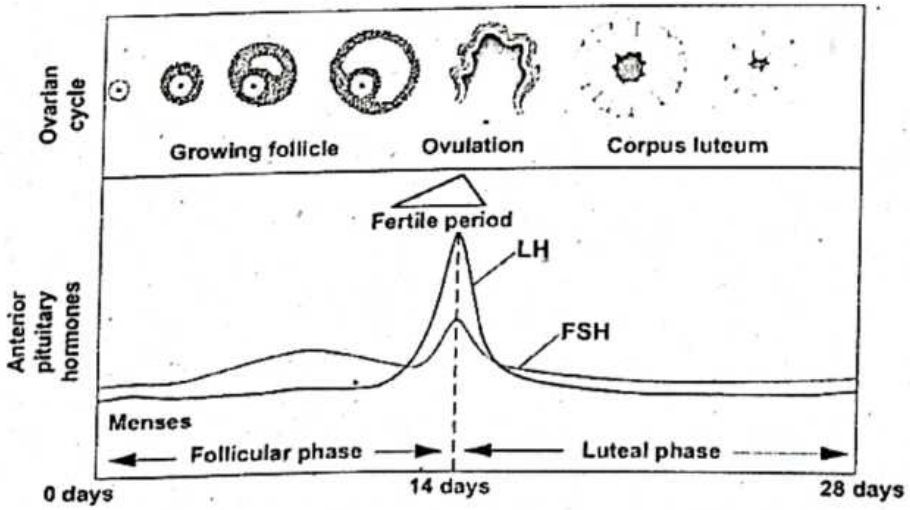

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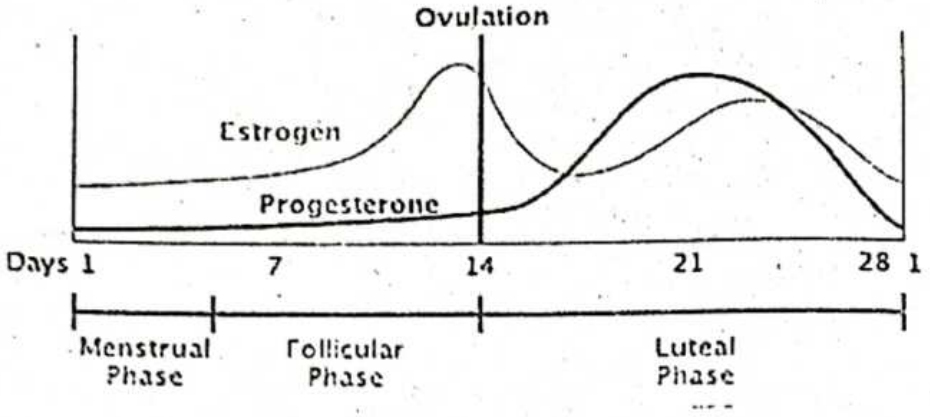


39. Decrease of FSH and increase of estrogen, causes the pituitary gland to secrete LH which induces ovulation.

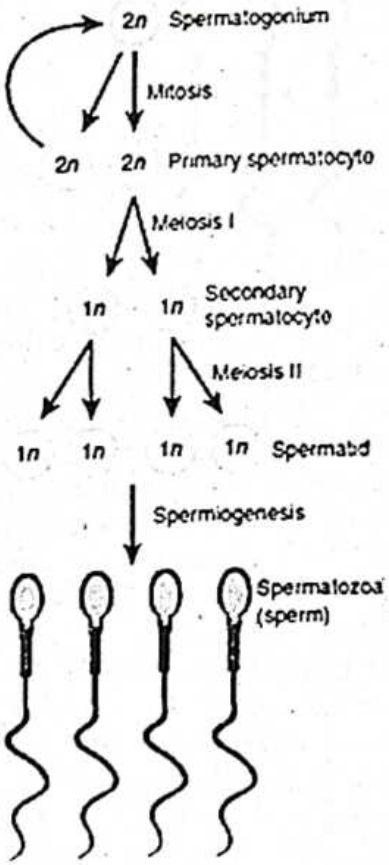
40. If a pregnancy occurs, progesterone is produced in the placenta and levels remain elevated throughout the pregnancy. It maintains pregnancy and is also involved in stopping ovulation during pregnancy.

41. Primary follicles form before birth and stay in the pachytene stage of meiosis-I. At the time of puberty FSH releases from the pituitary and this primary follicle moves to the next stages of development.

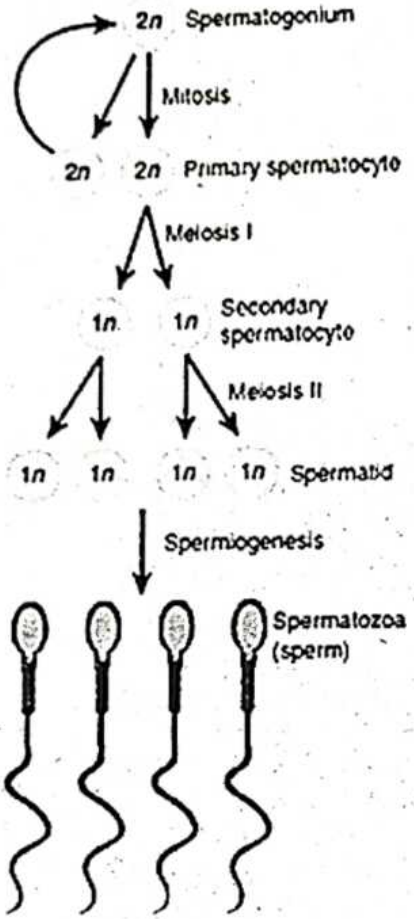
42. LH is also called as interstitial cells stimulating hormone (ICSH) which also act on interstitial cells to produce the testosterone.

PAST PAPER MCQs

1. If fertilization does not occur, the corpus luteum starts degenerating. The progesterone secretion diminishes and its supporting effect on the spongy endometrium is reduced. which suffers a breakdown.
2. FSH from pituitary acts on follicle cells of ovary. During the development of follicles estrogen is secreted which inhibits the secretions of FSH and promotes the secretions of LH. LH causes ovulation, which results the formation of ruptured follicles known as carpus luteum which is source of progesterone.
3. Spermatogonium cell produced at an early stage in the formation of spermatozoa. formed in the wall of a seminiferous tubule and giving rise by mitosis to spermatocytes.
4. LH is also called as interstitial cells stimulating hormone (ICSH) which also act on interstitial cells to produce the testosterone.
5. If fertilization does not occur, the corpus luteum starts degenerating. The progesterone secretion diminishes and its supporting effect on the spongy endometrium is reduced. which suffers a breakdown.
6. Decrease of FSH and increase of estrogen, causes the pituitary gland to secrete LH which induces ovulation.
7. Oogenesis starts before birth in ovary when oogonia divide mitotically to produce primary oocytes.
8. 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.
9. The release of the ripe egg (ovum) from the ovary. The egg is released when the cavity surrounding it (the follicle) breaks open in response to a hormonal signal.
10.



11. 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.
12. LH is also called as interstitial cells stimulating hormone (ICSH) which also act on interstitial cells to produce the testosterone.
13. LH causes ovulation, which results the formation of ruptured follicles known as carpus luteum which is source of progesterone.
14.

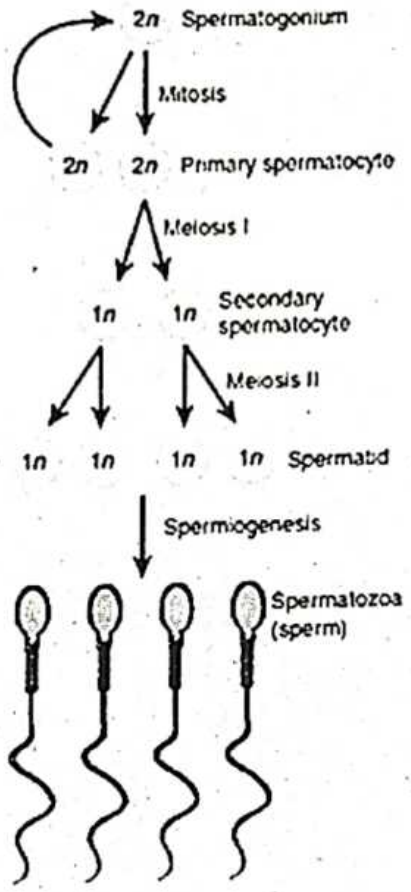


15. LH is also called as interstitial cells stimulating hormone (ICSH) which also act on interstitial cells to produce the testosterone.
16. Secondary oocyte undergoes through meiosis II but arrested in Metaphase II. It is released in this stage from ovary and does not proceed further until fertilized.
17. 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.
18. Pituitary gland on the onset of puberty, releases FSH which stimulates the development of several primary follicles.
19. Ovary under influence of FSH produces estrogen.
20. The second half of the menstrual cycle after ovulation; the corpus luteum secretes progesterone which prepares the endometrium for the implantation of an embryo.
21. Events of menstrual cycle are regulated by pituitary gonadotrophins.
22. Decrease of FSH and increase of estrogen, causes the pituitary gland to secrete LH which induces ovulation.

23. Estrogen, on one hand, stimulates the endometrium and vascularizes it. On the other hand, it inhibits secretion of FSH from anterior lobe of pituitary.

24. An increase of progesterone inhibits the release of LH, because that's what normally causes progesterone to be secreted.

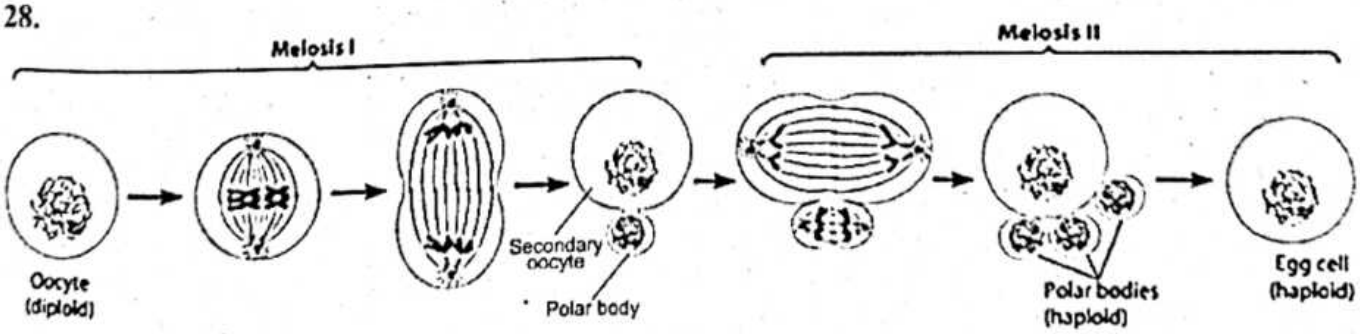
25.



26. An increase of progesterone inhibits the release of LH, because that's what normally causes progesterone to be secreted.

27. LH causes ovulation, which results the formation of ruptured follicles known as carpus luteum which is source of progesterone.

28.

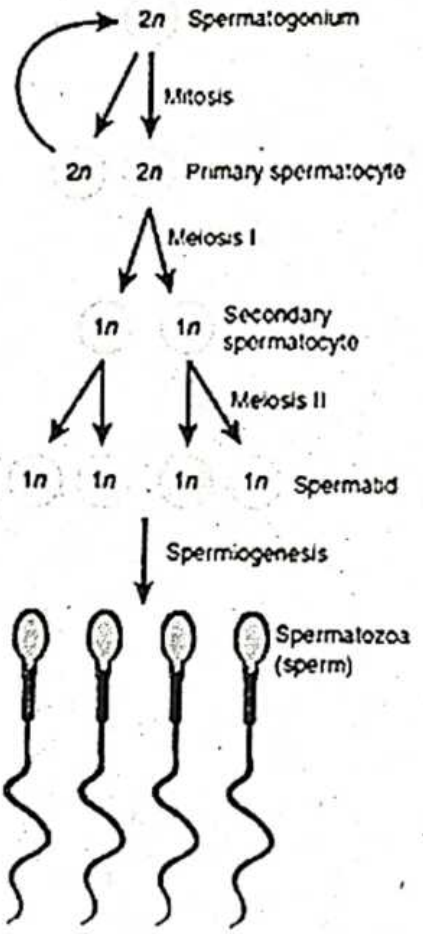


(b) Gamete formation in the female

29. Ovary under influence of FSH produces estrogen.

30. Thickness of endometrium changes in different phases of menstrual cycle. Estrogen and progesterone make it more thick and spongy.

31. Both estrogen and progesterone have supportive effect on endometrium.
32. LH causes ovulation, which results the formation of ruptured follicles known as carpus luteum which is source of progesterone.
33.



15 TOPIC GENETICS

PRACTICE EXERCISE

TOPIC-WISE MCQs

BASICS OF GENETICS

Q.1 The alleles are:

A) A pair of genes governing a specific character
B) Multiple forms of genes
C) Genes governing eye characters
D) Genes present onallosomes

Q.2 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.3 An organism's genetic constitution is called its:

A) Genotype
B) Phenotype
C) Genetics
D) Gene pool

Q.4 An organism with two identical alleles for a given trait is:

A) Homozygous
B) Heterozygous
C) Dominant
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) Genotypes
C) Phenotypes
D) Karyotype

Q.6 The dwarfness in plants of F_2 generation is due to:

A) Homozygous recessive alleles
B) Heterozygous dominant alleles
C) Homozygous dominant alleles
D) Heterozygous recessive alleles

Q.7 All the genes/alleles found in a breeding population at a given time are collectively termed as:

A) Genome
B) Genotype
C) Gene pool
D) Karyotype

Q.8 _____ is the physiological effect of an allele over its partner allele on the same gene locus.

A) Dominance
B) Epistasis
C) Pleiotropy
D) Polymeric gene interaction

Q.9 The contrasting pair of alleles for all the seven traits chosen by Mendel showed:

A) Complete dominance
B) Incomplete dominance
C) Partial dominance
D) Over dominance

Q.10 In humans, the blood group with MN phenotype has both the antigens, simultaneously produced by their allele L^M and L^N. It is because of:

A) Complete dominance
B) Over dominance
C) Co-dominance
D) Incomplete dominance

Q.11 Inheritance of ABO blood group system is an example of

A) Multiple allelism
B) Partial dominance
C) Epistasis
D) Pleiotropy

Q.12 **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 two of them in its genome
C) Have four of them in its genome
D) Have multiple of them in its genome

Q.13 **In humans, the polymorphic gene 'I' has three multiple alleles which are the result of:**
A) Epistasis
B) Pleiotropy
C) Mutation
D) Gene linkage

Q.14 **The genotype of blood group 'A' can be:**
A) I^AI^A
B) I^BI^B
C) I^AI^A or I^AI^O
D) I^AI^O

Q.15 **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 'B'
C) Blood group 'AB'
D) Blood group 'O'

Q.16 **If a female has 'A' blood group and her husband has 'O' blood group, then the blood group of their children possibly be:**
A)A and B groups only
B) AB only
C) A and O groups only
D) All four groups

Q.17 **ABO blood grouping is controlled by gene I which has three alleles and show co-dominance. There are six genotypes. How many phenotypes in all are possible?**
A) Six
B) Three
C) Four
D) Five

Q.18 **All of the following can form a linkage group on human chromosome 11 except:**
A) Gout
B) Sickle cell anemia
C) albinism
D) Leukemia

Q.19 **Which of the following blood groups is not possible in a person whose father is of blood group O?**
A) AB
B) A
C) B
D) O

Q.20 **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) 25%
C) 75%
D) 0%

Q.21 **Which of the following blood group is considered as universal donor?**
A) AB^{+ve}
B) AB^{-ve}
C) O^{-ve}
D) O^{+ve}

Q.22 **Blood group antigens can be found in?**
A) RBCs
B) Saliva
C) Body fluids
D) ALL A, B, C

GENE LINKAGE: CROSSING OVER AND RECOMBINATION FREQUENCY

Q.23 **Which of the following will not result in variations among siblings?**
A) Independent assortment of genes
B) Crossing over
C) Linkage
D) Mutation

Q.24 **The recombination frequency is 20% between the two genes. The distance between them in unit map is:**
A) 20
B) 30
C) 60
D) 80

CONTINUOUS AND DISCONTINUOUS VARIATIONS

Q.25 A wheat grain has genotype AabbCc. What will be its color?

A) Red
B) Light pink
C) Pink
D) Light red

Q.26 Which of the following is an example of multiple alleles?

A) ABO blood group
B) Wheat grain color
C) Skin color
D) Height

Q.27 In human beings, the colour of skin is controlled by

A) Multiple alleles
B) Lethal genes
C) Polygenic effect
D) Epistatic effect

MONOHYBRID CROSS, DIHYBRID CROSSES AND TEST CROSS

Q.28 In Mendelism, the linkage was not observed due to:

A) Mutation
B) Independent assortment
C) Synapsis
D) Crossing over

Q.29 A cross between plants having RRYY and rryy composition will yield plants with

A) Round and yellow seeds
B) Round and green seeds
C) Wrinkled and yellow seeds
D) Wrinkled and green seeds

Q.30 A cross between a homozygous recessive and a heterozygous plant is called

A) Monohybrid cross
B) Dihybrid cross
C) Test cross
D) Back cross

Q.31 In Mendel's experiments, the phenotypic ratio of recessive to dominant plants was equal to:

A) 1:3
B) 3:1
C) 3:9
D) 9:3

Q.32 Self-cross between Tt and Tt plants results into the genotype ratio of

A) 3 : 1
B) 1 : 2 : 1
C) 1 : 3
D) 4 : 0

Q.33 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) Three
C) Four
D) Eight

Q.34 In Mendelian dihybrid cross, how many of progeny in F_2 generation possess genotype rryy?

A) $\frac{1}{16}$
B) $\frac{2}{16}$
C) $\frac{3}{16}$
D) $\frac{4}{16}$

Q.35 In the dihybrid cross, the number of round green seeds that were homozygous for round trait:

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

SEX LINKAGE IN HUMANS (HEMOPHILIA AND COLOR BLINDNESS

Q.36 A couple has a baby boy, the chances of baby girl as a next child are:

A) 100%
B) 50%
C) No chances
D) Cannot predict

Q.37 How many chromosomes in human male and female are similar?

A) 23
B) 45
C) 46
D) 44

Q.38 Which of the following is not a genetic disorder?

A) Hemophilia
B) Phenylketonuria
C) Colour blindness
D) Epilepsy

Q.39 If a 'Y' carrying sperm fertilizes the egg the zygote will be:

A) 45A+ YY
B) 44A+ XX
C) 44A+ XY
D) 43A+ X0

Q.40 Example of X-linked dominant trait is:

A) Hemophilia A
B) Hemophilia B
C) Tritanopia
D) Hypophosphatemia

Q.41 All of the following are non-allelic X-linked traits except:

A) Hemophilia A
B) Hemophilia B
C) Hemophilia C
D) TFM syndrome

Q.42 Which is not related to color blindness?

A) Zigzag pattern of inheritance
B) Rhodopsin
C) Passes directly from father to son
D) More common in men

Q.43 _____ is male sex switch which triggers developmental process towards maleness.

A) Se
B) SRY
C) TFM
D) H

Q.44 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 sons will be color blind
C) All daughters will be carriers
D) Half of the sons will be color blind

Q.45 All daughters of a diseased father and a normal mother are affected by the disease. This disease is probably:

A) Hemophilia
B) Hypophoshatemic rickets
C) Blue cone monochromacy
D) Protanopia

Q.46 All of the following diseases are related to X chromosome except:

A) Tritanopia
B) Hemophilia
C) Duchenne muscular dystrophy
D) Testicular feminization

Q.47 What is the probability of a hemophilic daughter of a normal man whose father was hemophilic and a carrier woman?

A) 0%
B) 25%
C) 50%
D) 75%

PAST PAPER MCQs

2008

Q.1 **Position of a gene on the chromosome is called its:**
A) Phenotype
B) Locus
C) Junction
D) Genotype

Q.2 **The color phenotype of the grain is the sum of individual effects of _____ alleles.**
A) Six
C) Five
B) Four
D) Five or three

Q.3 **The genes of blue opsins are present on:**
A) Autosome 9
B) Autosome 7
C) Autosome 1
D) Autosome 3

2009

Q.4 **If all the members of a population are homozygous for the same allele, that allele is said to be:**
A) Random in population's pool
B) Fixed in population's pool
C) Random in a species
D) Fixed in the gene pool

Q.5 **Which one ofthe following is correct about 'Rh$^+$' blood?**
A) Will produce anti-Rh antibodies if given Rh$^+$ blood
B) Cannot produce anti-Rh antibodies in any case
C) Rh+ antigens are present on RBCs
D) Rh+ antibodies are present in blood

Q.6 **What is true about pattern baldness?**
A) It is autosomal recessive disease in males
B) It is autosomal dominant disease in males
C) It is X-linked disease
D) It is Y-linked disease

2010

Q.7 **The karyotype of an individual is _____ of chromosomes.**
A) Number
B) Types
C) Number, types and chemical composition
D) Number and type

Q.8 **Gene for albinism in man is present on chromosome number:**
A) 11
B) 22
C) 21
D) 12

Q.9 **When a disease is transmitted directly from an affected father to his son, it is called:**
A) X-linked
B) Autosomal
C) Y-linked
D) X and Y-linked

2011

Q.10 **Which trait in humans is an example of multiple alleles?**
A) Eye colour
B) Skin colour
C) ABO-blood group
D) Rh-Blood group

Q.11 **Which of the following will be hemophilic?**
A) X^HX^h
B) X^HX^H
C) X^hY
D) X^HY

Q.12 **Which of the following is an example of X-linked recessive trait in humans?**
A) Hypophosphatemic rickets
B) Colour blindness
C) Baldness
D) Beard growth

2012

Q.13 The gene for ABO-blood group system in humans is represented by symbol:

A) X C) Y
B) I D) O

2014

Q.14 Position of a genewithin a DNA molecule is:

A) Locus C) Amplicon
B) Origin D) Filial

2015

Q.15 ABO blood system is an example of:

A) Polygenes C) Multiple alleles
B) Multiple genes D) Multiple mutation

Q.16 Human skin color is a good example of:

A) Sex linked inheritance C) X-linked inheritance
B) Polygenic inheritance D) Y-linked inheritance

Q.17 Number of pairs of autosomes in humans is:

A) 23 C) 21
B) 24 D) 22

Q.18 X-linked recessive trait is:

A) Hypophosphatemia C) Haemophilia
B) Vitamin-D resistant rickets D) Diabetes mellitus

2016

Q.19 The total number of genes in a population is called:

A) Gene pool C) Genome
B) Allele pool D) Genomic library

Q.20 A character determined by three alleles is:

A) Human skin color C) Human eye color
B) Human blood group D) Human Rh factor

Q.21 Which one of the following is X-linked trait?

A) Male pattern baldness C) Haemophilia
B) Diabetes mellitus D) Erythroblastosisfoetalis

2017

Q.22 Locus stands for:

A) Position of gene on homologous chromosomes
B) Regions of chromosomes
C) Position of an allele within a DNA molecule
D) Close regions of same chromosomes

Q.23 Self-fertilization of F_1 dihybrids, following independent assortment of alleles will result in:

A) 3/16 tall, round: 3/16 dwarf, wrinkled C) 9/16 tall, round: 1/16 3/16dwarf, round
B) 9/16 tall, wrinkled: 3/16dwarf, round D) 3/16 tall, wrinkled: 3/16 dwarf, round

Q.24 As a result of cross-fertilization of true breeding pea plant having purple colored flowers with that of white colored flowers, the offsprings will have flower with:

A) ¼ purple and ¾ white C) All white
B) ¼ white and ¾ purple D) All purple

Q.25 Pure breeding lines of Pea were taken regarding seed shape – Round and Wrinkled and were crossed with no intermediate between parents. All offsprings were found to be round. These results show:

A) Co-dominance
B) Dominant – recessive relationship of alleles
C) Incomplete dominance
D) Over dominance relationship

Q.26 The gene for red-green color blindness is present on:

A) Y–chromosome
B) X–chromosome
C) Autosome No. 7
D) Autosome No.9

2017-Retake

Q.27 Different alleles of a gene that are both expressed in a heterozygous condition are called:

A) Complete dominance
B) Incomplete dominance
C) Co-dominance
D) Over-dominance

2018

Q.28 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 _____.

A) Locus
B) Gene
C) Allele
D) Kinetochore

Q.29 _____ is the exact position of a gene on the chromosome.

A) Genotype
B) Locus
C) Centromere
D) Trait

Q.30 Which one of the following is multiple allelic character?

A) Length of stem in pea plant
B) Shape of seed in pea plant
C)Blood group of the human being
D) Colour of flower in pea plant

Q.31 When two or more alleles do not show complete dominance or both the alleles are expressing independently in heterozygotic condition. Such a condition is called:

A) Complete dominance
B) Over-dominance
C) Co-dominance
D) Incomplete dominance

Q.32 There are_____ number of linkage groups in human.

A) 22
B) 23
C) 46
D) 80

Q.33 Chance of a cross over between two loci is directly proportional to their:

A) Length
B) Distance
C) Width
D) Thickness

2019

Q.34 Homozygous means:

A) Having two identical alleles of a gene
B) Having two identical genes
C) Alleles in an organism
D) Two different alleles of a gene
D) 100%

Q.35 In genetics, the term locus refers to the _____ of the gene on the chromosome.

A) Frequency
B) Copy
C) Position
D) Inversion

Q.36 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?

A) 50%
B) 25%
C) 75%
D) 100%

Q.37 In which situation, genes are not assorted independently during meiosis in a chromosome?

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 thejr loci are close to each other

Q.38 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? Select best answer from given condition.

$X^HX^hX^hY$

A) 100% all females and males will be haempohlic
B) Carrier female 25% haemophilic female 25%, 25% normal male and 25% haemophilic male
C) Females and males both have 50% chances to getting haemophilia
D) Females have 50% chances of getting haemophilia and females will be 100% haemophilic.

ANSWER KEY

TOPIC-WISE MCQs

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

PAST PAPERS MCQs

1	B	11	C	21	C	31	C
2	A	12	B	22	A	32	B
3	B	13	B	23	D	33	B
4	D	14	A	24	D	34	A
5	C	15	C	25	B	35	C
6	B	16	B	26	B	36	B
7	D	17	D	27	C	37	D
8	A	18	C	28	B	38	B
9	C	19	A	29	B		
10	C	20	B	30	C		

EXPLANATORY NOTES

TOPIC-WISE MCQs

1. Partner of a gene pair is known as allele.
2. Such an allele that masks the effect of other allele in a pair is called dominant allele and such trait is dominant.
3. Such an allele that masks the effect of other allele in a pair is called dominant allele and such trait is dominant.
4. When both alleles of a gene pair in an organism are same, the organism is homozygous for that gene pair.
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. The trait whose effect has been masked in F_1 generation but it reappears in F_2 generation is recessive.
7. 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.
8. Dominance is a physiological effect of an allele over its partner allele on the same gene locus.
9. The contrasting pair of alleles for all the seven traits chosen by Mendel showed complete dominance.
10. Both alleles are expressed fully in co-dominance. E.g., MN and AB blood group
11. All such altered alternative forms of a gene, whose number is more than two are called multiple alleles.
12. 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.
13. Gene mutations may produce many different alleles of a gene.
14.

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

15.

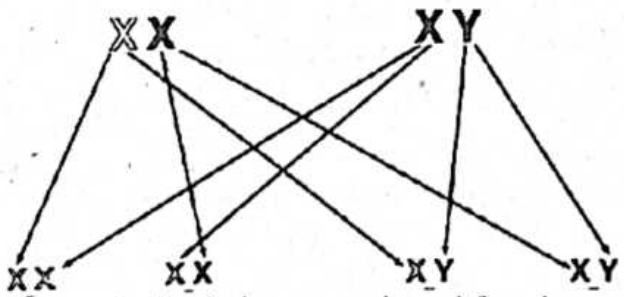
Phenotype	Genotype	Antigen	Antibody
A	I^AI^A, I^Ai	A	Anti-B antibody
B	I^BI^B, I^Bi	B	Anti-A antibody
AB	I^AI^B	A & B	No Antibody
O	ii	No	Anti-A antibody Anti-B antibody

16. Female has I^aI^a or I^ai and male is ii, same conditions will be in offsprings.
17. ABO blood group shows four different phenotypes, A, B, AB, and O.
18. Genes for colour blindness, haemophilia, gout etc form one linkage group on human X chromosome.
19. Father's genotype is ii so the blood group of offspring can,t be AB.

20. Male has ii genotype and female is I^Ai, there are 50% chances for the child with O blood group.
21. Blood group without any antigen can be donated to any other blood.
22. Blood group antigens can be found in RBCs, body fluids and saliva.
23. Gene linkage minimizes the chances of genetic recombination and variation among offsprings.
24. The recombination frequency is 20% between the two genes. The distance between them in unit map is 20.
25.

Genotype	Phenotype
AABBCC	Dark red
Aabbcc	White
Aabbcc/ aaBbcc/ aabbCc	Light pink
AAbbcc/ aaBBcc/ aabbCC/ AaBbcc/ aaBbCc/ AabbCc	Pink
AaBbCc/ AABbcc/ AabbCC	Light red
AABBcc/ aaBBCC/ AAbbCC	Red
AABBCc/ AABbCC/ AaBBCC	Moderately dark red

26. ABO blood group is first discovered multiple allelic blood group system in man.
27. A continuously varying trait is encoded by alleles of two or more different gene pairs found at different loci, all influencing the same trait in an additive way. Those quantitative traits are called ***polygenic traits*** and their genes are ***polygenes***.
Human skin colour is controlled by 3-6 gene pairs.
28. In Mendelism, the linkage was not observed due to independent assortment.
29. Round (RR) phenotype is dominant over wrinkle (rr) and yellow (YY) is dominant over green (yy). In F1 generation all plants will be round and yellow seeded.
30. It is a mating in which an individual showing a dominant phenotype is crossed with an individual showing its recessive phenotype. This cross finds out the homozygous or heterozygous nature of the genotype of dominant phenotypes.
31. In monohybrid cross the phenotypic ratio between plants during F2 generation would is 3:1.
32. When Tt is crossed with Tt then offsprings with TT, Tt, Tt and tt genotypes are produced.
33. Q.34 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, all plants will have TtRr genotype.
34. One out of sixteen plants of F2 dihybrid cross will have genotype rryy.
35. There is only single plant showing RRyy genotype in F2 generation of dihybrid cross.
36.



37. All 45 chromosomes are similar in human male and female except Y chromosome that is present in male but absent in female.

38. Hemophilia, colorblindness and Parkinson's disease are due to genetic disorders.
39. 44 chromosomes are autosomes in both male and female, egg has X while sperm has Y chromosome. When sperm fuses with egg resulting 44 autosomes+ XY sex chromosomes containing zygote will be produced.
40. ***Testicular feminization syndrome*** is a rare X-linked recessive trait. Similarly Haemophilia is also X-linked recessive.
41. Haemophilia A and Bare non-allelic recessive sex-linked but haemophilia C is an autosomal recessive trait(Autosome 4).
42. Like any sex-linked recessive traits, colourblindness is also moves zigzags from maternal grandfather through a carrier daughter to a grandson.
43. Sry gene definition, a sex-determining gene on the Y chromosome in mammals that determines maleness and is essential for development of the testes.
44.

Parental
Phenotypes Carrier Female x Normal Male
Genotypes X^NX^n X^NY
Gametes (X^N) (X^n) (X^N) (Y)

Offspring 1
Genotypes

Male Gametes \ Female Gametes	(X^N)	(X^n)
(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

45. X-linked recessive traits are common in male while X-linked dominant traits are common in female because X chromosome containing disease gene directly pass on from father to daughter.
46. Tritanopia is autosomal recessive trait.
47. Female can be carrier but phenotypically will be normal.

Parental
Phenotypes Carrier Female x Normal Male
Genotypes X^NX^n X^NY
Gametes (X^N) (X^n) (X^N) (Y)

Offspring 1
Genotypes

Male Gametes \ Female Gametes	(X^N)	(X^n)
(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

PAST PAPERS MCQs

1. The position of a gene on the chromosome is called its locus.

Genotype	Phenotype
AABBCC	Dark red
Aabbcc	White
Aabbcc/ aaBbcc/ aabbCc	Light pink
AAbbcc/ aaBBcc/ aabbCC/ AaBbcc/ aaBbCc/ AabbCc	Pink
AaBbCc/ AABbcc/ AabbCC	Light red
AABBcc/ aaBBCC/ AAbbCC	Red
AABBCc/ AABbCC/ AaBBCC	Moderately dark red

2. The genes for red and green opsins are on X chromosome while the gene for blue opsin is present on autosome 7.
3. If all the members of a population are homozygous for the same allele, that allele is said to be fixed in gene pool.
4. Rh blood group system is defined on the basis of Rh factor present on the surface of RBCs.
5. ***Sex influenced traits*** occur in both males and females, but they are more common in one sex e.g. pattern baldness. These are influenced by hormonal differences. It is autosomal dominant disease in males.
6. The chromosomes of a cell, usually displayed as a systematized arrangement of chromosome pairs in descending order of size this is known as karyotype.
7. Gene for albinism in man is present on chromosome number 11.
8. Son receives Y chromosome from father and X chromosome from mother.
9. ABO blood group is first discovered multiple allelic blood group system in man.
10.

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

11. Haemophilia and colourblindness are X-linked recessive traits.
12. 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.
13. The position of a gene on the chromosome is called its locus.
14. ABO blood group is first discovered multiple allelic blood group system in man.
15. A continuously varying trait is encoded by alleles of two or more different gene pairs found at different loci, all influencing the same trait in an additive way. Those quantitative traits are called ***polygenic traits*** and their genes are ***polygenes***.
Human skin colour is controlled by 3-6 gene pairs.
16. 22 pairs of chromosomes are autosomes in human.
17. Haemophilia and colourblindness are X-linked recessive traits.

18. 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.

19. 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.

20. Haemophilia and colourblindness are X-linked recessive traits.

21. The position of a gene on the chromosome is called its locus.

22.

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 = 3/4	Tall = 3/4	Round tall = 3/4 x 3/4 = 9/16
Round = 3/4	dwarf = 1/4	Round dwarf= 3/4 x 1/4 = 3/16
Wrinkled = 1/4	Tall = 3/4	Wrinkled Tall = 1/4 x 3/4 = 3/16
Wrinkled = 1/4	dwarf = 1/4	Wrinkled dwarf = 1/4 x 1/4 = 1/16

23. Purple colour flowers are dominant over white colour plants.

24. It is a strictly relative effect between two alleles of a given gene of any function; one allele can be dominant over a second allele of the same gene.

25. The genes for red and green opsins are on X chromosome while the gene for blue opsin is present on autosome 7.

26. Relationship between elating to two alleles of a gene pair in a heterozygote that are both fully expressed is known as co-dominance.

27. Genes are actually parts of DNA comprising its basic sequence.

28. The position of a gene on the chromosome is called its locus.

29. ABO blood group is first discovered multiple allelic blood group system in man.

30. Relationship between two alleles of a gene pair in a heterozygote that are both fully expressed is known as co-dominance.

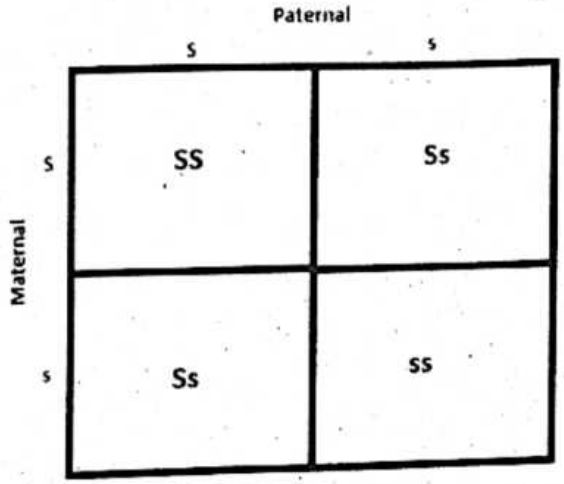
31. Number of linkage group is equal to number of homologous chromosomes in a cell. there are 23 linkage groups in human cell.

32. The value of ***Cross over or recombination frequency*** is directly proportional to distance between the genes on gene map.

33. When both alleles of a gene pair in an organism are same, the organism is homozygous for that gene pair.

34. The position of a gene on the chromosome is called its locus.

35.



SICKLE CELL DISEASE
Recessive

Each child's chances are:

25% of not having the disease (SS)
25% of having the disease (ss)
50% of carrying the disease

36. Linked genes do not obey law of independent assortment.

37.

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

16 TOPIC BIOTECHNOLOGY

PRACTICE EXERCISE

TOPIC-WISE MCQs

RECOMBINANT DNA TECHNILOGY/ GENETIC ENGINEERING

Q.1 Arrange the following events in the proper sequence for genetic recombination:
1 = Ligate gene into bacterial plasmid
2 = Isolate DNA from organisms containing desired gene
3 = Introduce cloned gene into bacterial cells
4 = Fragment DNA with restriction enzyme
A) 1,2,3,4
B) 2,4,1,3
C) 2,1,4,3
D) 2,4,3,1

Q.2 Restriction enzymes are naturally found in:
A) Bacteria
B) Bacteriophage
C) Viruses
D) Both A, B

Q.3 Which of the following structure is protein in nature?
A) pBR 322
B) pSC 101
C) EcoR I
D) Palindromic sequences

Q.4 What is the function of a vector in genetic engineering?
A) Separate fragments of DNA
B) Carry DNA into host cell
C) Link together fragments of DNA
D) Make millions of copies of DNA

Q.5 What is the function of DNA ligase in recombinant technology?
A) Cut DNA at palindromic sequence
B) Chemically modify the DNA
C) Enhance gene expression
D) Act as molecular gum

Q.6 Total number of restriction enzymes discovered so far:
A) 400
B) 350
C) 300
D) 500

Q.7 Specific sequence of four or six nucleotides arranged symmetrically in reverse order where restriction enzymes works:
A) Okazaki fragments
B) Palindromic sequences
C) Primers
D) Probes

Q.8 The key tool of genetic engineering is a special group of enzymes that recognizes specific short sequences of DNA and cleaves the DNA:
A) Interferons
B) Restriction endonucleases
C) Interleukin
D) Antibody

Q.9 Foreign DNA inserted into a plasmid and then replicated many times in a population of bacteria is a _____.
A) DNA clone
B) Gene library
C) DNA probe
D) Gene map

Q.10 By reverse transcription, _____ is assembled on _____.
A) mRNA; DNA
B) cDNA; mRNA
C) DNA; enzymes
D) DNA; agar

Q.11 Recombinant DNA is introduced into the host cell in the form of:
A) Fungus
B) Vector
C) Bacterium
D) Phage

Q.12 **Which of these is a true statement?**
A) Both plasmids and viruses can serve as vectors
B) Both Plasmids and viruses have antibiotic resistant genes
C) Both Plasmids and viruses are self-replicating molecules
D) Virus is a living organism

Q.13 **Bacteria protect themselves from viruses by fragmenting viral DNA upon entry with:**
A) Ligases
B) Vector
C) Endonucleases
D) Methylases

Q.14 **Plasmids were discovered by study of which characteristic of bacteria?**
A) Life cycle
B) Sex life
C) Nutrition
D) Respiration

Q.15 **Which of the following plasmid have antibiotic resistant gene/s for both tetracycline and ampicillin?**
A) pBR322
B) pSC 101
C) EcoRI
D) pBR 320

Q.16 **Identify the restriction site of EcoR1:**
A) GAATTC / CTTAAG
B) GATATC / CTATAG
C) GCCTTC / CGGAAG
D) GUUAAC / CAAUUG

Q.17 **Restriction endonucleases restrict the growth of:**
A) Fungi
B) Bacteria
C) Viroids
D) Bacteriophages

Q.18 **The bacterial cell is treated with calcium chloride to enhance its:**
A) Expression
B) Affinity for recombinant plasmid
C) Restriction
D) Cloning

Q.19 **Bacterial virus use in recombinant DNA technology as molecular carrier:**
A) Plasmid
B) Lambda phage
C) T-2 Bacteriophage
D) T-4 Bacteriophage

PCR

Q.20 **Which statement is not true about PCR?**
A) Developed by Kary Mullis
B) Take its name from DNA polymerase
C) Is not very specific
D) Taq polymerase is used

Q.21 **What is the function of the PCR in genetic engineering?**
A) Insertion of chimeric DNA into expression system
B) To increase gene expression
C) Make millions of copies of DNA
D) Transcription of gene of interest

Q.22 **Hydrogen bonds between complementary base pairs during PCR are broken down using:**
A) Helicase
B) Primase
C) Heat
D) DNA Gyrase

Q.23 **Which one of the following is not related to PCR:**
A) Amplification of DNA
B) Use to obtain protein
C) *In vitro* method
D) Quick method

Q.24 **During PCR, primer always attaches to _____ end of DNA.**
A) 5'
B) 5
C) 3'
D) 3

Q.25 In addition to DNA polymerase and primers, the polymerase chain reaction also requires:
A) A large amount of DNA template
B) Supply of the four DNA nucleotides
C) Restriction enzymes
D) Complementary sequences of RNA

Q.26 For PCR, Primers sequences of about _____ bases are needed.
A) 10
B) 15
C) 20
D) 30

Q.27 PCR is done by using specialized apparatus called:
A) Thermoregulator
B) Thermocycler
C) Thermostabilizer
D) PCR centrifuge

Q.28 DNA polymerase is a temperature-insensitive enzyme extracted from *Thermus aquaticus* which is a:
A) Protozoan
B) Fungus
C) Bacterium
D) Alga

Q.29 Sequence of events during PCR are:
A) Denaturation → Extension → Annealing
B) Annealing → Extension → Denaturation
C) Denaturation → Annealing → Extension
D) Extension → Annealing → Denaturation

Q.30 Annealing refers to:
A) Primer Attachment + High temperature
B) Denaturation + High temperature
C) Primers Attachment +Low temperature
D) Extension+ Medium temperature

GEL ELECTROPHORESIS AND DNA ANALYSIS

Q.31 Which of the following is not used in DNA finger printing?
A) Restriction enzymes
B) Gel electrophoresis
C) Probe
D) Ligase

Q.32 Which of the following technique is not used in preparing DNA fingerprints?
A) Gene therapy
B) RFLP analysis
C) Gel electrophoresis
D) Polymerase chain reaction

Q.33 Which one of the followings is not true about probe?
A) Genetic markers
B) Fluorescently labeled
C) Radioactively labeled
D) Inorganic

Q.34 A pattern of bands made up of a specific DNA fragments is a:
A) Restriction enzyme
B) Homeotic gene
C) Cloning vector
D) DNA fingerprint

Q.35 The technique used to separate bands of DNA on gel is called:
A) Water bath
B) Thermocycler
C) Electroporation
D) Electrophoresis

Q.36 RFLPs are separated by:
A) PCR
B) Northern blotting
C) Dideoxyribonucleotide sequencing
D) Gel Electrophoresis

Q.37 DNA finger printing cannot apply on:
A) Sperm cell
B) RBCs
C) Skin cell
D) Hepatic cell

GENE THERAPY

Q.38 When bone marrow stem cells are removed from the blood and infected with a retrovirus that carries a normal gene, this is an example of:
A) In-vitro gene therapy
B) In-vivo gene therapy
C) Chemotherapy
D) Ex vivo gene therapy

Q.39 Bone marrow stem cells for the treatment of SCID are taken from:

A) Bone
B) Blood
C) Bone marrow
D) Lymph

Q.40 The protein expressed by gene in coronary artery angioplasty:

A) Vascular endothelial growth inhibitor
B) Vascular endothelial growth promoter
C) Vascular epithelial growth factor
D) Vascular endothelial growth factor

Q.41 Retroviruses are not used for the treatment of:

A) Cystic fibrosis
B) SCID
C) Familial hypercholesterolemia
D) Hemophilia

Q.42 In familial hypercholesterolemia, liver cell lack:

A) Receptor gene
B) Trans-membrane protein
C) Channel protein
D) Receptor protein

Q.43 Organoids containing gene for clotting factor are mostly used for gene therapy of:

A) Haemophilia
B) Cystic fibrosis
C) Parkinson disease
D) SCID

Q.44 The role of gene of VEGF in coronary artery angioplasty is _____.

A) Angiogenesis
B) Proliferation of epithelial cells of heart
C) Proliferation of blood cells
D) Growth of blood cells

TRANSGENIC ORGANISMS

Q.45 To obtain bacteria that produce insulin, genetic engineers:

A) Remove repressor proteins that inhibit the expression of the bacterial insulin gene
B) Insert a vector containing the human gene for insulin into bacteria
C) Search for bacteria that can grow in a medium that lacks insulin
D) Grow normal bacteria in a nutrient medium that contains a large amount of sugar

Q.46 Chemical nature of biodegradable plastic is:

A) Diphydroxy butyrate
B) Polyhydroxy butyrate
C) Diphydroxy Propionate
D) Dihydroxyacetone

Q.47 Which of the following is mostly used to develop transgenic animals?

A) Sanger's method
B) Maxam Gilbert method
C) Particle gun method
D) Microinjections method

Q.48 To prevent blood clotting during surgery _____ is used.

A) Prothrombin II
B) Anti–thrombin II
C) Prothrombin III
D) Anti–thrombin III

Q.49 During formation of transgenic plants, electric current is used to make tiny hole in _____ for entrance of genetic material.

A) Nuclear membrane
B) Plasma membrane
C) Cell wall
D) Mitochondrial membrane

PAST PAPER MCQs

2009

Q.1 _____ are used as important vectors in genetic engineering.

A) Ribosomes
B) Plasmids
C) Nucleoids
D) Mesosomes

Q.2 Temperature-insensitive (thermostable) enzyme used in PCR is:

A) DNA polymerase I
B) DNA polymerase III
C) DNA ligase
D) *Taq* polymerase

2010

Q.3 Gene can be synthesized in laboratory from messenger RNA by using:

A) Restriction enzymes
B) cDNA (complementary DNA)
C) Vector
D) Reverse transcriptase

Q.4 Antibiotic resistance gene for tetracycline and ampicillin are present in the plasmid:

A) pSC 101
B) pCR 101
C) pBR 322
D) pBR 233

2011

Q.5 The common vectors used in recombinant DNA technology are:

A) Probes
B) Palindromes
C) Plasmids
D) Prions

Q.6 The enzyme used to isolate gene from DNA is:

A) Helicase
B) Reverse Transcriptase
C) Restriction enzyme
D) DNA polymerase

Q.7 Which one of the following enzymes is temperature insensitive?

A) DNA polymerase-I
B) *Taq* polymerase
C) DNA polymerase-III
D) RNA polymerase

Q.8 Liposomes are used in gene therapy against:

A) Hypercholesterolemia
B) Severe combined immunodeficiency syndrome
C) Cystic fibrosis
D) Coronary artery angioplasty

Q.9 Genetically engineered cells are introduced into bone marrow cells in the treatment of:

A) Hypercholesterolemia
B) Severe combined immunodeficiency syndrome
C) Cystic fibrosis
D) Coronary artery angioplasty

2012

Q.10 In the recombinant DNA technology plasmids are used as:

A) Genetic material
B) Enzymes
C) Vectors
D) Probes

Q.11 In recombinant DNA technology _____ are tools for manipulating DNA.

A) Viruses
B) Chromosomes
C) Enzymes
D) Genes

Q.12 In which process multiple copies of the desired genes are produced?

A) Polymerase chain reaction
B) Gene sequencing
C) Analyzing DNA
D) DNA finger printing

Q.13 **In DNA finger printing process, the use of _____ produces distinctive pattern on autoradiography or X-ray film.**
A) Restriction enzymes
B) Micro satellites
C) Macro satellites
D) Probes for genetic markers

Q.14 **The enzyme adenosine deaminase is missing in person suffering from:**
A) Cystic fibrosis
B) Hypercholesterolemia
C) Severe combined immunodeficiency
D) Parkinson's disease

2013
Q.15 **The phage commonly used as a vector in genetic engineering is:**
A) Gamma phage
B) T2-phage
C) T4 phage
D) Lambda phage

Q.16 **Restriction endonucleases are naturally occurring enzymes of:**
A) Viruses
B) Bacteria
C) Fungi
D) Plants

Q.17 **The DNA molecule formed from mRNA by reverse transcriptase is called:**
A) Complementary DNA
B) Recombinant DNA
C) Chimeric DNA
D) Plasmid DNA

Q.18 **The agent which separates the two strands of DNA in PCR is:**
A) DNA ligase
B) Primer
C) Heat
D) Helicase

Q.19 **Cystic fibrosis patients lack a gene that codes for trans-membrane carrier of:**
A) Na^+ ion
B) Cl^- ions
C) Ca^{+2} ions
D) K^+ ion

Q.20 **Plants having foreign DNA incorporated into their cells are called:**
A) Clonal plants
B) Transgenic plants
C) Biotech plants
D) Tissue cultured plants

2014
Q.21 **pBR322 have antibiotic resistant genes for:**
A) Ampicillin and aspirin
B) Streptomycin and metronidazole
C) Ampicillin and tetracycline
D) Penicillin and metronidazole

Q.22 **The enzymes which act as molecular scissors in recombinant DNA technology:**
A) Exonucleases
B) Polymerases
C) Endonucleases
D) Reverse transcriptase

Q.23 **When two different pieces of DNA are joined together, the result is which one of the following?**
A) Complementary DNA
B) Recombinant DNA
C) Mutated DNA
D) Cloned DNA

Q.24 **The use of living organisms in industry for the production of useful products is known as:**
A) Parasitology
B) Biochemistry
C) Biotechnology
D) Molecular biology

Q.25 **Which one of the following is a correct sequence of PCR?**
A) Heating → Cooling → Add Primer → Copying of strand
B) Heating → Add primer → Cooling → Copying of strand
C) Add primer → Heating → Cooling → Copying of strand
D) Cooling → Add primer → Heating → Copying of strand

Q.26 Cystic fibrosis affects which one of the following cells of the body?
A) Epithelial cells
B) Endothelial cells
C) Plasma cells
D) Blood cells

Q.27 Plants having foreign DNA incorporated into their cells are called:
A) Clone plants
B) Transgenic plants
C) Parthenocarpic plants
D) Mutant giants

2015

Q.28 Which one of the following is made up of radioactively labeled nucleotides?
A) Phage DNA
B) Genomic library
C) Recombinant DNA
D) Gene probe

Q.29 The DNA formed by the reverse transcription is called:
A) rDNA
B) dDNA
C) cDNA
D) DNA

Q.30 Bacterial cells take up recombinant plasmids when they are treated with:
A) $CaCl_2$
B) NaCl
C) KCl
D) NaOH

Q.31 In cystic fibrosis, liposomes-microscopic vesicles are used which are coated with:
A) Healthy gene
B) Chromosome
C) Protein
D) Carbohydrate

Q.32 A technique in transgenic animals in which desired gene is inserted into the eggs of animal is called:
A) Embryonic stem cell mediated transfer
B) Microinjection
C) Retro-virus mediated gene transfer
D) Virus vectors

2016

Q.33 Restriction endonucleases cleave the _____ of duplex DNA.
A) Nitrogenous base
B) Pentose sugar
C) Phosphodiester bond
D) Hydrogen bond

Q.34 The enzyme which is responsible for the formation of bond between two double stranded DNA fragments is:
A) Endonuclease
B) Lipase
C) Ligase
D) Helicase

Q.35 _____ acts as an ideal expression system in recombinant DNA technology.
A) Retrovirus
B) Rotavirus
C) Algae
D) Bacteria

Q.36 The modified plasmid or phage DNA is called:
A) Clone DNA
B) Recombinant DNA
C) cDNA
D) rDNA

Q.37 _____ enzyme is very stable and active even at very high temperature.
A) RNA polymerase
B) DNA polymerase II
C) Helicase
D) *Taq* polymerase

2017

Q.38 Restriction enzyme EcoR1 cuts DNA to produce:
A) Blunt ends
B) Non-palindromic ends
C) Sticky ends
D) Split ends

Q.39 Restriction endonucleases are produced by:
A) Fungi
B) Algae
C) Bacteria
D) Viruses

Q.40 _____ is the first heat stable component used in PCR.

A) *Taq* isomerase
C) *Taq* polymerase
B) *Taq* helicase
D) *Taq* SSBP

Q.41 DNA segments of different lengths can be separated by a process of:

A) Western blotting
C) Autoradiography
B) Northern blotting
D) Gel electrophoresis

Q.42 Patients of Cystic Fibrosis (CF) produce thick mucus due to faulty:

A) Trans-membrane carrier
C) Na^+ ions
B) Cl^- ions
D) Mucous membrane

2017-Retake

Q.43 Commonly used restriction enzyme is:

A) EcoR1
C) pBR 322
B) pSC 101
D) BamH1

Q.44 Gene can be from mRNA using:

A) Reverse transcriptase
C) DNA ligase
B) DNA polymerase
D) Helicase

Q.45 Collection of bacterial or bacteriophage clones is called:

A) Gene pole
C) Genomic library
B) Genome
D) Bean bag

Q.46 Formation of new strand of DNA from template strand is the function of:

A) DNA polymerase
C) DNA ligase
B) RNA Polymerase
D) Helicase

2018

Q.47 Enzymes used by the bacteria to cut the DNA of the invading virus for its protection is:

A) Restriction exonuclease
C) Restriction endonuclease
B) Restriction ligase
D) DNA polymerase

Q.48 DNA made by joining pieces from two or more different sources:

A) Mutated DNA
C) Probes
B) Restriction endonuclease
D) Recombinant DNA

Q.49 PCR means:

A) Polymerase cross reaction
C) Polymerase copy reaction
B) Polymerase chain reaction
D) Polymerase chronic reaction

Q.50 Chemical nature of primer used in PCR process is _____.

A) Protein
B) Carbohydrate
C) RNA
D) DNA

Q.51 Deficiency of enzyme _____ causes combined immunodeficiency syndrome.

A) Adenosine transaminase
B) Adenosine deaminase
C) Adenosine polymerase
D) Adenosine transcriptase

2019

Q.52 Complementary DNA molecule is:

A) An artificial DNA
B) Single stranded DNA
C) DNA from mRNA
D) A small segment of chromosomal DNA

Q.53 The plasmid pBR322 has antibiotic resistance genes for:

A) Tetracycline and Doxycycline
B) Streptomycin
C) Doxycycline and Ampicillin
D) Ampicillin and Tetracycline

Q.54 DNA polymerase enzyme for PCR is isolated from bacteria *Thermus aquaticus* because:

A) It can withstand high denaturation temperature
B) It can withstand low denaturation temperature
C) It can work at high speed
D) It can be used again and again

Q.55 Which enzyme is administered to the patients of Severe Combined Immunodeficiency Disease (SCID)?

A) Pancreatic Enzyme
B) Adenosine Deaminase (ADA)
C) β – galactosidase
D) β – lactamase

Q.56 Transgenic mice have been used to produce:

A) Protein rich milk
B) A growth hormone
C) Protein rich meat
D) Extra hair

ANSWER KEY

TOPIC-WISE MCQs

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

PAST PAPERS MCQs

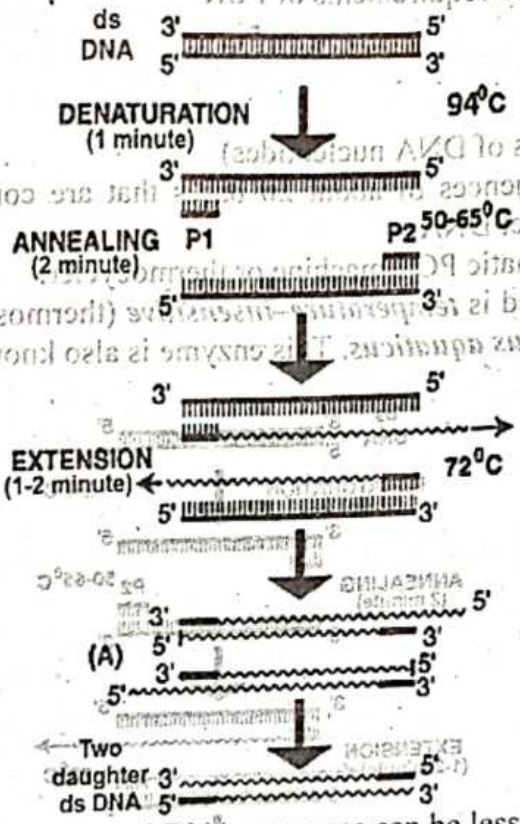
1	B	11	C	21	C	31	A	41	D	51	D
2	D	12	A	22	C	32	B	42	A	52	C
3	D	13	D	23	B	33	C	43	A	53	D
4	C	14	C	24	C	34	C	44	A	54	A
5	C	15	D	25	A	35	D	45	C	55	B
6	C	16	B	26	A	36	B	46	A	56	B
7	B	17	A	27	B	37	D	47	C		
8	C	18	C	28	D	38	C	48	D		
9	B	19	B	29	C	39	C	49	B		
10	C	20	B	30	A	40	C	50	D		

EXPLANATORY NOTES

TOPIC-WISE MCQs

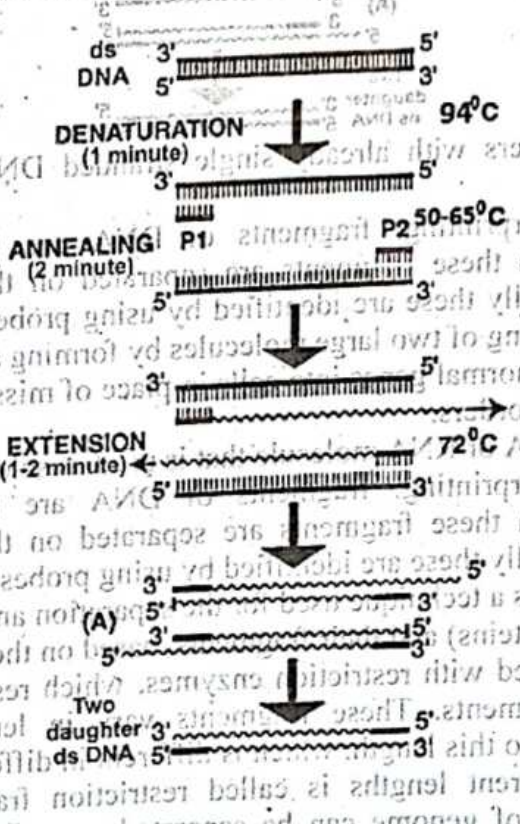
1. Four requirements of recombinant DNA technology are:
   i. Gene of interest which is to be cloned
   ii. Molecular scissors to cut out gene of interest
   iii. Molecular carrier or vector
   iv. Expression system
2. Restriction enzymes are the natural enzymes of bacteria, which they use for their own protection against viruses.
3. All enzymes are proteins but all proteins are not enzymes. EcoRI is restriction enzyme.
4. Vectors are the means by which recombinant DNA is introduced into a host cell.
5. A ligase is an enzyme that can catalyze the joining of two large molecules by forming a new chemical bond.
6. 400 restriction enzymes are discovered, 20 are commonly used.
7. Palindromic sequences are sequences of four or six nucleotides arranged symmetrically in the reverse order produced by restriction enzymes, which cut the DNA at specific sites.
8. A restriction enzyme, restriction endonuclease, is an enzyme that cleaves DNA into fragments at or near specific recognition sites within molecules known as restriction sites.
9. Genetically identical copies of DNA molecules produced through replication process.
10. Gene can be synthesized in the lab from mRNA using reverse transcriptase. Such DNA molecule produced from mRNA is called complementary DNA (cDNA).
11. Vectors are the means by which recombinant DNA is introduced into a host cell.
12. Plasmids and Lambda phage (DNA of bacterial viruses) can also be used as a vector.
13. These are the natural enzymes of bacteria, which they use for their own protection against viruses. The restriction enzyme cuts down the viral DNA but does not harm to bacterial chromosome. Thus, they restrict viral growth.
14. Plasmids are natural extra chromosomal circular DNA molecules which carry genes for antibiotic resistance and fertility. These were first discovered in intestinal bacterium *Escherichia coli* while studying their sex life.
15. ***pSC 101*** has antibiotic resistance gene for tetracycline.
    pBR 322 has antibiotic resistance gene for tetracycline as well as ampicillin.
16. ***Palindromic sequences*** are sequences of four or six nucleotides arranged symmetrically in the reverse order produced by restriction enzymes, which cut the DNA at specific sites.
17. Restriction enzymes are the natural enzymes of bacteria, which they use for their own protection against viruses.
18. Bacterial cells take up recombinant plasmid if they are treated with calcium chloride to make them more permeable.
19. Plasmids and Lambda phage (DNA of bacterial viruses) can also be used as a vector.
20. PCR is very specific; the targeted DNA sequence can be less than one part in a million of the total DNA sample.
21. PCR is very specific; the targeted DNA sequence can be less than one part in a million of the total DNA sample.

22.

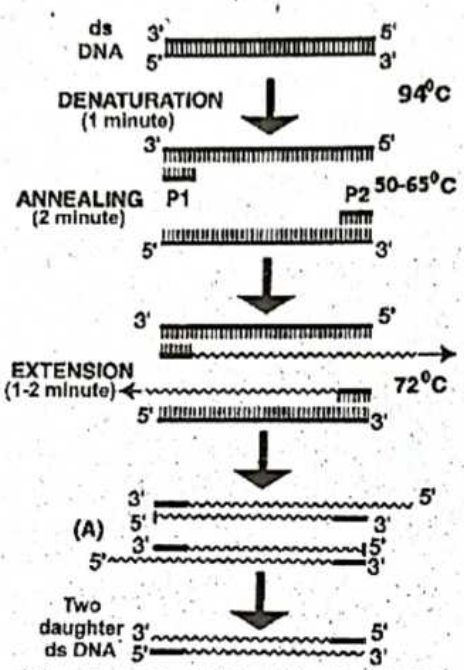


23. PCR is very specific; the targeted DNA sequence can be less than one part in a million of the total DNA sample. It not concern with protein synthesis.

24.

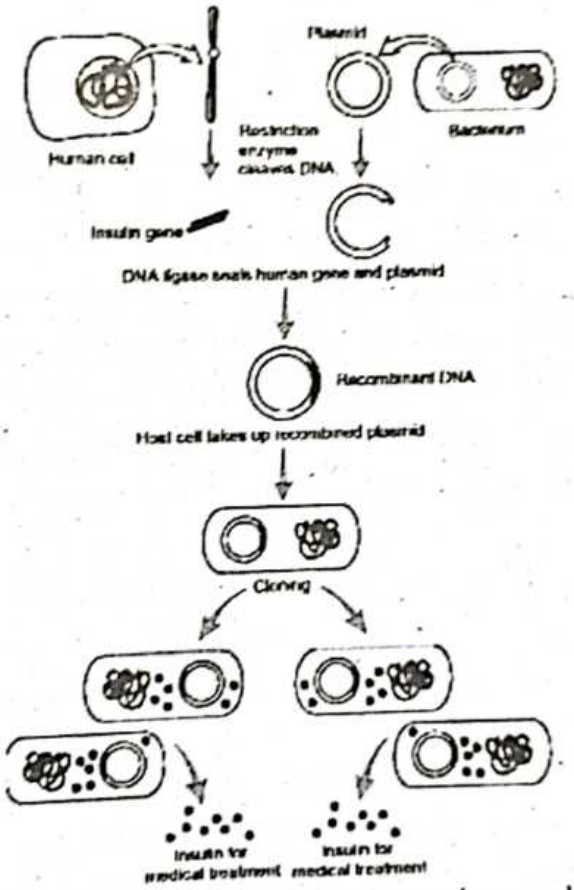


25. Following are the basic requirements of PCR
    i. Template DNA
    ii. Primers
    iii. Taq. polymerase
    iv. dNTPs (four types of DNA nucleotides)
26. ***Primers*** are the sequences of about 20 bases that are complementary to the bases on either side of the target DNA.
27. PCR is done in automatic PCR machine or thermocycler.
28. DNA polymerase used is ***temperature–insensitive*** (thermostable) enzyme extracted from the bacterium ***Thermus aquaticus***. This enzyme is also known as ***Taq polymerase***.
29.



30. Attachment of primers with already single stranded DNA molecules during PCR is known as annealing.
31. During DNA fingerprinting, fragments of DNA are formed by using restriction endonucleases. Then these fragments are separated on the basis of their size on gel electrophoresis. Finally these are identified by using probes. A ligase is an enzyme that can catalyze the joining of two large molecules by forming a new chemical bond.
32. The introduction of normal genes into cells in place of missing or defective ones in order to correct genetic disorders.
33. Probe is either ssDNA or RNA molecule that is used as selection marker.
34. During DNA fingerprinting, fragments of DNA are formed by using restriction endonucleases. Then these fragments are separated on the basis of their size on gel electrophoresis. Finally these are identified by using probes.
35. Gel electrophoresis is a technique used for the separation and analysis of macromolecules (DNA, RNA and proteins) and their fragments, based on their size and charge.
36. The genome is treated with restriction enzymes, which results in a unique collection of different sized fragments. These fragments vary in length and restriction enzyme separates according to this length, which is different in different individuals. This process of existing in different lengths is called restriction fragment length polymorphism (RFLPs).Fragments of genome can be separated according to their lengths through a process called gel electrophoresis.

37. RBCs are without nuclei so DNA fingerprinting is not applied on RBCs.
38. Ex vivo gene therapy is a type of gene therapy which involves exterior modification of a patient's cell and reintroduction of it to the patient.
39. Blood of human is the source of bone marrow stem cells.
40. Plasmid DNA product containing vascular endothelial growth factor 2 used in clinical trials for coronary artery diseases (CAD).
41. Liposome-microscopic vesicles (lipoproteins coated with gene) are used as gene carrier for the treatment of cystic fibrosis.
42. Lack of receptor on liver cells for cholesterol leads to hypercholesterolemia.
43. To treat hemophilia, patients could get regular doses of cells that contain normal clotting factor genes or such cells could be placed in ***organoids***, artificial organs that can be implanted in the abdominal cavity.
44. Angiogenesis is the physiological process through which new blood vessels form from pre-existing vessels by introducing plasmid containing genes for vascular endothelial growth factors.
45.

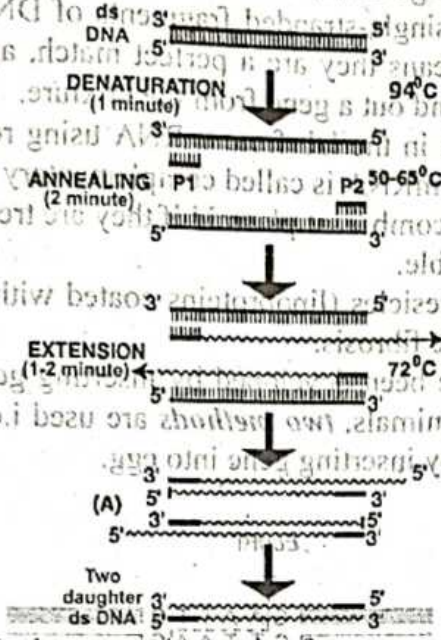


46. A weed called mouse-eared cress has been engineered to produce a ***biodegradable plastic (polyhydroxy butyrate)*** in cell granules.
47. In order to get transgenic animals, ***two methods*** are used i.e. ***microinjection*** (by hand) and ***vortex mixing method***, by inserting gene into egg.
48. Anti-thrombin III prevents blood clot formation during surgery.
49. A foreign gene isolated from any type of organism is placed in the tissue culture medium. This tissue culture contains protoplasts. High voltage electric pulses are used to create pores in the plasma membrane so that DNA enters.

PAST PAPER MCQs

1. Plasmids and Lambda phage (DNA of bacterial viruses) can also be used as a vector. But plasmids are most commonly used vectors in genetic engineering.
2. DNA polymerase used is *temperature–insensitive* (thermostable) enzyme extracted from the bacterium *Thermus aquaticus*. This enzyme is also known as *Taq polymerase*.
3. Gene can be synthesized in the lab from mRNA using reverse transcriptase. Such DNA molecule produced from mRNA is called complementary DNA (cDNA).
4. *pSC 101* has antibiotic resistance gene for tetracycline.
   pBR 322 has antibiotic resistance gene for tetracycline as well as ampicillin.
5. Plasmids and Lambda phage (DNA of bacterial viruses) can also be used as a vector. But plasmids are most commonly used vectors in genetic engineering.
6. A restriction enzyme, restriction endonuclease, is an enzyme that cleaves DNA into fragments at or near specific recognition sites within molecules known as restriction sites.
7. DNA polymerase used is *temperature–insensitive* (thermostable) enzyme extracted from the bacterium *Thermus aquaticus*. This enzyme is also known as *Taq polymerase*.
8. Liposome-microscopic vesicles (lipoproteins coated with gene) are used as gene carrier for the treatment of cystic fibrosis.
9. For the treatment of SCIDS ex-vivo gene therapy method is used in which Bone marrow stem cells are taken outside of the body and gene of interest is inserted into the target cells.
10. Plasmids and Lambda phage (DNA of bacterial viruses) can also be used as a vector. But plasmids are most commonly used vectors in genetic engineering.
11. Genetic engineering became possible with the discovery of mainly two types of enzymes: the cutting enzymes called restriction endonucleases and the joining enzymes called ligases.
12. PCR is very specific; the targeted DNA sequence can be less than one part in a million of the total DNA sample.
13. Use of probes for genetic markers produces a distinctive pattern that can be recorded on X-ray film.
14. SCID is caused by adenosine deaminase (ADA) deficiency, in which infants lack the ADA enzyme necessary for the maturation of T and B cells.
15. Plasmids and Lambda phage (DNA of bacterial viruses) can also be used as a vector. But plasmids are most commonly used vectors in genetic engineering.
16. Restriction enzymes are the natural enzymes of bacteria, which they use for their own protection against viruses.
17. Gene can be synthesized in the lab from mRNA using reverse transcriptase. Such DNA molecule produced from mRNA is called complementary DNA (cDNA).

18.



19. Cystic fibrosis patients lack a gene that codes for trans-membrane carrier of chloride ions.

20. Plants having any foreign gene are called transgenic plants.

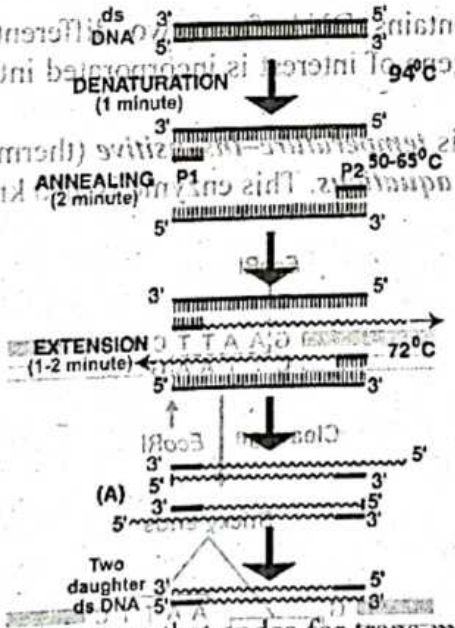
21. ***pSC 101*** has antibiotic resistance gene for tetracycline. ***pBR 322*** has antibiotic resistance gene for tetracycline as well as ampicillin.

22. A restriction enzyme, restriction endonuclease, is an enzyme that cleaves DNA into fragments at or near specific recognition sites within molecules known as restriction sites.

23. ***Recombinant DNA*** contains DNA from two different sources. It is also called as chimeric DNA.

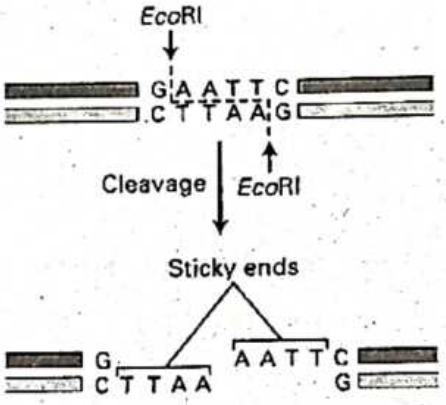
24. The exploitation of biological processes for industrial and other purposes, especially the genetic manipulation of microorganisms for the production of antibiotics, hormones, etc. is known is biotechnology.

25.



26. Cystic fibrosis patients lack a gene that codes for trans-membrane carrier of chloride ions which are located in epithelial cells.

27. Plants having any foreign gene are called transgenic plants.
28. Gene probes are small, single-stranded fragments of DNA that are complementary to a gene of interest. This means they are a perfect match, and when applied to a sample, a gene probe can help to find out a gene from the mixture.
29. Gene can be synthesized in the lab from mRNA using reverse transcriptase. Such DNA molecule produced from mRNA is called complementary DNA (cDNA).
30. Bacterial cells take up recombinant plasmid if they are treated with calcium chloride to make them more permeable.
31. Liposome-microscopic vesicles (lipoproteins coated with gene) are used as gene carrier for the treatment of cystic fibrosis.
32. Transgenic animals have been developed by inserting genes into the eggs of animals. In order to get transgenic animals, ***two methods*** are used i.e. ***microinjection*** (by hand) and ***vortex mixing method,*** by inserting gene into egg.
33.



34. A ligase is an enzyme that can catalyze the joining of two large molecules by forming a new chemical bond.
35. Bacteria are used as ideal expression system because of their less doubling time. Products can be easily collected.
36. ***Recombinant DNA*** contains DNA from two different sources. It is also called as chimeric DNA. When gene of interest is incorporated into plasmid, plasmid is termed as recombinant DNA.
37. DNA polymerase used is ***temperature–insensitive*** (thermostable) enzyme extracted from the bacterium ***Thermus aquaticus***. This enzyme is also known as ***Taq polymerase***.
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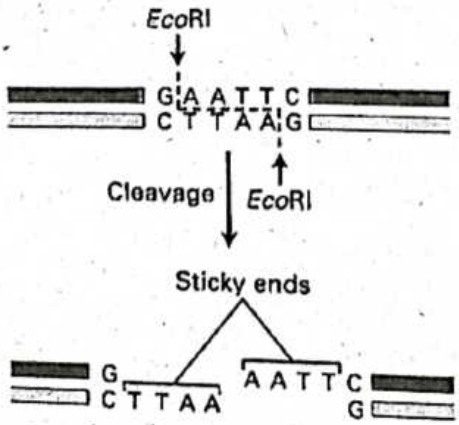
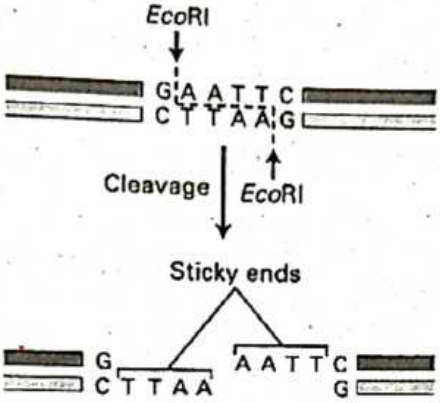


39. Restriction enzymes are the natural enzymes of bacteria, which they use for their own protection against viruses.
40. DNA polymerase used is ***temperature–insensitive*** (thermostable) enzyme extracted from the bacterium ***Thermus aquaticus***. This enzyme is also known as ***Taq polymerase***.
41. Gel electrophoresis is a technique used for the separation and analysis of macromolecules (DNA, RNA and proteins) and their fragments, based on their size and charge.
42. Cystic fibrosis patients lack a gene that codes for trans-membrane carrier of chloride ions which are located in epithelial cells.
43.



44. Gene can be synthesized in the lab from mRNA using reverse transcriptase. Such DNA molecule produced from mRNA is called complementary DNA (cDNA).
45. Genomic library represents an entire genome of an individual animal, bacteria, plant or virus under study. or It is the collection of cloned segments of DNA containing at least one copy of every gene from a particular organism.
46. DNA Polymerase is a naturally occurring complex of proteins whose function is to copy a cell's DNA before it divides in two. Taq polymerase is DNA polymerase used in PCR for DNA amplification.
47. Restriction enzymes are the natural enzymes of bacteria, which they use for their own protection against viruses.
48. ***Recombinant DNA*** contains DNA from two different sources. It is also called as chimeric DNA. When gene of interest is incorporated into plasmid, plasmid is termed as recombinant DNA.
49. ***PCR*** takes its name from DNA polymerase, the enzyme that carries out DNA replication process in cell.
50. ***Primers*** are the sequences of about 20 NDA bases that are complementary to the bases on either side of the target DNA.
51. SCID is caused by adenosine deaminase (ADA) deficiency, in which infants lack the ADA enzyme necessary for the maturation of T and B cells.
52. Gene can be synthesized in the lab from mRNA using reverse transcriptase. Such DNA molecule produced from mRNA is called complementary DNA (cDNA).
53. ***pSC 101*** has antibiotic resistance gene for tetracycline.
pBR 322 has antibiotic resistance gene for tetracycline as well as ampicillin.
54. DNA polymerase used is ***temperature–insensitive*** (thermostable) enzyme extracted from the bacterium ***Thermus aquaticus***. This enzyme is also known as ***Taq polymerase***.
55. SCID is caused by adenosine deaminase (ADA) deficiency, in which infants lack the ADA enzyme necessary for the maturation of T and B cells.
56. Transgenic mice have been genetically engineered to produce growth hormone.

9 Topic EVOLUTION

PRACTICE EXERCISE

TOPIC-WISE MCQs

THEORY OF NATURAL SELECTION

Q.1 Series of changes in the genetic composition of a population over time is called:
A) Revolution
B) Evolution
C) Population genetics
D) Succession

Q.2 Over many years two population could become dissimilar enough to be designated as separate species that is applied upon:
A) Galapagos finches
B) Black smith bicep
C) Giant Turtle
D) Giraffe neck

Q.3 Unique fauna was observed by Darwin in:
A) Ecuador
B) Galapagos
C) Bahamas
D) Maldives

Q.4 Darwin perceived origin of new species and _____.
A) Fixation
B) Adaptation
C) Stabilization
D) Maladaptation

Q.5 Wallace developed theory of _____ essentially identical to Darwin's.
A) Inheritance
B) Artificial selection
C) Natural selection
D) Use and disuse

Q.6 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.7 According to Darwin _____ become better adapted to local environment through natural selection.
A) Regional community
B) Population
C) Ecosystem
D) Flora

Q.8 Survival is only for the fittest is true for:
A) Artificial selection
B) Natural selection
C) Descent with modification
D) Revolution

Q.9 Survival in the struggle for existence depends upon:
A) Physical environment
B) Chemical constituents
C) Hereditary constitution
D) Environmental resources

Q.10 How many types of finches were observed by Darwin at Galapagos Island?
A) 12
B) 11
C) 13
D) 10

Q.11 Main points developed by Darwin in origin of species are:
A) Descent with modification, natural selection and adaptation
B) Use and disuse, inheritance of acquired characters
C) Natural selection with modification and descent with acquired characters
D) Geographical distribution and fossils records

Q.12 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.13 Product of evolution is:

A) Ecosystem
B) Biome
C) Community
D) Species

Q.14 Modern biological sciences suggest that _____ are the ancestors of all life forms.

A) Protists
B) Protozoans
C) Prokaryotes
D) Parazoans

Q.15 The Finches of Galapagos Islands provide evidence in favor of:

A) Evolution due to mutation
B) Retrogressive evolution
C) Evolution due to biogegraphy
D) Special creation

Q.16 Who developed a theory of natural selection essentially identical to Darwin's?

A) Hardy-Weinberg
B) Alfred Wallace
C) Malthus
D) Lyell

Q.17 Neo-Darwinism has integrated discoveries and ideas from all except:

A) Taxonomy
B) Paleontology
C) Genetics
D) Serology

Q.18 Adaptations that an organism acquires by its own actions are:

A) Heritable
B) Not heritable
C) Can be made heritable through some modifications
D) Both heritable and not heritable

Q.19 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

HARDY-WEINBERG THEOREM AND FACTORS AFFECTING GENE / ALLELE FREQUENCY

Q.20 If union of gametes to produce next generation is random, then allele frequencies between two generations are:

A) Increasing
B) Decreasing
C) Constant
D) Zero

Q.21 If all members of a population are homozygous for the same allele, that allele is said to be:

A) Fixed in gene pool
B) Mobile in gene pool
C) Random in gene pool
D) Stationary in gene pool

Q.22 At a particular locus, frequency of A allele is 0.6 and that of a is 0.4. What would be the frequency of heterozygotes in a random mating population at equilibrium?

A) 0.36
B) 0.16
C) 0.24
D) 0.48

Q.23 Assume that a population is in Hardy–Weinberg equilibrium for a trait controlled by one locus and two alleles. If the frequency of the dominant allele is 0.90, what is the frequency of the recessive allele?

A) 0.10
B) 0.90
C) 0.81
D) 0.2

Q.24 Change in the frequency of alleles at a locus that occurs by chance is:

A) Mutation
B) Selection
C) Non-random mating
D) Genetic drift

Q.25 Which of the following processes had resulted in the production of different breeds of domestic dogs and pigeons?

A) Natural selection
B) Cross breeding
C) Artificial selection
D) Self breeding

Q.26 All are assumptions in Hardy- Weinberg equilibrium except:

A) Equal potential of reproduction
B) Mating is random
C) Population size is infinitely large
D) Population size is small

Q.27 Genetic drift is a _____ process.

A) Random
B) Co–evolutionary
C) Directed
D) Uniformitarian

Q.28 Which of the following defines Hardy-Weinberg's law?

A) $p^2+2pq+q^2=0$
B) $q^2+p^2+2pq=0$
C) $p^2+2pq+q^2=1$
D) $p^2+3pq+q^2+1$

Q.29 Hardy-Weinberg equilibrium is known to be affected by gene flow, genetic drift, mutation, genetic recombination and _____

A) Saltation
B) Evolution
C) Limiting factors
D) Natural selection

PAST PAPER MCQs

2009

Q.1 The survival of an organism during the struggle for existence is not random, but depends on:

A) Its genetic constitution
B) Its ability to acquire characters
C) Its ability to over-produce
D) Its ability to over-eat

Q.2 Large population size, random mating, no mutation and no emigration or immigration are postulates of:

A) Hardy-Weinberg equation
B) Mendel's law of segregation
C) Mendel's law of independent assortment
D) Theory presented by Schleiden and Schwann

2017-Retake

Q.3 Change in frequency of alleles at a locus that occurs by chance is called:

A) Mutation
B) Migration
C) Non-random mating
D) Genetic drift

Q.4 Which of the following factor causes change in gene frequency:

A) Meiosis
B) Sexual recombination
C) Mutation
D) Random mating

Q.5 According to the theory of natural selection, organisms produce:

A) More offspring than supported
B) Less offspring than supported
C) Offspring according to the resources available
D) Offspring to create resources

Q.6 Change in frequency of alleles that occurs by chance is called as:

A) Natural selection
B) Migration
C) Mutation
D) Genetic drift

ANSWER KEY

TOPIC-WISE MCQs

1	B	11	A	21	A
2	A	12	B	22	D
3	B	13	D	23	A
4	B	14	C	24	D
5	C	15	C	25	C
6	A	16	B	26	D
7	B	17	D	27	A
8	B	18	B	28	C
9	C	19	A	29	D
10	C	20	C		

PAST PAPERS MCQs

1	A
2	A
3	D
4	C
5	A
6	D

EXPLANATORY NOTES

TOPIC-WISE MCQs

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. 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.
3. Darwin visited the Galapagos Islands and observed unique fauna of this land.
4. After returning to Britain, Darwin perceived the origin of new species and adaptations as closely related processes for evolution.
5. The research of British naturalist Alfred Russel Wallace(1823-1913) played a pivotal role in developing the theory of natural selection. Like Darwin, Wallace also seems to think that small changes over time would result in speciation.
6. 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'sdiversity.
7. 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.
8. 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.
9. Survival in struggle for existence depends upon hereditary constitutions and good variations.
10. From Galapagos Islands, Darwin collected 13 types of finches because these were although quite similar, seemed to be different species.
11. Darwin's theory consisted of two main points; 1) diverse groups of animals evolve from one or a few common ancestors; 2) the mechanism by which this evolution takes place is natural selection.
12. 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.
13. Final Product of evolution is always species and it is smallest unit of classification.
14. The oldest known fossil belongs to prokaryotes which suggest that they are the ancestors of all life forms.
15. Biogeographical evolution is a process in which gene pool of a population gradually changes in response to environmental pressures, natural selection and genetic mutations.
16. The research of British naturalist Alfred Russel Wallace (1823-1913) played a pivotal role in developing the theory of natural selection as it had the sametheme to that of Darwin. But, he attributes his work to Charles Darwin.

17. 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, Palaeontology and Genetics but not serology (study of blood).

18. Darwin's theory has been supported by a lot of evidence. Lamarck's Theory of Inheritance of Acquired Characteristics has been disproved. This was done in two major ways. The first is by experiment. We have seen through many real examples and observations that changes which occur in an animal during life are not passed on to the animal's offspring. If a dog's ears are cropped short, its puppies are still born with long ears. If someone exercises every day, runs marathons, eats well, and is generally very healthy, the fitness is not passed on and the person's children still have to work just as hard to get that fit and healthy, because only germ cell mutation are inherited.

19. 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.

20. This is in accordance with Hardy-Weinberg Theorem which states that the alleles and genotype frequencies in a population's gene pool remain constant over the generation unless acted upon by agents other than sexual recombination.

21. A fixed allele is homozygous for all members of the population. The term allele normally refers to one variant gene out of several possible for particular loci in the DNA.

22. According to Hardy Weinberg equation. D would be the right answer.

$(A+a)^2=1$

$(0.6)^2+(0.4)^2+2(0.6)(0.4)=1$

$0.36+0.16+0.48=1$

0.48 is showing heterozygous frequency

23. According to Hardy Weinberg equation. (A) Would be the right answer.

If; $p + q = 1$ (p is dominant allele and q is recessive allele)

Then; $1 - p = q$

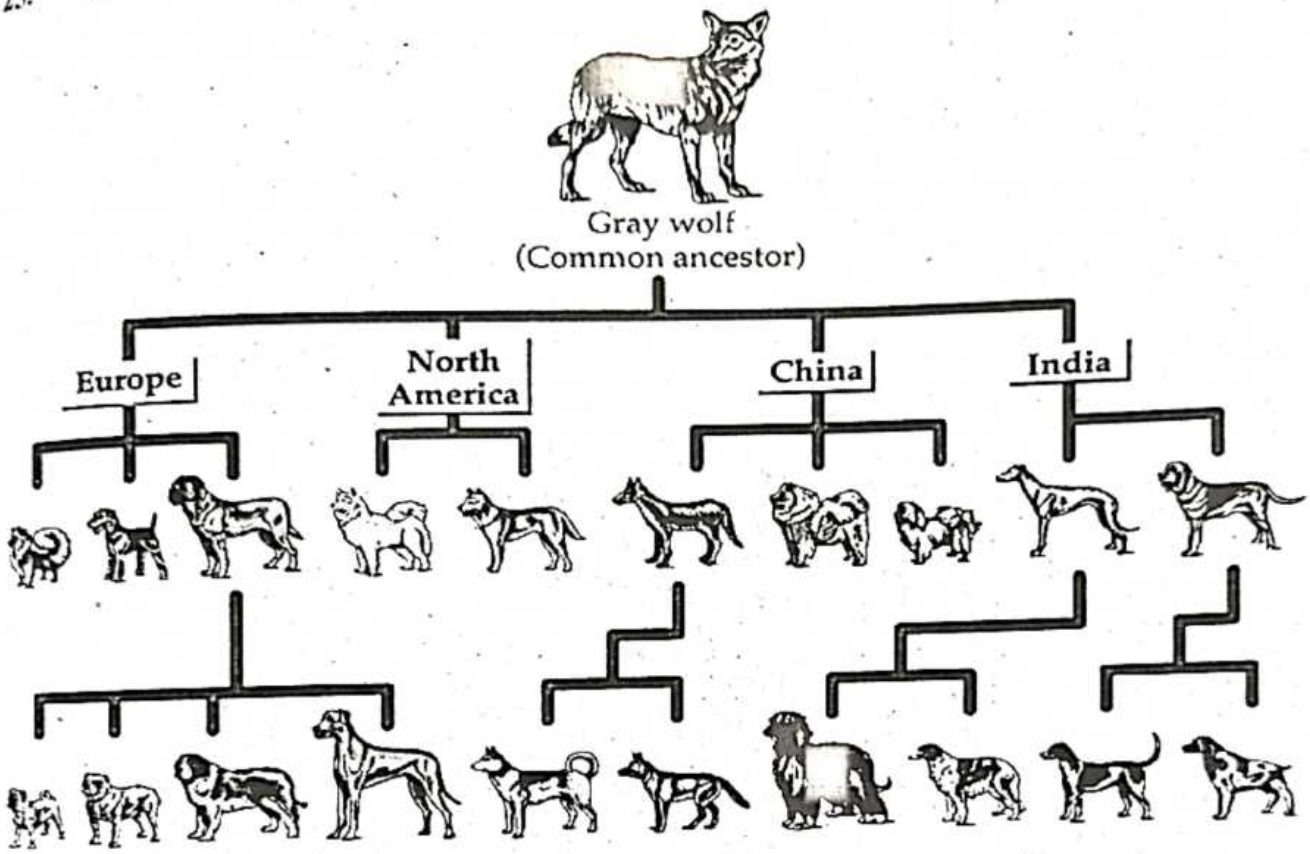
Here; $p = 0.90$

Therefor; $1 - 0.90 = 0.10$

0.10 is showing the frequency of the recessive allele.

24. Change in the frequency of alleles at a locus that occurs by chance is called genetic drift. Variation in the relative frequency of different genotypes in a small population. owing to the chance of disappearance of particular genes as individuals die or do not reproduce.

25. Given below varieties of dogs have been produced by artificial selection.



26. There are five basic Hardy-Weinberg assumptions: no mutation, random mating, no gene flow, infinite population size, and no selection.

27. Genetic drift is a change in frequency of alleles at a locus that occurs by chance.

28. $p^2 + 2pq + q^2 = 1$

This equation is in fact binomial expansion i,e. $(p + q)^2 = p^2 + 2pq + q^2$

This equation is used for calculating the frequencies of alleles and genotypes in populations at equilibrium.

29. In natural selection, environment plays role, thus affecting the proportions of gene in a population.

PAST PAPER MCQs

Q.1 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.

Q.2 Following are the factors that affect allele frequency:

- Mutation
- Migration
- Genetic Drift
- Non-random Mating
- Selection

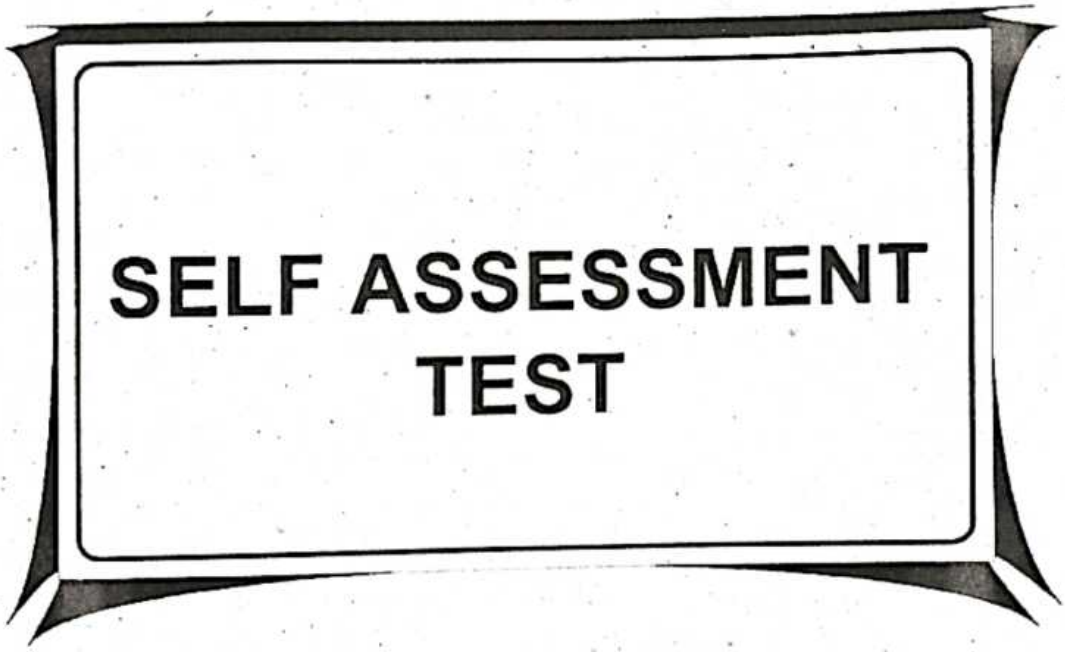
Q.3 Genetic drift is a change in frequency of alleles at a locus that occurs by chance.

Q.4 Following are the factors that affect allele frequency:

- Mutation
- Migration
- Genetic Drift
- Non-random Mating
- Selection

Q.5 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.

Q.6 Genetic drift is a change in frequency of alleles at a locus that occurs by chance.


SELF ASSESSMENT
TEST

UNIT 1 THE CELL

KIPS SELF ASSESSMENT TEST

Q.1 **Cytoplasmic streaming movement causes flow of all except:**
A) Endoplasmic reticulum
B) Mitochondria
C) Lysosomes
D) Glucose and salts

Q.2 **Movement of Na^+ across axon membrane via Na^+-K^+ pump is an example of:**
A) Active transport
B) Passive transport
C) Diffusion
D) Osmosis

Which labeled part would restrict the movement of small, lipid-insoluble molecules?

Q.3 **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

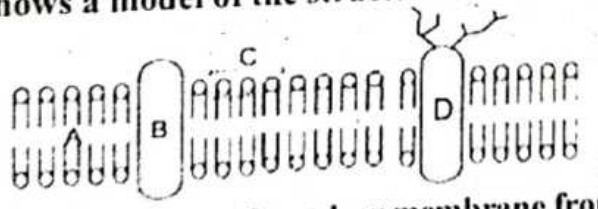
Q.4 **The source of illumination in electron microscope is:**
A) Visible light
B) Blue light
C) Far-red light
D) Beam of electrons

Q.5 **These play vital role in defense activity of macrophages:**
A) Mitochondria
B) Lysozymes
C) Lysosomes
D) Ribosomes

Q.6 **Damage to one of the following immediately kills the cell whether its prokaryotic or eukaryotic:**
A) Mitochondria
B) Cell wall
C) Cell membrane
D) Golgi apparatus

Q.7 **Which of these is not a part of murein?**
A) Polysaccharides
B) Amino acid chains
C) Glycans
D) Proteins

Q.8 **The diagram shows a model of the structure of a biological membrane:**



Ans: A

Q.9 **Which one always passes through nuclear membrane from nucleoplasm to cytoplasm?**
A) Proteins
B) Enzymes
C) DNA nucleotides
D) RNA

Q.10 **Some cellular organelles are bounded by a single membrane, while others have two membranes around them. Which one of the following is correct?**

	Single membrane		Two membranes	
A)	Vacuole	Lysosome	Nucleus	Chloroplast
B)	Chloroplast	Lysosome	Nucleus	Vacuole
C)	Nucleus	Chloroplast	Lysosome	Vacuole
D)	Nucleus	Lysosome	Chloroplast	Vacuole

Q.11 **They help to detoxify the harmful drugs:**
A) Ribosomes
B) RER
C) SER
D) Golgi bodies

Q.12 In Golgi apparatus, cisternae are thought to be moving from ____ to ____ face.
A) Inner, outer
B) Concave, convex
C) Medial, lateral
D) Convex, concave

Q.13 It is mismatched with reference to mitochondrial membrane:
A) Outer membrane- Smooth
B) Outer membrane – Chemiosmosis
C) Inner membrane - F1 particles
D) Inner membrane - Increases surface area

Q.14 In cross-section, each centriole consists of a cylindrical array of:
A) 3 microtubule triplets
B) 9 microtubule triplets
C) 6 microtubule triplets
D) 12 microtubule triplets

Q.15 Cell secretions are actually produced at _____, then transported to outside through _____ and _____.
A) Ribosomes, RER, SER
B) Ribosomes, Golgi apparatus, SER
C) RER, Golgi apparatus, Lysosomes
D) Ribosomes, ER, Golgi apparatus

Q.16 Types of ribosome present in the cytosol and organelles of the eukaryotic cell are respectively:
A) 60S and 40S
B) 70S and 80S
C) 80S and 70S
D) 80S and 80S

Q.17 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) III and IV only
C) I and III only
D) II and III only

Q.18 Which of the following is a protective structure in bacterial cells?
A) Cell wall
B) Cellulose
C) Protoplasm
D) Nuclei

Q.19 Plant cells are distinguishable from animal cells in containing:
A) Mitochondria
B) Ribosomes
C) Endoplasmic reticulum
D) Cell wall

Q.20 Endoplasmic reticulum is absent in:
A) Animal cells
B) Prokaryotic cells
C) Plant cells
D) Protists and Fungal cells

Q.21 Which one is always unicellular?
A) Mycoplasma
B) Virus
C) Protists
D) Algae

Q.22 If size of a particle is large or it has polarity, the suitable method of transportation will be:
A) Osmosis
B) Diffusion
C) Facilitated diffusion
D) Passive transport

Q.23 Nucleolus contains:
A) Ribosomal precursor
B) Protein precursor
C) Polysome
D) Lipid precursor

Q.24 Transport of glucose into the cell with the help of insulin is an example of:
A) Osmosis
B) Active transport
C) Facilitated diffusion
D) Endocytosis

Q.25 **The functional units of Golgi apparatus is:**
A) Thylakoids
B) Oxysomes
C) Cristae
D) Cisternae

Q.26 **Centrioles/centrosome takes part in:**
A) Nucleolus formation
B) Start of cell division
C) Cell plate formation
D) Spindle formation

Q.27 **Outer and inner membranes of mitochondria are:**
A) Structurally and functionally similar
B) Structurally and functionally different
C) Structurally similar but functionally different
D)Structurally different but functionally similar

Q.28 **Which substances can cross plasma membrane more easily?**
A) Ions
B) Proteins
C) Lipid soluble
D) Starch

Q.29 **Part of cell membrane which is in contact with external and internal environment is:**
A) Hydrophobic
B) Hydrophilic
C) Hydrophilic and hydrophobic
D) Neutral

Q.30 **The ratio of RNA and protein in a ribosome is:**
A) 1 : 1
B) 2 : 3
C) 4 : 7
D) 3 : 1

Q.31 **Secretory granules bud off from:**
A) Golgi bodies
B) SER
C) Vacuoles
D) Nucleus

Q.32 **What is a polysome?**
A) Group of mRNAs and one ribosome
B) mRNA + rRNA + tRNA + ribosome
C) Many ribosomes and many mRNAs
D) One mRNA and many ribosomes

Q.33 **The vesicles which diffuse to form stack of cisternae sacs are derived from:**
A) Golgi Apparatus
B) RER
C) SER
D) Lysosomes

Q.34 **Which one is a self-replicating organelle?**
A) Ribosome
B) Lysosome
C) Centriole
D) Mitochondrion

Q.35 **The exact replica of the chromosome is:**
A) Centromere
B) Kinetochore
C) Chromatid
D) Nucleosomes

Q.36 **Which of the following organelle is involved in autophagy?**
A) Lysosomes
B) Peroxisomes
C) Glyoxysomes
D) Microsomes

Q.37 **All of the following are single membranous organelles except:**
A) Mitochondria
B) Lysosomes
C) Glyoxysomes
D) Peroxisomes

Q.38 **Lysosomes are most abundant in:**
A) Plant cells having phagocytic activity
B) Bacteria with additional DNA plasmids
C) Protozoa
D) Animal cells having phagocytic activity

Q.39 **The absence of an enzyme that is involved in the catabolism of lipids results in:**
A) Tay-Sach's disease
B) Glycogenosis type I
C) Glycogenosis type II
D) Phenylketonuria

Q.40 **Tay-Sach's disease mostly affects which of the followings organ in human body:**
A) Liver
B) Brain
C) Kidneys
D) Muscles

Q.41 The lysosomes which eat parts of their own cells or cellular components during cellular starvation are called:
A) Primary lysosomes
B) Tertiary lysosomes
C) Secondary lysosomes
D) Autophagosomes

Q.42 Enzymes necessary for photosynthesis are present in:
A) Chloroplast
B) Peroxisome
C) Cytoskeleton
D) Lysosome

Q.43 Small and many vacuoles are generally found in:
A) Mycelium
B) Bacteria
C) Animal cell
D) Plant cell

Q.44 In a non dividing cell, centrioles are_____ in number:
A) 4
B) 3
C) 2
D) 1

Q.45 The conversion of amino acids into proteins is the function of:
A) Glyoxysomes
B) Peroxisomes
C) Lysosomes
D) Ribosomes

Q.46 The process of photosynthesis occurs at:
A) Plastids
B) Chlorophylls
C) Chloroplasts
D) Thylakoids

Q.47 The size and number of mitochondria in a cell depends upon which factor?
A) Size and shape of the cell
B) Physiological activities
C) Genetic makeup
D) Evolutionary history

Q.48 Which cell would have chloroplasts in abundance?
A) Phloem cells
B) Epidermal cells
C) Meristem
D) Mesophyll cells

Q.49 The type of cytoskeletal proteins that play important role in assembly and disassembly of spindle during mitosis:
A) Microtubules
B) Microfilaments
C) Intermediate filaments
D) Actin and tropomyosin

Q.50 Which of the following can maintain the shape of the cell?
A) Microtubules
B) Intermediate filaments
C) Microfilaments
D) All of these

Q.51 Which of the following function is not performed by the cell membrane of a plant cell?
A) Regulation of material
B) Transport of material
C) Active transport
D) Phagocytosis

Q.52 Organelles involved in organic molecule synthesis and organic molecule breakdown respectively:
A) Mitochondria and ribosomes
B) Chloroplast and ribosomes
C) Chloroplast and mitochondria
D) Mitochondria and chloroplast

Q.53 Which organelle in eukaryotic cell functionally resemble with mesosomes of prokaryotic cell?
A) Golgi apparatus
B) Endoplasmic reticulum
C) Cell membrane
D) Mitochondria

Q.54 Which type of molecule will make channels for movement of neutral substances down concentration gradient?
A) Phospholipids
B) Protein
C) Nucleic acid
D) Carbohydrates

Q.55 **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 producing cytoplasmic enzymes
C) A cell that digesting food particles
D) A cell that enlarging its vacuole

Q.56 **Which of following possesses a microtubular structure similar to a basal body?**

A) Centriole
B) Lysosome
C) Nucleolus
D) Ribosomes

Q.57 **Mitochondria have enzyme for all of these process except:**

A) Replication of DNA
B) Krebs cycle
C) Fatty acid metabolism
D) Fermentation

Q.58 **If cell organelle present near the exterior surface of the nucleus and consists of a cylindrical array of nine clusters each having three microtubules, then the organelle would be:**

A) Endoplasmic reticulum
B) Golgi bodies
C) Centriole
D) Mitochondria

Q.59 **Concerning entry of substances through plasma membrane, which statement is correct?**

A) Only passive transport needs energy
B) Only active transport needs energy
C) Phagocytosis is passive transport
D) Passive and active transport need energy

Q.60 **An organelle having its own DNA, ribosomes and protein formation indicate that organelle is:**

A) Self-replicating
B) Self-indicating
C) Self twisting
D) Self reproducing

ANSWER KEY

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

UNIT 2 BIOLOGICAL MOLECULES

KIPS SELF ASSESSMENT TEST

Q.1 These are most abundant organic compounds to be found in cells:

A) Carbohydrates
B) Proteins
C) Lipids
D) Water

Q.2 What does a hemoglobin molecule contain?

A) Four Fe^{2+} attached to each haeme group
B) Four oxygen molecules attached to each haeme group
C) Four polypeptide chains each with four attached haeme groups
D) Four polypeptide chains each with one attached haeme group

Q.3 All of the following elements are present in all carbohydrates except:

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

Q.4 Which term most appropriately describes catalase, collagen and haemoglobin?

A) Enzymes
B) Fibrous proteins
C) Globular proteins
D) Polypeptides

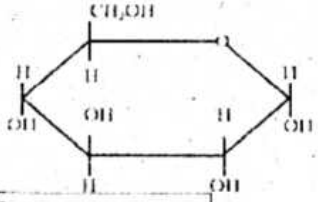
Q.5 Which property of proteins enables them to act as pH buffers?

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.6 _____ has unbranched chains of glucose and is soluble in hot water.

A) Amylose
B) Amylopectin
C) Glycogen
D) Cellulose

Q.7 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

Q.8 Silk protein is present in:

A) Nail
B) Plant cell wall
C) Hair
D) Spider's web

Q.9 All of the following are true about lipids except:

A) They store high amount of energy
B) They play important role in insulation
C) They are polymers of fatty acids
D) They are mostly hydrophobic in nature

Q.10 Property of water important for thermo-stabilization:

A) Highly reactive
B) Non ploar
C) Specific heat capacity
D) Solubility

Q.11 **Evaporation of 2ml of water, lowers the temperature of remaining 998 ml by:**
A) 2 C^0
B) 1 C^0
C) 5 C^0
D) 10 C^0

Q.12 **Lipids which are abundant in membranes:**
A) Acylglycerols
B) Terpenoids
C) Waxes
D) Phospholipids

Q.13 **All are true about ATP except:**
A) Energy currency of cell
B) Contains three high energy bonds
C) Contains ribose sugar
D) Contains three phosphate groups

Q.14 **A DNA fragment contains ACGT nucleotide sequence in one strand. How many hydrogen bonds will it make with other strand?**
A) 8
B) 10
C) 12
D) 6

Q.15 **Adenine and guanine are:**
A) Main nitrogenous bases of nucleic acids
B) Main nitrogenous bases of phospholipids
C) Main nitrogenous wastes of humans
D) Main types of amino acids in proteins

Q.16 **Secondary structure of DNA duplex is maintained by:**
A) Phosphodiester linkage
B) Ionic bond
C) Hydrogen bond
D) Hyperphobic interaction

Q.17 **3′ end of nucleic acids have always a free _____group:**
A) Phosphate
B) Hydroxyl
C) Carboxylic
D) Amino

Q.18 **This is not true about DNA molecule:**
A) Double polymer
B) Secondary structure
C) One groove in each turn
D) Constant diameter

Q.19 **Form of polysaccharide stored in bacteria and animals:**
A) Starch
B) Glycogen
C) Cellulose
D) Chitin

Q.20 **A structural protein is:**
A) Pepsin
B) Haemoglobin
C) Collagen
D) Immunoglobulin

Q.21 **Which of the following are single ringed structures?**
A) Cytosine, thymine and Adenine
B) Adenine, Guanine and Cytosine
C) Cytosine, Guanine and thymine
D) Cytosine, Thymine and Uracil

Q.22 **A famous sugar found in genetic material is:**
A) Hexose sugar
B) Pentose sugar
C) Tetrose sugar
D) Triose sugar

Q.23 **Nitrogen bases of nucleotides in RNA are attached to:**
A) Sugar molecules
B) Phosphate radicals
C) Nucleoside
D) Deoxyribose

Q.24 **Cross links of double helix of DNA are formed of:**
A) Sugar molecules
B) Phosphate radicals
C) Complementary nitrogen bases
D) Similar nitrogen bases

Q.25 **Regulatory sites other than active site, present over the enzymes are called:**
A) Active sites
B) Catalytic groups
C) Binding site
D) Allosteric sites

Q.26 **Which one is found only in RNA?**
A) Cytosine
B) Adenine
C) Uracil
D) Guanine

Q.27 A monosaccharide is:
A) Lactose
B) Sucrose
C) Ribose
D) Maltose

Q.28 The most common carbohydrate monomer is:
A) Maltose
B) Lactose
C) Glucose
D) Galactose

Q.29 Which forms nails, hair and feathers?
A) Fibrin
B) Keratin
C) Collagen
D) Elastin

Q.30 DNA is directly involved in the synthesis of all except:
A) DNA
B) Protein
C) tRNA
D) mRNA

Q.31 Immediate source of energy is:
A) Sucrose
B) Glucose
C) Fat
D) Starch

Q.32 Which one is correct base pairing for DNA molecule?
A) Cytosine - Uracil
B) Thymine - Guanine
C) Adenine - Thymine
D) Thymine - Uracil

Q.33 In one strand of DNA, the base sequence is CATGACTAG. What is the base sequence on the other strand?
A) CATTAGGAC
B) GATGTCACT
C) GAUCUGAUC
D) GTACTGATC

Q.34 Number of oxygen atoms in lipid molecules is always _____ as compared to number of carbon atoms.
A) Less
B) More
C) Equal
D) Double

Q.35 Two amino acid monomers are joined by:
A) Hydrogen bond
B) Peptide bond
C) Phosphodiester bond
D) Ester bond

Q.36 Unsaturated fats are made saturated by:
A) Polymerization
B) Hydrogenation
C) Dehydrogenation
D) Hybridization

Q.37 A peptide chain attains secondary structure through the formation of:
A) Peptide bond
B) Ionic bond
C) Hydrogen bond
D) Disulphide bond

Q.38 Specificity of an enzyme is determined by:
A) Numberand sequence of amino acids
B) Charge on substrate
C) pH of environment
D) Charge and shape of active site

Q.39 An activated enzyme consisting of polypeptide chain and a cofactor is called:
A) Apoenzyme
B) Coenzyme
C) Holoenzyme
D) Proenzyme

Q.40 Activators are usually derived from:
A) Vitamins
B) Proteins
C) Carbohydrates
D) Metal ions

Q.41 At a certain point where conversion of substrate/s into product/s is maximum, the enzyme/s would be:
A) Free
B) Activated
C) Denatured
D) Saturated

Q.42 **A three dimensional cavity bearing a specific charge by which the enzyme reacts with its substrate is called:**

A) Active site
B) Catalytic site
C) Binding site
D) Allosteric site

Q.43 **Which step causes activation of catalytic site of an enzyme?**

A) Change in pH of enzyme
B) Change in the shape of substrate
C) Formation of ES complex
D) Change in temperature

Q.44 **In a naturally occurring chemical reaction, all active sites are occupied, the rate of reaction would be:**

A) Minimum and constant
B) Maximum and accelerating
C) Zero and constant
D) Constant and maximum

Q.45 **All of the following pairs contain keratin except:**

A) Hooves & Horns
B) Hair & Nails
C) Skin & Feathers
D) Muscles & Bones

Q.46 **Excessive increase in temperature of medium causes the enzyme molecule to be:**

A) Activated
B) Denatured
C) Unaffected
D) Inactivated

Q.47 **Inhibitors are chemically:**

A) Metals
B) Inorganic
C) Organic
D) All A, B, C

Q.48 **Optimum temperature of enzymes present in human body is:**

A) 27°C
B) 47°C
C) 37°C
D) 30°C

Q.49 **Inhibitors which block the enzyme by forming weak bond are called:**

A) Competitive inhibitors.
B) Irreversible inhibitors.
C) Non- competitive inhibitors.
D) Reversible inhibitors

Q.50 **Malonic acid is an example of:**

A) Irreversible inhibitor
B) Competitive inhibitor
C) Reversible inhibitor
D) Non-competitive inhibitor

Q.51 **Enzymes belong to which class of proteins?**

A) Fibrous
B) Globular
C) Glycoprotein
D) Lipoprotein

Q.52 **Apoenzyme is:**

A) Protein part of enzyme
B) Non protein part of enzyme
C) Activated enzyme
D) Co-enzyme

Q.53 **Unsaturated fatty acids may contain double bonds between carbon atoms up to:**

A) 1
B) 2
C) 6
D) 7

Q.54 **The presence of which of the following will cause maximum stability of DNA?**

A) A=T base pairs
B) G≡C base pairs
C) Absence of Uracil base
D) Deoxyribose sugar

Q.55 **How many water molecules are consumed during the formation of one lecithin molecule:**

A) 0
B) 2
C) 3
D) 4

Q.56 **Number of phosphodiester bonds in ATP molecule:**

A) 1
B) 2
C) 3
D) 0

Q.57 **If DNA of yeast contains Adenine 31.3% and Guanine 18.7%.The approximate percentage of cytosine would be:**

A) 32.9
B) 31.3
C) 17.1
D) 21.0

Q.58 **Major portion of RNA in cell is:**

A) mRNA+tRNA
B) mRNA
C) rRNA
D) tRNA

Q.59 **Two chains of polynucleotides in DNA are:**

A) Same
B) Complementary
C) Parallel
D) Parallel with same base

Q.60 **Ribose and deoxyribose different from each other with respect to carbon number:**

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

ANSWER KEY

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

UNIT 3 CHROMOSOMES AND DNA CELL DIVISION

KIPS SELF ASSESSMENT TEST

Q.1 Chromatin contains:

A) DNA
B) Basic protein histone
C) Some non-histone protein and RNA
D) All A, B, C

Q.2 Match the column:

Column I	Column II
A. Metacentric chromosomal	1. Middle centromere
B. Sub-metacentric	2. Centromere slightly way from middle
C. Acrocentric	3. Centromere close to its end
D. Telocentric	4. Terminal centromere

A) A-1, B-2, C-3, D-4
B) A-1, B-2, C-4, D-3
C) A-2, B-1, C-3, D-4
D) A-4, B-2, C-2, D-1

Q.3 The following diagram shows a chromosome. Label what A represents:

A) Chromosomes
B) Kinetochore
C) Centromere
D) Acrocentric

Q.4 Which nucleic acid in some viruses can also act as genetic material?

A) DNA
B) RNA
C) mRNA
D) tRNA

Q.5 The process of making RNA from DNA is termed as:

A) Transaction
B) Transformation
C) Transcription
D) Transduction

Q.6 The genetic code:

A) Is a sequence of nucleotides on rRNA
B) Determines the sequence of amino acid in proteins
C) Is universal in biological system
D) None of the above

Q.7 The process of protein synthesis in biological systems is termed as:

A) Transaction
B) Transcription
C) Translation
D) Transformation

Q.8 DNA is a polymer of:

A) Nucleotides
B) Ribonucleotides
C) Nucleosides
D) Deoxyribonucleotides

Q.9 A nucleotide has the following components:

A) A phosphate group, nitrogenous base, a hexose sugar
B) A phosphorous base, nitrogenous group, a ribose sugar
C) A nitrogenous base, phosphate group, a ribose sugar
D) A nitrogenous base, phosphate group, a hexose sugar

Q.10 Which of the following is not a pyrimidine?

A) Thymine
B) Uracil
C) Adenine
D) Cytosine

Q.11 A nitrogenous base is linked to the pentose sugar through

A) Phosphoester linkage
B) O-glycosidic linkage
C) Phosphodiester linkage
D) N-glycosidic linkage

Q.12 In the context of genetic material: Base + sugar →

A) Nucleotide
B) Nucleoside
C) Nucleic acid
D) Nuclein

Q.13 The correct representation of central dogma is as follows:

A) DNA $\xrightarrow{\text{Transcription}}$ mRNA $\xrightarrow{\text{Transformation}}$ Protein

B) DNA $\xrightarrow{\text{Transcription}}$ mRNA $\xrightarrow{\text{Translation}}$ Proteins

C) Replication DNA $\xrightarrow{\text{Transcription}}$ mRNA $\xrightarrow{\text{Transformation}}$ Proteins

D) Replication DNA $\xrightarrow{\text{Transcription}}$ mRNA $\xrightarrow{\text{Translation}}$ Proteins

Q.14 In Meselson and Stahl experiment, ^{15}N can only be differentiated on the basis of:

A) Radioactively
B) Radioactive t ½
C) Physical observation
D) Density gradient

Q.15 The process of copying genetic information form DNA to RNA is known as:

A) Translation
B) Transduction
C) Transcription
D) Transformation

Q.16 The product of transcription process is in fact:

A) Entire segment of DNA copied to RNA
B) Only segment of DNA copied to RNA
C) Both A) and B)
D) None of these

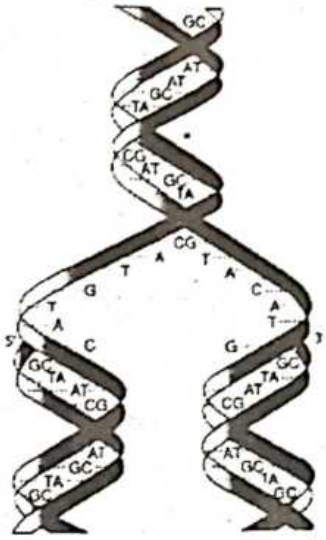
Q.17 In the process of transcription, the strand of DNA with polarity _____ acts as a _____ strand:

A) 5′ → 5′, Coding strand
B) 3′ → 5′, Template Strand
C) 3′ → 3′, Coding strand
D) 5′ → 3′, Template strand

Q.18 RNA polymerase I transcribes _____ in eukaryotes:

A) tRNA
B) rRNA
C) snRNA
D) hnRNA

Q.19 Which classical model proposed by Watson and Crick is represented by this figure?



A) Fully conservative DNA transcription
B) Semi-conservative RNA replication
C) Semi-conservative DNA replication
D) Non-conservative DNA replication

Q.20 What confers additional stability to double helix model of DNA apart from the H-bond?

A) One base pair provides inductive effect to the other
B) One base pair is stacked over the other
C) One base pair is stacked over the other.
D) One base pair interacts with another base pair via steric hindrance

Q.21 Human requires_____ codons to synthesize 20 amino acids:

A) 64 codons
B) 61 codons
C) 62 codons
D) 60 codons

Q.22 Which one of the following is the start codon?

A) AUG
B) UGA
C) UAA
D) UAG

Q.23 Which of the following steps in transcription is catalyzed by RNA polymerase?

A) Initiation
B) Elongation
C) Termination
D) All A, B, C

Q.24 Control of gene expression takes place at the level of:

A) DNA-replication
B) Transcription
C) Translation
D) None of the above

Q.25 To initiate translation, the mRNA first binds to:

A) The smaller ribosomal sub-unit
B) The larger ribosomal sub-unit
C) The whole ribosome
D) No such specificity exists

Q.26 Histones are rich in which amino acid?

A) Methionine, Arginine
B) Lysine, Arginine
C) Lysine, Proline
D) Methionine, Lysine

Q.27 Typically a nucleosome consists of how many base pairs?

A) 190
B) 200
C) 300
D) 310

Q.28 The backbone of DNA double helix consists of:

A) Sugar - base
B) Sugar – phosphate
C) Sugar-hydroxyl group
D) Sugar-Methyl group

Q.29 In the nucleus, the region of chromatin which is loosely packed is known as:
A) Heterochromatin
B) Chromatin fibres
C) Euchromatin
D) Chromosome

Q.30 Discontinuously synthesized strands of DNA adjacent to _____ DNA template are joined together by _____:
A) 5 → 3, DNA endonuclease
B) 3′ → 5′, DNAase
C) 3′ → 5′, DNA ligase
D) 5 → 3, DNA ligase

Q.31 The sequence of events by which a cell duplicates its genome, synthesize the other constituent of cells and eventually divides itself into two daughter cell is termed as:
A) Cytology
B) Cell division
C) Cell cycle
D) Cell biology

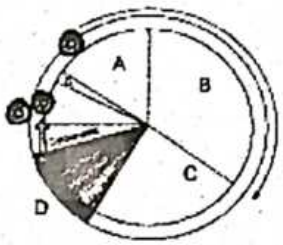
Q.32 Which of the following is correct about cell cycle?
A) All events occur in coordinated manner
B) All events are under genetic control
C) DNA synthesis occurs only during one specific stage in the cell cycle
D) All of these

Q.33 Cell growth (increase in cytoplasm) is a:
A) Continuous process
B) Discontinuous process
C) Irregular process
D) Retrogressive process

Q.34 Our cell can divide itself once approximately in:
A) 24 hours
B) 24 minutes
C) 24 seconds
D) 24 days

Q.35 Duration of a cell cycle in yeast is approximately:
A) 90 seconds
B) 90 minutes
C) 20 minutes
D) 45 minutes

Q.36 Identify A, B, C and D in the below diagram:



A) A-G, B-S, C-G_2, D-M Phase
B) A-G_2,B-M Phase, C-G_1, D-S
C) A-S, B-G_2, C-G_1, D-M Phase
D) A-M Phase, B-G_1, C-G_1, D-S

Q.37 M-Phase in human cell lasts for:
A) 1 hour
B) 2 hours
C) 23 hours
D) 4 hours

Q.38 Which of following is correct about interphase?
A) It is the phase present between two successive M-phase
B) It lasts for more than 95 per cent in the duration of cell cycle in human cell
C) It is also known as resting phase
D) All the above

Q.39 The main difference between dividing an animal and plant cell lies in:
A) Cell plate formation
B) Chromosome movement
C) Coiling of chromosome
D) Chromosome division

Q.40 **Which of the following cells do not divide once it is differentiation?**
A) Interstitial cells
B) Nerve cells
C) Myeloid cells
D) Glial cells

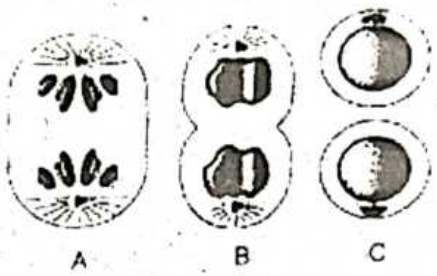
Q.41 **G_1phase is not characterized by:**
A) Continuous growth
B) Active metabolism
C) DNA replication
D) Non-replication of DNA

Q.42 **S-phase is not characterized by:**
A) DNA duplication
B) No increase in chromosome number
C) DNA replication
D) Duplication of centriole in nucleus of eukaryotic animal cell

Q.43 **What occurs continuously when cell is divided into G_1, S and G_2phase?**
A) DNA Replication
B) DNA Duplication
C) Centriole duplication
D) Growth of cell

Q.44 **If a cell 2n number of chromosome in G_1phase, what is the number of chromosome in cell after S-phase?**
A) n
B) $4n$
C) $2n$
D) $8n$

Q.45 **Identify A, B and C in the below diagram:**



A) A-Interphase, B-Telophase, C-Anaphase
B) A-Anaphase, B-telophase, C-Interphase
C) A-Telophase, B-Interphase, C-Anaplase
D) A-Interphase, B-Anaphase, C-Telophase

Q.46 **The cells which do not divide enter _____phase from G_1phase:**
A) S-phase
B) Directly G_2–phase
C) G_0 –phase
D) Any one of these

Q.47 **G_0phase is characterized by:**
A) DNA duplication
B) Active metabolism
C) S-phase
D) M-phase

Q.48 **Select the incorrect statement from the following:**
A) In animals, mitotic cell division is only seen in the diploid somatic cells
B) Plants can show mitotic division in both haploid and diploid cells
C) In an adult's heart, the cells do not divide
D) A organism starts life cycle from multiple cells

Q.49 **Mitosis is further divided in _____ stages of cytoplasmic division:**
A) 1
B) 2
C) 3
D) None of these

Q.50 **Cells at the end of prophase, when viewed under the microscope, do not show:**
A) Golgi body and ER
B) Nucleolus
C) Nuclear envelope
D) All A, B, C

Q.51 **Which of the following initiates the start of metaphase?**
A) Completion of bivalent chromosome formation
B) Assemblage of microtubules of nucleoplasm
C) Complete disintegration of nuclear envelope
D) Duplication of chromosome

Q.52 Metaphase is not characterized by:
A) Complete condensation of chromosome
B) Alignment of chromosome on metaphase plants
C) Attachment of spindle fibres to kinetochore
D) Splitting of chromosome

Q.53 Prophase I is divided into how many phases based on the chromosomal behavior?
A) 1
B) 2
C) 4
D) 5

Q.54 Select the correct statement from the following:
A) In leptotene stage the chromosomes become gradually visible under light microscope
B) During zygotene the heterologous chromosome shows pairing
C) Chiasmata is a J-shape structure formed in diplotene
D) Pachytene is characterized by the formation of synaptonemal complex

Q.55 Recombination is seen in:
A) Diplotene
B) Zygotene or synaptotene
C) Pachytene
D) Diakinesis

Q.56 Diakinesis is characterized by:
A) Condensation of chromosome
B) Assemblage of spindle
C) Disappearance of nucleous and nuclear membrane
D) All the above

Q.57 Homologous chromosomes gets separate during
A) Metaphase-I
B) Anaphase-I
C) Anaphase-II
D) Telophase-I

Q.58 The stage between two meiosis is
A) M-phase
B) Interphase
C) S-phase
D) Interkinesis

Q.59 Which of the following statement is incorrect?
A) Prophase II is simpler than prophase I
B) Prophase I is longer and complex than prophase of mitosis
C) Nuclear membrane reappears in telophase I
D) Anaphse II is not characterized by the splitting of centromere

Q.60 Meiosis is significant in all except:
A) Increases genetic variability
B) In conservation of specific chromosome number
C) Important for evolution
D) Increase in number of cells

ANSWER KEY

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

UNIT 4 VARIETY OF LIFE BIOENERGETICS

KIPS SELF ASSESSMENT TEST

Q.1 What is common to bacteria, mosses and fungus?

A) It is a mode of nutrition
B) Presence of cell wall
C) Autotrophic
D) Body organization

Q.2 Kingdom protista contains

A) Blue green algae
B) Fungi
C) Unicellular eukaryotes
D) All A, B, C

Q.3 Which of the following is incorrect about Protista?

A) All are single cell eukaryotes
B) Some have flagella or cilia
C) Sexually reproduce by cell fusion and zygote formation
D) Members of Protista are primarily terrestrial

Q.4 Sleeping sickness is caused by:

A) Plasmodium
B) Paramoecium
C) Trypanosoma
D) Entamoeba

Q.5 The protist which possess flagella is:

A) Paramoecium
B) Plasmodium
C) Trypanosoma
D) Entamoeba

Q.6 Which of the following is not example of fungus?

A) Toadstool
B) Puccinia
C) Yeast
D) Slime molds

Q.7 The following feartures belongs to:

A. Body consists of long, slender thread-like structures called hyphae.
B. Cell wall consist of chitin
C. Cosmopolitan

A) Ciliated protozoans
B) Slime moulds
C) Fungi
D) Euglenoids

Q.8 Life cycle in plant has generally two distinct phase the _____sporophytic and the _____ gametophytic that alternate with each other. This phenomenon is called as: alternation of generation:

A) Diploid, diploid
B) Diploid, haploid
C) Haploid, diploid
D) Haploid, haploid

Q.9 Plant cells have all except:

A) Chloroplast
B) Cellulosic cell wall
C) Large vacuole
D) Centriole

Q.10 Organisms referred to as amphibians of plant kingdom are:

A) Pteridophytes
B) Bryophytes
C) Angiosperm
D) Gymnosperms

Q.11 When the body of an animal can be divided into equal left and right halves by one plane symmetry. It is known as:

A) Bilateral
B) Radial
C) Biradial
D) Asymmetric

Q.12 Mammalia means organism which possess:
A) Exoskeleton
B) Endoskeleton of bone
C) Mammary gland
D) Two pair of limbs

Q.13 The growth and reproduction are mutually exclusive events in:
A) Plants only
B) Animals only
C) Higher animal and plants
D) Primitive organism

Q.14 Growth by cell division occurs_____ in plants and _____in animals:
A) Continuously, only up to a certain age
B) Only up to a certain age, continuously
C) Continuously, never
D) Continuously, continuously

Q.15 Virus is:
A) Completely non-living
B) Inert crystalline structure outside the living cell
C) Cellular organism
D) One of Whittaker's classifications

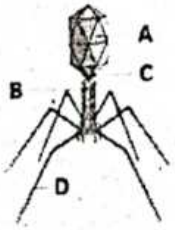
Q.16 Viruses can be seen through:
A) Naked eye
B) Electron microscope
C) Compound microscope
D) Light microscope

Q.17 Bacteriophages generally have:
A) Single stranded RNA
B) Double stranded DNA
C) Double stranded RNA
D) Any of the above

Q.18 Capsomeres may be arranged in:
A) Helical
B) Polyhedral
C) Ellipsoid
D) Either A or B

Q.19 Viroids are:
A) Free protein
B) Free RNA
C) Free DNA
D) Free saccharides

Q.20 Given below is the diagram of a bacteriophage. In which one of the option all four parts A, B, C and D are correct?



A) A: Tail fibres, B: Head, C: Sheath, D: Collar
B) A: Sheath, B: Collar, C: Head, D: Tail fibres
C) A: Head, B: Sehath, C: Collar, D: Tail fibres
D) A: Collar, B: Tail fibres, C: Head, D: Sheath

Q.21 Infectious proteins are present in:
A) Gemini viruses
B) Prions
C) Viroids
D) Satellite viruses

Q.22 In a bacteriophage, DNA is present in:
A) Head
B) Tail
C) Head and tail
D) In tail fibres only

Q.23 AIDS virus contains:
A) DNA only
B) RNA only
C) DNA + protein
D) RNA + protein

Q.24 **Reverse transcriptase is:**
A) RNA dependent RNA polymerase
B) DNA dependent RNA polymerase
C) DNA dependent DNA polymerase
D) RNA dependent DNA polymerase

Q.25 **Enzyme needed for production of DNA from RNA is:**
A) RNA polymerase
B) Reverse transcriptase
C) DNA helicase
D) DNA polymerase

Q.26 **HIV can be transmitted by all of the following sources except:**
A) Intimate sexual contact
B) Breast feeding
C) Contact with blood
D) Saliva

Q.27 **Uncoating of HIV virion occurs:**
A) Outside the cell
B) In nucleus
C) In cytoplasm
D) At any place

Q.28 **HIV genome contains:**
A) Single RNA strand
B) Two complementary DNA strands
C) Two identical RNA strands
D) Single DNA strand

Q.29 **The major cells infected by HIV are:**
A) Basophils
B) Neutrophils
C) Lymphocytes
D) Eosinophils

Q.30 **Virus can detects its specific host cell by:**
A) Specific hormones of host
B) Specific receptors
C) Specific enzymes
D) Specific pH

Q.31 **Which of the following describes condition 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)	High	Low	Low
C)	Low	High	High
D)	Low	Low	High

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

Q.33 **Photosystem II has reaction center of:**
A) P_{680}
B) P_{730}
C) P_{700}
D) P_{660}

Q.34 **Which of the following is a molecule formed in metabolic pathway by the equal splitting of a phosphorylated hexose into two halves?**
A) Acetyl coenzyme A
B) Fructose 1, 6-bisphosphate
C) Ribulosebisphosphate
D) Triose phosphate

Q.35 **What is the function of molecular oxygen in cellular respiration?**
A) To cause the breakdown of citric acid
B) To combine with glucose to produce carbon dioxide
C) To combine with carbon from organic molecules to produce carbon dioxide
D) To combine with hydrogen from organic molecules to produce water

Q.36 **How many moles of carbon dioxide are produced by the complete oxidation of 1 mole of pyruvate?**
A) 1
B) 3
C) 4
D) 6

Q.37 The reaction which occurs in thylakoid interior space:
A) Photolysis
B) Transport of electrons
C) ATP synthesis
D) Dark reaction

Q.38 In photosynthetic prokaryotes, which of the following might be absent?
A) Grana
B) Chlorophyll
C) Thylakoid like membranes
D) ATP synthase

Q.39 The wavelengths of light least absorbed by carotenes are:
A) Blue to green
B) Yellow to orange
C) Red to orange
D) Yellow to red

Q.40 What will be the number of carbon and hydrogen atoms respectively in the tail of chlorophyll b molecule?
A) 20, 39
B) 55, 72
C) 20, 40
D) 55, 70

Q.41 A plant shifts from cyclic to non-cyclic flow of electron when:
A) It has low reducing power
B) It runs low on assimilating power
C) Assimilating power is restored
D) It has sufficient reducing power

Q.42 Photosystem I and II are differentiated on the basis of their:
A) Chlorophyll a
B) Primary electron acceptor
C) Chlorophyll b
D) Carotenoids

Q.43 In which of the following steps, NADH is formed without decarboxylation?
A) Isocitrate $\rightarrow$ α-ketoglutarate
B) α-ketoglutarate $\rightarrow$ succinate
C) Pyruvate $\rightarrow$ Acetyl CoA
D) Malate $\rightarrow$ oxaloacetate

Q.44 The oxidation of which of the following will produce $FADH_2$?
A) Malate
B) FAD
C) Fumarate
D) Succinate

Q.45 Light energy is converted into chemical energy through the formation of:
A) NADH
B) ADP
C) ATP and $NADPH_2$
D) RuBP

Q.46 Photophosphorylation during photosynthesis consists of:
A) Cyclic and non-cyclic phosphorylation
B) Oxidative phosphorylation
C) Substrate level phosphorylation
D) Respiratory chain

Q.47 The by-product of photosynthesis is:
A) Organic compound
B) Oxygen
C) $NADPH_2$
D) Energy

Q.48 Stroma is the ground matrix of:
A) Lysosomes
B) Oxysomes
C) Ribosomes
D) Chloroplast

Q.49 In which wavelength of light, photosynthesis is maximum?
A) Red light
B) Green light
C) Blue light
D) Ultra-violet light

Q.50 Source of protons within the chloroplasts is:
A) Water
B) Excited chlorophyll molecules
C) Carbon dioxide
D) Rubisco

Q.51 Dark reactions of carbon assimilation occur in:
A) Cytoplasmic matrix
B) Mitochondria
C) Leucoplasts
D) Chloroplasts

Q.52 The number of carbon atoms present in ribulose:
A) 6
B) 5
C) 4
D) 3

Q.53 ATP molecules required for synthesis of a glucose molecule in Benson-Calvin cycle are:
A) 36
B) 38
C) 12
D) 18

Q.54 Photophosphorylation is synthesis of:
A) ADP from ATP
B) Glucose 6-phosphate from glucose
C) ATP from ADP
D) $NADP^+$ from NAD^+

Q.55 When a molecule of pyruvic acid is subjected to anaerobic respiration and forms lactic acid, then:
A) 2 ATP are formed
B) 4 ATP are formed
C) No ATP is formed
D) 6 ATP are formed

Q.56 Incomplete breakdown of sugars in anaerobic respiration forms:
A) Fructose and water
B) Glucose and CO_2
C) Alcohol and CO_2
D) Water and CO_2

Q.57 Following is/are obtained during cyclic photophosphorylation:
A) ATP
B) O_2
C) $NADPH_2$
D) All A,B,C

Q.58 ATP formation occurs during all of the following steps of aerobic respiration except:
A) Glycolysis
B) Pyruvic acid oxidation
C) Krebs cycle
D) Electron transport chain

Q.59 Action spectrum of photosynthesis was described in 1883 by:
A) Robert Hill
B) T.W. Engelmann
C) M. Calvin
D) Hatch and Slack

Q.60 Conversion of NAD^+ into NADH requires:
A) 2 Electrons 1 proton
B) 1 Electron 2 protons
C) 2 Electrons 2 protons
D) 1 Electrons 1 proton

ANSWER KEY

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

UNIT 5

GAS EXCHANGE TRANSPORT IN PLANTS

KIPS SELF ASSESSMENT TEST

Q.1 Oxygenated blood from lungs is carried to the heart by:

A) Pulmonary arteries
B) Pulmonary veins
C) Coronary veins
D) Subclavian vein

Q.2 In terrestrial mammals, the movements for ventilation are governed by:

A) Abdominal muscles
B) Skeletal muscles
C) Diaphragm
D) Diaphragm and intercostal muscles

Q.3 In human beings, CO_2 concentration in the inspired and expired air is respectively:

A) 0.01% and 5.3%
B) 0.4% and 5.0%
C) 0.04% and 4.0%
D) 0.04% and 5.0%

Q.4 Vocal cords are _____ bands stretched across the mucous membrane in the glottis.

A) Two thick edge cartilaginous
B) Two thin edge muscular
C) Two thin edge fibrous
D) Two pairs of thick edge fibrous

Q.5 Air is warmed as it passes through:

A) Nasal cavities
B) Trachea
C) Bronchi
D) Alveoli

Q.6 Human lungs are spongy because of presence of millions of:

A) Bronchi
B) Parabronchi
C) Alveoli
D) Air sacs

Q.7 Surfactant is present in:

A) Alveoli
B) Bronchi
C) Bronchioles
D) All A, B, C

Q.8 All of the following play a protective role in respiratory passage except:

A) Macrophages
B) Hair and mucous
C) Ciliated epithelium
D) Lymphocytes

Q.9 The decrease in pH of blood has _____ effect on the oxygen carrying capacity of hemoglobin.

A) Positive
B) Negative
C) No effect
D) First negative than positive

Q.10 A structure that does not contain cartilage:

A) Alveolar duct
B) Alveoli
C) Alveolar sacs
D) All A, B, C

Q.11 Smooth muscles are present in all except:

A) Trachea
B) Bronchioles
C) Bronchi
D) Alveoli

Q.12 Each nasal cavity is divided into _____ passage ways.

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

Q.13 Nasal cavity is lined with:

A) Columnar epithelium
B) Ciliated epithelium
C) Squamous epithelium
D) Cuboidal epithelium

Q.14 Pigment present in muscles has all characteristics except:

A) Can bind with four O_2 molecules
B) Composed of one polypeptide chain
C) Single Haem group
D) Iron is present

Q.15 **Pleura is a thin membranous sac that cover lungs with:**
A) Single layer
B) Double layer
C) Triple layer
D) Pair of double layers

Q.16 **How many oxygen molecules can bind to muscle haemoglobin?**
A) 2
B) 1
C) 4
D) 8

Q.17 **Which of the following is not carried by haemoglobin?**
A) Oxygen
B) Carbon dioxide
C) Bicarbonate
D) Carbon monoxide

Q.18 **Percentage of O_2 transported through plasma:**
A) 3%
B) 70%
C) 97%
D) 30%

Q.19 **The process of bringing oxygenated air into contact with a gas exchange surface is:**
A) Ventilation
B) Photorespiration
C) Gas transport
D) Respiration

Q.20 **The mode of respiration in a mammal is:**
A) Mucosal
B) Tracheal
C) Cutaneous
D) Pulmonary

Q.21 **Which is the correct sequence of the air passage way in 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.22 **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.23 **The maximum amount of air that our lung can normally hold is:**
A) Vital capacity
B) Tidal capacity
C) Total lung capacity
D) Pulmonary capacity

Q.24 **Which one of the following is capable of carrying more oxygen?**
A) Blood
B) Serum
C) Lymph
D) Plasma

Q.25 **Which one is mismatched?**
A) Haemoglobin —Frog
B) Haemoglobin —Snail
C) Heamocyanin —Mollusca
D) Haemoglobin —Man

Q.26 **Carbonic anhydrase is found in high concentration in:**
A) Erythrocytes
B) Leucocytes
C) Lymphocytes
D) Blood plasma

Q.27 **During an asthma attack, a person has difficulty in breathing because of the contraction of:**
A) Trachea
B) Bronchi
C) Alveoli
D) Terminal bronchioles

Q.28 **Breakdown of alveoli occurs in:**
A) Emphysema
B) Tuberculosis
C) Asthma
D) Cancer

Q. 29 It is now estimated that 90% of the lung cancer is caused by:

A) Air pollution
B) Genetically
C) Oncovirus
D) Smoking

Q. 30 Which of the following is an example of bacterial infection of respiratory system?

A) Asthma
B) Tuberculosis
C) Emphysema
D) Histoplasmosis

Q. 31 Translocation in plants moves sucrose from sources to sinks. Which of the following can be a source and which a sink?

	source	Sink
A	germinating seeds	green leaves
B	green leaves	storage roots
C	phloem	germinating seeds
D	storage roots	phloem

Q. 32 Which processes are involved in transpiration?

1. **the diffusion of water vapour from stomata**
2. **the mass flow of water through the xylem**
3. **the evaporation of water from spongy mesophyll cells**
4. **the evaporation of water vapur from exposed leaves**

A) 1, 2, 3 and 4
B) 1 and 4 only
C) 1 and 4 only
D) 2, 3 and 4 only

Q. 33 What is the main function of a companion cell in mature phloem tissue?

A) Providing cytoplasmic contact with the sieve tube element for loading
B) Providing structural support for the sieve tube element
C) Providing the nucleus for cell division in the phloem
D) Providing the source of assimilates for storage

Q. 34 During transpiration, what is the site of evaporation of water in the leaves?

A) Air spaces
B) Guard cell walls
C) Mesophyll cell walls
D) Stomata

Q. 35 Which features of xerophytes are adaptations to reduce water loss by transpiration?

	Rolled leaves	Fleshy leave	Sunken stomata	Thick waxy cuticles
A	✓	✓	✓	✓
B	✗	✓	✓	✓
C	✓	✓	✓	✗
D	✗	✓	✓	✓

Key
✓= reduces water loss
✗= no effect on water loss

Q. 36 Which feature of xylem vessel elements helps the cohesion of water?

A) Lignin forms an incompletes secondary wall
B) New vessels carry extra water as plant grows
C) Diffusion of water through the stoma
D) Evaporation of water from the mesophyll cell walls

Q. 37 **Water that is present inside a root hair cell may leave the cell and pass to the xylem. Through which pathway must the water travel?**

A) Apoplast
B) Plasmodesmata
C) Symplast
D) Vacuoles

Q. 38 **In which combination of environmental conditions are the stomata of a plant most likely to close?**

	Atmospheric humidity	Soil water potential	Wind speed
A	High	Low	High
B	High	Low	Low
C	Low	High	High
D	Low	Low	High

Q. 39 **Which statement explains how mass flow arises in sieve tube elements?**

A) Sucrose actively loaded into sieve tube elements decreases the water potential causing the hydrostatic pressure to increase.

C) Sucrose diffused into sieve tube elements decreases the water potential causing the hydrostatic pressure to increase.

B) Sucrose actively loaded into sieve tube elements increases the water potential causing the hydrostatic pressure to decrease.

D) Sucrose diffused into sieve tube elements increases the water potential causing the hydrostatic pressure to decrease.

Q. 40 **Water will move from:**

A) Higher pressure potential to lower
B) Higher solute potential to lower
C) Higher water potential to lower
D) Lower water potential to higher

Q. 41 **Transport over longer distance in plants is known as:**

A) Translocation
B) Transformation
C) Transduction
D) Diffusion

Q. 42 **Xylem is associated with the translation of:**

A) Water
B) Mineral
C) Some organic nitrogen and hormone
D) All A, B, C

Q. 43 **The most widely accepted explanation for the ascent of sap in tree is**

A) Capillarity
B) Roll of atmospheric pressure
C) Pulsating action of living cells
D) Transpiration cohesion theory

Q. 44 **What determines the rate of water movement form the roots to the leaves?**

A) Absorption of water through the root hair cells
B) Development of a less negative water potential in the leaves
C) Diffusion of water through the stomata
D) Evaporation of water from the mesophyll cell walls

Q. 45 Movement of water is correctly represented by:

A) Cortex→Root hair (Epidermis)→Xylem →Endoderis→Pericycle

B) Root hair (Epidermis) →Endodermis→Xylem→Pericycle→Cortex

C) Root hair (Epidermis) →Cortex→Endodermis→Pericycle→Xylem

D) Xylem→Cortex→Endodermis→Pericycle→Root hair (Epidermis)

Q. 46 Which one of the following structures between two adjacent cells is an effective transport pathway?

A) Plasmodesmata

B) Plastoquinone

C) Endoplasmic reticulum

D) Plasmalemma

Q. 47 Transpiration driven ascent of sap depends mainly on the _____physical properties of water:

A) Cohesion

B) Adhesion

C) Surface tension

D) All A, B, C

Q. 48 Sap ascends in woody stems because of the root pressure and:

A) Transpiration pull

B) Capillarity

C) Molecular adhesion

D) Photosynthesis

Q. 49 The loss of water in the form of vapor from the aerial plant parts is known as:

A) Osmosis

B) Respiration

C) Photosynthesis

D) Transpiration

Q. 50 Guard cells are found in:

A) Stomata

B) Root tips

C) Ovary

D) Lenticels

Q. 51 In both transpiration and evaporation, water is lost in the form of vapor yet they differ, because:

A) Both transpiration and evaporation are similar but the rate of water loss differs

B) Frequency of water loss is different in both of them

C) Transpiration is a physical process and evaporation is a physiological process

D) Transpiration is a physiological process and evaporation is a physical process

Q. 52 Out of the following, which one is the common type of transpiration?

A) Foliar

B) Stomatal

C) Lenticular

D) Cuticular

Q. 53 In a hot summer day, a plant cools itself due to:

A) Loss of water vapors from leaf

B) Transport of water in plant

C) Loss of liquid water

D) Loss of water from entire plant

Q. 54 Which of the following is called necessary evil?

A) Osmosis

B) Absorption

C) Transpiration

D) Photosynthesis

Q. 55 **What is he means of transport through which sucrose moves into sieve tube of source and out of sieve tube at sink?**

A) Simple diffusion
B) Facilitated diffusion
C) Active transport
D) Passive transport

Q. 56 **When sugar is added to the source water potential of sucrose _____ and when sugar is removed from sink, the water potential of sink _____:**

A) ↑es, ↑es
B) ↑es, ↓es
C) ↓es, ↓es
D) ↓es, ↑es

Q. 57 **Stoma open at night and close during the day time in case of:**

A) Succulents
B) Mesophytes
C) Hydrophytes
D) Xerophytes

Q. 58 **If cohesion-tension transpiration pull theory is correct, a break in water column should:**

A) Increase water content of leaves
B) Increase rate of photosynthesis
C) Cause wilting of leaves
D) Have no effect at all

Q. 59 **Sunken stomata are found in:**

A) Mesophytes
B) Hydrophytes
C) Xerophytes
D) Epiphytes

Q. 60 **The cohesive force of water is due to:**

A) S-bonds
B) O-bonds
C) H-bonds
D) OH-bonds

ANSWER KEY

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

UNIT 6 TRANSPORT IN HUMANS IMMUNITY

KIPS SELF ASSESSMENT TEST

Q.1 **Amount of blood pumped by heart into body per minute is called:**

A) Atrial output
B) Ventricular output
C) Cardiac output
D) Stroke volume

Q.2 **At the time of diastole, heart is filled with:**

A) Mixed blood
B) Venous blood
C) Oxygenated blood
D) Deoxygenated blood

Q.3 **Blood passes from left ventricle to right atrium. It is:**

A) Systemic circulation
B) Pulmonary circulation
C) Coronary circulation
D) Atrio-venous circulation

Q.4 **There are _____ different types of WBCs in our blood:**

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

Q.5 **All of the following types of WBCs can have lobed nucleus except:**

A) Neutrophils
B) Monocytes
C) Eosinophils
D) Lymphocytes

Q.6 **_____ inactivate inflammation producing substances and attack parasites:**

A) Neutrophils
B) Monocytes
C) Eosinophils
D) Lymphocytes

Q.7 **It serves as a temporary seal to prevent bleeding until the damaged tissue will be repaired:**

A) Wound
B) Clot
C) Scar
D) Skin

Q.8 **Which white blood cellsare involved in following function:**

A) Basophils
B) Neutrophils
C) Lymphocytes
D) Eosinophils

Q.9 **How many valves are present in human heart?**

A) 4
B) 2
C) 3
D) 6

Q.10 **ECG is a diagnostic test for abnormality in:**

A) Rhythmicity
B) Valves
C) Pressure
D) Mixing

Q.11 **If the distance between two P waves on an ECG of a person is more than the normal, what will be the possible duration of his cardiac cycle?**

A) 0.2 second
B) 0.6 second
C) 0.8 second
D) 1 second

Q.12 **Which of the following is correctly matched?**

		Veins	Capillaries
A)	Blood pressure	Intermediate	Low
B)	Blood flow	Intermediate	Slow
C)	Endothelial cells	No	Yes
D)	Elasticity	Less elastic	No

Q.13 If an artery supplying blood to brain bursts as a result of high blood pressure, it will leads to:
A) Hemorrhage
B) Stroke
C) Cerebral infarction
D) Hypertension

Q.14 Carotid artery carries:
A) Deoxygenated blood to brain
B) Oxygenated blood to brain
C) Oxygenated blood to heart
D) Deoxygenated blood to heart

Q.15 Tricuspid valve is found in between:
A) Sinus venosus and right atrium
B) Right atrium and right ventricle
C) Left ventricle and left atrium
D) Right ventricle and aorta

Q.16 Contraction of right ventricle pumps blood into:
A) Aorta
B) Pulmonary trunk
C) Pulmonary vein
D) Coronary artery

Q.17 Cardiac muscles differ from skeletal muscles in their:
A) Control
B) Structure
C) Function
D) All A, B, C

Q.18 If fatty materials deposited inside the artery, then the condition is termed as:
A) Arteriosclerosis
B) Atherosclerosis
C) Thrombosis
D) Embolism

Q.19 The least blood pressure can be observed in:
A) Arteries
B) Veins
C) Capillaries
D) Vena cava

Q.20 All of the following are characters of veins except:
A) Low blood pressure
B) No pulse detection
C) Valves present
D) Have smaller bore and thin walls

Q.21 Which of the following is the leading cause of death in Western civilization?
A) Hypertension
B) Thromboembolism
C) Myocardial infarction
D) Cerebral infarction

Q.22 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.23 Baroreceptors are located in/at:
A) Wall of aorta
B) Wall of each artery
C) Endothelium of capillary
D) At the base of pulmonary vein

Q.24 All are correct regarding cerebral infarction except:
A) Symptoms vary depending upon damaged area
B) Thromboembolism is the main cause
C) Neural tissue death can occur due to accumulation of toxic substances
D) High blood pressure can exaggerate the problem

Q.25 S.A node is located at:
A) Upper end of right atrium
B) Inter-atrial septum
C) Inter-ventricle septum
D) Atrio-ventricle septum

Q.26 Pick the odd one out with reference to blood clotting:
A) Thrombin
B) Platelets
C) Fibrin
D) Heparin

Q.27 The most abundant compound in blood plasma is:
A) NaCl
B) Water
C) Albumin
D) Globulin

Q.28 Which one is not related to cardiovascular system:
A) Blood
B) Heart
C) Arteriole
D) Lacteal

Q.29 The ultimate destination of lymph is:
A) Lymph Node
B) Lymph Capillaries
C) Lymphoid Organs
D) Subclavian vein

Q.30 More than 70% of colloidal osmotic pressure is due to:
A) Fibrinogen
B) Fibrin
C) Albumin
D) Thrombin

Q.31 What are antigens?
A) Non-self molecules found only on bacteria
B) Non-self molecules that trigger immune response
C) Proteins having two light and two heavy chains
D) Self molecules on B-lymphocyte

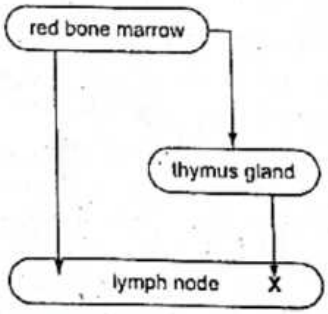
Q.32 Which are specific immune responses?
1. Phagocytosis
2. Production of antibodies
3. Effect of histamine
A) 1 only
B) 2 only
C) 1 and 3 only
D) 2 and 3 only

Q.33 Which description is correct for B-lymphocytes?

	made from bone marrow stem cells	processed in the thymus	release antibodies
A)	✓	✓	✓
B)	✓	✓	×
C)	✓	×	✓
D)	×	×	✓

Q.34 An antiserum to a 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) Artificial passive immunity
C) Natural active immunity
D) Natural passive immunity

Q.35 The diagram shows the relationship between the red bone marrow. The thymus gland and the lymph nodes.



What does X represent?
A) Antibodies
B) B-lymphocytes
C) Macrophages
D) T-lymphocytes

Q.36 New-born babies have natural passive immunity. Why is this only temporary?

A) No memory cells are produced in the baby. C) The antibodies only act in the mother.
B) The antibodies are insufficient in number. D) The immunity is not inherited

Q.37 What is the difference between B and T lymphocytes in the immune system?

	B lymphocytes	T lymphocytes
A)	do not produce memory cells	produce memory cells
B)	formed from bone marrow cells	formed from cells in the thymus
C)	form plasma cells which secrete antibodies into the blood stream	do not form plasma cells
D)	stimulate macrophages to carry out phagocytosis	do not stimulate macrophages to carry out phagocytosis

Q.38 Cells which divide and give rise to lymphocytes are called stem cells. Where in the human body do these stem cells divide?

A) Bone marrow C) Spleen
B) Lymph nodes D) Thymus

Q.39 What is the function of the plasma cells during an immune response?

A) To secrete antibodies C) To kill cells infected with viruses
B) To engulf bacteria D) To change into memory cells

Q.40 Breast milk produced by the mother for a new-born baby contains antibodies. What do these antibodies provide?

A) Artificial active immunity C) Natural active immunity
B) Artificial passive immunity D) Natural passive immunity

Q.41 Why is passive immunity effective for only a short time?

A) Antibodies are rapidly broken down C) Memory cells soon die
B) Antigens are rapidly broken down D) Phagocytes soon die

Q.42 What is the first response by the immune system to a pathogen?

A) Ingestion of the pathogen by B-lymphhocytes.
B) Ingestion of the pathogen by phagocytes
C) Production of antibodies
D) Production of antigens

43. Stronger and specific immunity is found in:

A) All animals C) Humans only
B) Invertebrates only D) All vertebrates

Q.44 Immune system in man is mainly composed of:

A) Leucocytes C) Phagocytes
B) Lymphocytes D) Antigens

Q.45 During breast feeding, infants gain:

A) Active Immunity C) Natural passive Immunity
B) Artificial Active Immunity D) Vaccination

Q.46 Plasma cells are produced from:

A) B lymphocytes C) Macrophages
B) T lymphocytes D) Neutrophils

Q.47 Chemical nature of an antigen is:

A) Protein C) Carbohydrate
B) Non-protein D) Of any chemical nature

Q.48 Which of the following method of immunization is used for treatment of snake bite?

A) Active artificial immunization
B) Active natural immunization
C) Passive natural immunization
D) Passive artificial immunization

Q.49 Antiserum has:

A) Antigens
B) Antibodies
C) White blood cells
D) Red blood corpuscles

Q.50 Immunity is mostly lost in all conditions except:

A) SCID
B) Cystic fibrosis
C) AIDS
D) Leukemia

Q.51 Skin and mucous are an example of:

A) 1st line of defense
B) 2nd line of defense
C) 3rd line of defense
D) 4th line of defense

52. Disulphide bridge is found between_____ in antibodies:

A) Between two heavy chains
B) Between two light chains
C) Between heavy and light chains
D) Both A and C

Q.53 What happens when people are injected with dead bacteria?

A) B-lymphocytes produce antibodies
B) B-lymphocytes produce antigens
C) T-lymphocytes produce antibodies
D) T-lymphocytes produce antibodies

Q.54 A child is vaccinated against a viral disease. A few weeks later she is exposed to the same virus.

What is the expected response to this exposure?

A) Increased numbers of B-lymphocytes
B) Increased number of T-lymphocytes
C) Large numbers of antibodies are released
D) Large numbers of antigens are released

Q.55 Which action is taken by a B-lymphocyte activated by an antigen?

A) It attaches to the infected cell displaying the antigen and destroys it.
B) It divides repeatedly to form a clone of genetically identical plasma cell.
C) It engulfs the infected body cell which displays the antigen.
D) It secretes cytokines which stimulate T-lymphocytes to produce plasma cells.

Q.56 Which statement is correct for a neutrophil?

A) They are found in tissues and secrete cytokines in response to infection
B) They can leave the blood and accumulate at sites of inflammation
C) They can leave the blood and secrete cytotoxins when exposed to damaged cells
D) They circulate in the blood and present antigens in response to infection

Q.57 What describes artificial passive immunity?

A) Protection against a pathogen by an injection of antibodies

B) Protection against a pathogen by drinking colostrum containing antibodies

C) Stimulation of lymphocytes by antigens contained in a vaccine

D) Stimulation of lymphocytes by antigens on the surface of invading pathogens.

Q.58 Which statements about macrophages are correct?

1 More are found in tissues such as the lungs, than in the blood.

2 They have a role in antigen presentation.

3 They can engulf pathogens, dust particles and damaged body cells.

A) 1, 2 and 3

B) 1 and 2 only

C) 1 and 3 only

D) 2 and 3 only

Q.59 Which cells do not play any role in providing immunity?

A) Erythrocytes

B) Lymphocytes

C) Eosinophils

D) Phagocytes

Q.60 A vaccine contains:

A) Antigens

B) Antibodies

C) Macrophages

D) All A, B, C

ANSWER KEY

1	C	11	D	21	B	31	B	41	A	51	A
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4	D	14	B	24	C	34	B	44	B	54	C
5	D	15	B	25	A	35	D	45	C	55	B
6	C	16	B	26	D	36	A	46	A	56	B
7	B	17	D	27	B	37	C	47	D	57	A
8	B	18	B	28	D	38	A	48	D	58	A
9	A	19	D	29	D	39	A	49	B	59	A
10	A	20	D	30	C	40	D	50	B	60	A

UNIT 7

HOMEOSTASIS MUSCLES AND MOVEMENT

KIPS SELF ASSESSMENT TEST

Q.1 **The mechanism an organism has adapted to eliminate harmful nitrogenous wastes depends upon availability of:**

A) Water
B) Glucose
C) Energy
D) Nutrients

Q.2 **It is central requirement for survival of all organisms:**

A) Reproduction
B) Photosynthesis
C) Homeostasis
D) Locomotion

Q.3 **Which of the following has main role in homeostasis of body temperature?**

A) Kidneys
B) Skin
C) Lungs
D) Bones

Q.4 **It is completely reabsorbed at the level of PCT:**

A) Glucose
B) Salts
C) Water
D) Urea

Q.5 **The sequence of key processes involved in formation of urine can be described as:**

A) Filtration, secretion and absorption
B) Secretion, absorption and filtration
C) Filtration, reabsorption and secretion
D) Secretion, filtration and absorption

Q.6 **The ureters of both kidneys drain urine from:**

A) Pelvis
B) Uterus
C) Hilus
D) Bladder

Q.7 **The functional unit of human kidney is:**

A) Renal corpuscle
B) Ureter
C) Nephron
D) Renal pelvis

Q.8 **In juxtamedullary nephrons, additional capillaries extend down to form a loop of vessels called:**

A) Loop of Henle
B) Vasa recta
C) Peritubular capillaries
D) Glomerulus

Q.9 **Which option more accurately defines the process of excretion?**

A) Removal of waste water
B) Removal of waste proteins
C) Removal of undigested wastes
D) Removal of metabolic wastes

Q.10 **Conversion of excess of amino acids into urea is done in:**

A) Lungs
B) Large intestine
C) Liver
D) Kidneys

Q.11 **Thermoregulation is regulation of:**

A) Temperature
B) Water
C) Solute
D) Nitrogenous wastes

Q.12 **The homeostatic thermostat in man is**

A) Thalamus
B) Medulla
C) Cerebrum
D) Hypothalamus

Q.13 **Whales and seals have a very thick layer of insulating fat called as**

A) Bladder
B) Blubber
C) Brown fat
D) Pelage

Q.14 Mechanism involved in heat production through hormones is
A) Shivering thermogenesis
B) Thermogenesis
C) Non-shivering thermogenesis
D) Thermoregulation

Q.15 Mammalian kidney including human is adapted to conserve water by over _____ reabsorption of glomerular filtrate
A) 99%
B) 99.5 %
C) 99.2%
D) 99.9%

Q.16 Regarding the nitrogenous waste production, man is:
A) Ammonotelic
B) Ureotelic
C) Uricotelic
D) Ureotelic as well as Uricotelic

Q.17 The afferent and efferent vessels of glomerulus are:
A) Arterial in nature
B) Venous in nature
C) One is arterial and the other is venous
D) Capillary in nature

Q.18 The accumulation of bile pigments in the blood indicates:
A) Uremia
B) Diabetes
C) Rickets
D) Jaundice

Q.19 Tubular epithelial secretion is mainly for _____.
A) Sodium Absorption
B) Water absorption
C) pH balance
D) Concentration of urine

Q.20 During one cardiac cycle, kidneys receive _____ of blood.
A) 10%
B) 20%
C) 40%
D) 50%

Q.21 Which substance acts as a precursor for urea cycle occurring in liver?
A) Arginine
B) Oxaloacetate
C) Citrulline
D) Ornithine

Q.22 The colleting tubules in kidney open into:
A) Renal medulla
B) Renal hilus
C) Renal cortex
D) Renal pelvis

Q.23 When filtrate leaves the proximal convoluted tubules, it mostly contains:
A) Glucose
B) Salts
C) Nitrogenous wastes
D) Hydrogen ion

Q.24 Under normal circumstances, glomerular filtrate contains:
A) Urea, uric acid and albumin
B) Urea, uric acid and RBC's
C) Urea, uric acid, glycogen and water
D) **Urea, uric acid, glucose and water**

Q.25 In urinary system, aldosterone takes part in retention/ reabsorption of:
A) Ca^{+2}
B) Fe^{+2}
C) Na^{+}
D) PO_4^{-1}

Q.26 Which hormone influences water reabsorption in collecting tubules?
A) Renin
B) Angiotensin
C) Aldosterone
D) Vasopressin

Q.27 Part of nephron involved in active reabsorption of sodium:
A) Proximal convoluted tubule
B) Distal convoluted tubule
C) Descending limb of Henle's loop
D) Ascending limb of Henle's loop

Q.28 All play crucial role in production of concentrated urine except:
A) Juxtamedullary nephrons
B) Vasa recta
C) Cortical nephrons
D) Loop of Henle

Q.29 All of the following hormones act on kidneys except:
A) Insulin
B) Erythropoietin
C) Vasopressin
D) Aldosterone

Q.30 Which of the following is anatomically different from the others?
A) Bowman's capsule
B) Glomerulus
C) Proximal convoluted tubule
D) Distal convoluted tubule

Q.31 Visceral muscles are also called as smooth muscles because they:
A) Don't contain muscle proteins
B) Don't have striations
C) Don't have multiple nuclei
D) Help in peristalsis

Q.32 Cross bridges are the part of:
A) Actin
B) Tropomyosin
C) Troponin
D) Myosin

Q.33 Regarding skeletal muscle structure, the area which contains only thick filaments:
A) A-band
B) H-zone
C) I-band
D) Z-line

Q.34 For muscle contraction, calcium ions in sarcoplasm are released from:
A) T-tubule
B) Sarcoplasmic reticulum
C) Mitochondria
D) Myosin filament

Q.35 Complete immobilization of muscle leads to:
A) Muscle atrophy
B) Muscle hypertrophy
C) Muscle hyperplasia
D) Muscle tetany

Q.36 Which of the following is structural unit of skeletal muscles?
A) Myofilament
B) Myofibril
C) Myofibre
D) Sarcomere

Q.37 During muscle contraction in humans, source of energy is:
A) Chemical
B) Mechanical
C) Physical
D) Kinetic

Q.38 Myoglobin is found in:
A) Blood
B) Bones
C) Spleen
D) Muscles

Q.39 Sarcomere is an area between:
A) Two I-bands
B) A and I-bands
C) Two Z-lines
D) Z and H-bands

Q.40 The smallest contractile part of a skeletal muscle is:
A) Myofilament
B) Microfilament
C) Myofibre
D) Sarcomere

Q.41 Which of the following protein starts muscle contraction by binding with Ca^{+2}?
A) Myosin
B) Tropomyosin
C) Troponin
D) Actin

Q.42 Which band does not change its length during muscle contraction?
A) I-band
B) A-band
C) Two Z-lines
D) A and I-bands

Q.43 T-tubules in skeletal muscles are formed by:
A) SER
B) RER and SER
C) Sarcolemma
D) Cytoplasm

Q.44 The most developed and complex type of muscles:

A) Cardiac
B) Smooth
C) Skeletal
D) Striated

Q.45 Chief component of thin filament is:

A) Actin
B) Myosin
C) Troponin
D) Fibrous proteins

Q.46 The sliding protein of muscle:

A) Tubulin
B) Myosin
C) Myoglobin
D) Actin

Q.47 Immediate source of energy for muscle contraction:

A) Glucose
B) GTP
C) Creatine phosphate
D) ATP

Q.48 Which one yields ATP required for muscle contraction?

A) Myoglobin
B) Creatine phosphate
C) Creatinine
D) Phosphate

Q.49 The earliest evolved muscles are:

A) Skeletal
B) Smooth
C) Cardiac
D) Striated

Q.50 Which of the following is a cell?

A) Sarcomere
B) Myofibril
C) Muscle fibre
D) Myofilament

Q.51 Which of the band allows most of the light to pass through it?

A) A band
B) I band
C) Muscle bundle
D) Muscle fiber

Q.52 It contains only thin filaments:

A) I-band
B) A-band
C) Sarcomere
D) H zone

Q.53 A protein that is complex of three polypeptide chains is:

A) Actin
B) Myosin
C) Tropomyosin
D) Troponin

Q.54 Number of actin filaments around each end of myosin filament:

A) 4
B) 6
C) 8
D) 2

Q.55 Muscle tissue is derived from:

A) Mesoderm
B) Ectoderm
C) Endoderm
D) Hypothalamus

Q.56 Muscles are characterized by:

A) Excitability and contractility
B) Extensibility
C) Elasticity
D) All A, B, C

Q.57 Which of the following is incorrect about visceral muscles?

A) Non-striated muscle (Smooth muscle)
B) Involuntary muscle
C) Located in inner walls of hollow visceral organs of the body
D) They are under voluntary control

Q.58 Sarcoplasmic reticulum is a store house of which ion:

A) Ca^{2+}
B) Na^{+}
C) K^{+}
D) Fe^{2+}

Q.59 Myofibrils show alternate dark and light bands in:

A) Cardiac muscles
B) Smooth muscles
C) Skeletal muscles
D) Both A) and B)

Q.60 Select the correct statement:

A) A-band is made up of thick myosin filament
B) H-zone is present in the middle of A-band
C) Actin and myosin are polymerized protein with contractility
D) All of the above are correct

ANSWER KEY

1	A	11	A	21	D	31	B	41	C	51	B
2	C	12	D	22	D	32	D	42	B	52	A
3	B	13	B	23	C	33	A	43	C	53	D
4	A	14	C	24	D	34	B	44	C	54	B
5	C	15	B	25	C	35	A	45	A	55	A
6	A	16	B	26	D	36	C	46	D	56	D
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9	D	19	C	29	B	39	C	49	B	59	D
10	C	20	B	30	B	40	D	50	C	60	D

UNIT 8 COMMUNICATION REPRODUCTION

KIPS SELF ASSESSMENT TEST

Q.1 An organ where a hormone shows its effect is called:
A) Effector
B) Target
C) Initiator
D) Terminator

Q.2 The primary target of the hormones of hypothalamus is:
A) Pineal gland
B) Thymus gland
C) Pituitary gland
D) Gonads

Q.3 Diabetes mellitus is the result of:
A) Under secretion of insulin
B) Under secretion of thyroxin
C) Under secretion of estrogen
D) Under secretion of vasopressin

Q.4 The hormone which reduces the sodium loss through urine and sweat is:
A) Calcitonin
B) Aldosterone
C) Parathormone
D) Vasopressin

Q.5 What is the essential character for a substance categorized as hormone?
A) Organic nature
B) Transportation by duct
C) Proteins
D) Production throughout life

Q.6 Hormones can regulate other hormones through:
A) Competition
B) Inhibition
C) Feedback
D) Antagonizing

Q.7 Besides testes, androgens are also produced by:
A) Thyroid
B) Thymus
C) Adrenal medulla
D) Adrenal cortex

Q.8 Glucagon is secreted from which cells of islet of Langerhans?
A) α-cells
B) β-cells
C) γ-cells
D) Both α and β cells

Q.9 Which is not a ductless gland?
A) Testis
B) Ovary
C) Sub-maxillary
D) Parathyroid

Q.10 Which one is polypeptide?
A) FSH
B) Progesterone
C) Testosterone
D) Estrogen

Q.11 Diabetes insipidus is due to less secretion of:
A) Vasopressin
B) Insulin
C) Thyroxine
D) Progesterone

Q.12 Chemical nature of LH and ICSH is:
A) Steroids
B) Polypeptides
C) Tyrosine derivatives
D) Amino acids

Q. 13 Synthetic auxins are more active than natural auxins because of:
A) High rate of action
B) Absence of enzymes against them
C) More functionality
D) Chemical difference

Q. 14 All of the following cause delay in leaf senescence except:
A) Auxins
B) Cytokinins
C) Gibberellins
D) Abscisic acid

Q.15 Which part of neuron may act as receptor as well?
A) Dendrite
B) Axon
C) Cell body
D) Ganglion

Q.16 It acts as relay neuron:
A) Sensory
B) Motor
C) Associative
D) Uni-polar

Q.17 Identify the incorrect statement about saltatory nerve impulse:
A) Faster conduction of impulse
B) Action potential jumps from node to node
C) Only occurs in myelinated neurons
D) Characteristic of all neurons

Q.18 Myelin sheath is the mainly present in:
A) Dendrites
B) Axon
C) Soma
D) Cell body

Q.19 The main neurotransmitter for synapses that lies outside the CNS is:
A) Adrenaline
B) Dopamine
C) Serotonin
D) Acetylcholine

Q.20 How many binding sites for Na^+ and K^+ are present in Na^+–K^+ pump, respectively?
A) 1, 2
B) 2, 3
C) 2, 1
D) 3, 2

Q.21 Which of the following membrane potential depicts hyperpolarization?
A) -50mV
B) +50mV
C) -90mV
D) -70mV

Q.22 Dendrites transmit impulse _____ cell body and axon transmits impulse _____cell body.
A) Towards, away from
B) Away, towards
C) Towards, towards
D) Away, away

Q.23 Nissl's granules are found in all except:
A) Cyton
B) Dendrites
C) Axon
D) Cell body

Q.24 Neuron can:
A) Detect stimuli
B) Receive stimuli
C) Transmit stimuli
D) All A, B, C

Q.25 Na/K pumps transport
A) $3Na^+$ out for $2K^+$ in
B) $3Na^+$ in for $2K^+$ out
C) $2Na^+$ out for $3K^+$ in
D) $2Na^+$ in for $3K^+$ out

Q.26 The electrical potential difference across the resting plasma membrane is called as:
A) Spike potential
B) Action potential
C) Resting potential
D) All of these

Q.27 Depolarization occurs due to:
A) Influx of Na^+
B) Efflux of Na^+
C) Influx of K^+
D) Efflux of K^+

Q.28 The correct sequence for depolarization and repolarization is:
(A) Stimulus applied at a site on polarized membrane
(B) Increase the permeability for Na^+
(C) Generation of A.P. (Action Potential)
(D) Increase the permeability for K^+
(E) Restoration of membrane potential
A) A→B→C→D→E
B) B→A→C→D→E
C) A→D→C→B→E
D) A→B→D→C→E

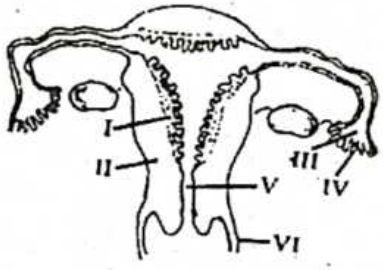
Q.29 Unidirectional transmission of the nerve impulse is maintained by:
A) Interneurons
B) Myelin sheath
C) Synapse
D) Membrane polarity

Q.30 In reflex action, the reflex arc is formed by:
A) Muscle, receptor, brain
B) Brain, spinal cord, muscle
C) Receptor, spinal cord, muscle
D) Receptor, muscle, spinal cord

Q.31 Sertoli cells are under control of:
A) LH
B) ICSH
C) FSH
D) Testosterone

Q.32 In a menstrual cycle of 24 days, which of the following will be day of ovulation?
A) 14^{th} day
B) 10^{th} day
C) 7^{th} day
D) 6^{th} day

Q.33 The figure given below depicts a female reproductive system of humans. Which one set of three parts out of I–VI has been correctly identified?



A) (I) Perimetrium, (II) Myometrium, (III) Fallopian tube
B) (II) Endometrium, (III) Infundibulum, (IV) Fimbriae
C) (II) Perimetrium, (III) Fallopian tube, (V) Cervix
D) (IV) Oviduct funnel, (V) Uterus, (VI) Cervix

Q.34 Sperm production in humans is:
A) Periodic process
B) Cyclic process
C) Continuous process
D) Discontinuous process

Q.35 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.36 Pick an incorrectly matched pair regarding males:
A) Epididymis – sperms storage
B) Urethra – carries urine only
C) Scrotum – thermoregulation
D) Testes – testosterone production

Q.37 Oviduct in females opens into:
A) Fallopian tube
B) Ovary
C) Uterus
D) Cervix

Q.38 The oocyte released during ovulation is in:
A) Anaphase I
B) Prophase I
C) Metaphase I
D) Metaphase II

Q.39 Peak level of LH corresponds with:
A) Oogenesis
B) Ovulation
C) Fertilization
D) Menstruation

Q.40 The end or complete stop of the menstrual cycle is called:
A) Andropause
B) Menstruation
C) Menopause
D) Menarche

Q.41 Follicular atresia is the degeneration of:
A) Primary oocyte
B) Primary follicles
C) 1st polar body
D) 2nd polar body

Q.42 Menstrual cycle begins with:
A) Proliferative phase
B) Menstrual phase
C) Ovulatory phase
D) Secretory phase

Q.43 FSH in males acts on:
A) Germinal epithelium
B) Interstitial cells
C) Simple epithelium
D) Germinal endothelium

Q.44 Glands of male reproductive system are:
A) Prostate and seminal vesicle
B) Prostate and Corpus luteum
C) Seminal vesicles and Corpus luteum
D) Prostate and Placenta

Q.45 Menstrual cycle is generally of:
A) 21 days
B) 28 days
C) 30 days
D) 40 days

Q.46 Fertilization in humans occurs in:
A) Uterus
B) Vagina
C) Fallopian tube
D) Urethra

Q.47 Primary oocyte is:
A) Diploid
B) Haploid
C) Polyploid
D) Monoploid

Q.48 How many sperms are formed from a secondary spermatocyte?
A) 4
B) 8
C) 2
D) 1

Q.49 Progesterone level is increased in all conditions except:
A) Gestation
B) Pregnancy
C) Luteal phase
D) Menstruation

Q.50 The main duct of male reproductive tract is:
A) Epididymis
B) Vas deferens
C) Seminiferous tubules
D) Vasa efferentia

Q.51 Highly convoluted duct is:
A) Vas deferens
B) Epididymis
C) Sperm duct
D) Urinogenital duct

Q.52 From the conversation of diploid oocyte to the mature egg formation how many polarbodies are formed?
A) 1
B) 3
C) 2
D) 4

Q.53 Implantation of zygote occurs at:
A) Oviduct
B) Uterus
C) Uterine tube
D) Cervix

Q.54 Which one of the following is not a part of female reproductive system?
A) Urethra
B) Cervix
C) Vagina
D) Uterus

Q.55 Structure that is formed at the site of ovulation:

A) Placenta
B) Corpus luteum
C) Graffian follicle
D) Primary Oocyte

Q.56 Humans are _____ and _____ organisms.

A) Sexually reproducing, oviparous
B) Asexually reproducing, ovoviviparous
C) Asexually reproducing, viviparous
D) Sexually reproducing, viviparous

Q.57 The formation of gametes is termed as:

A) Gametogamy
B) Syngamy
C) Gametogenesis
D) Gestation

Q.58 The correct chronological order of the following events is:

A) Gametogenesis → Fertilization →Insemination → Gestation → Implantation → Parturition
B) Gametogenesis → Insemination → Fertilization → Impanation → Parturition → Gestation
C) Gametogenesis → Insemination → Fertilization → Implantation → Gestation → Parturition
D) None of these

Q.59 The testes are situated _____ the abdominal cavity within a pouch called_____:

A) Inside, testicular lobules
B) Outside, scrotum
C) Outside, vas deferens
D) Inside, scrotum

Q.60 Which one of the following is not a male sex accessory gland?

A) Seminal vesicle
B) Epididymis
C) Prostate
D) Bulbourethral

ANSWER KEY

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

9 UNIT GENETICS

KIPS 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) Gene pool
C) Genome
D) Genotype

Q.2 What type of gametes will be formed by genotype RrYy?

A) RY, Ry, rY, ry
B) RY, Ry, ry, ry
C) Ry, Ry, Yy, ry
D) Ry, RR, Yy, YY

Q.3 Which genotype characterizes an organism that is heterozygous for two genes?

A) RRYy
B) RrYY
C) RRYY
D) RrYy

Q.4 Which of the following is the dominant character according to Mendel?

A) Dwarf plant & yellow fruit
B) Terminal fruit & wrinkled seed
C) White testa & yellow pericarp
D) Green coloured pod & rounded seed

Q.5 Exchange of genetic material between chromatids of homologous chromosomes during meiosis is called:

A) Synapsis
B) Chiasmata
C) Transformation
D) Crossing over

Q.6 An interaction between two alleles having single locus for a single trait can be labeled as:

A) Pleiotropy
B) Epistasis
C) Dominance
D) Polygene

Q.7 Majority of hemophilic patients suffer from deficiency of:

A) Factor VII
B) Factor VIII
C) Factor IX
D) Factor XI

Q.8 Chances for a man to be affected by hemophilia C is:

A) Greater than woman
B) Equal to woman
C) Lesser than woman
D) Not predictable

Q.9 The position of gene on chromosome is called:

A) Habitat
B) Locus
C) Niche
D) Place

Q.10 It is an androgen insensitivity syndrome:

A) Hemophilia
B) Colour blindness
C) Testicular feminization syndrome
D) Hypophosphatemic rickets

Q.11 A woman can suffer from hemophilia A if she is:

A) Homozygous dominant
B) Heterozygous
C) Homozygous recessive
D) Hemizygous recessive

Q.12 Alleles in an individual for a particular trait are called its:

A) Phenotype
B) Genotype
C) Gene pool
D) Karyotype

Q.13 From the following options, pick the one that best depicts the phenotypic and genotypic ratios of progeny of monohybrid cross:

A) 1:2:1 and 3:1 respectively
B) 3:1 and 1:2:1 respectively
C) 9:3:3:1 and 1:2:1 respectively
D) 3:1 and 9:3:3:1 respectively

Q.14 Keeping in view the Mendel's law of Segregation, if tall plants were crossed with short heighted plants, then which of the following best describe the F_1 Progeny?

A) Homozygous and tall heighted
B) Homozygous and short heighted
C) Heterozygous and tall heighted
D) Heterozygous and short heighted

Q.15 Which one might be the blood group of an individual with the following genetic makeup:"L^ML^N, I^Ai, Dd, hh"

A) Phenotypically MN, O and positive
B) Phenotypically MN, A and positive
C) Phenotypically MN, A and negative
D) Phenotypically MN, O and negative

Q.16 If a woman carrier for hemophilia marries a normal man, then:

A) All sons will suffer from hemophilia
B) All daughters will suffer from hemophilia
C) Half sons and half daughters will suffer from hemophilia
D) All statements are incorrect

Q.17 How many colors can be perceived by a monochromat?

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

Q.18 Protanopia is _____ blindness.

A) Red
B) Green
C) Blue
D) White

Q.19 Cone cells have specific light absorbing proteins called:

A) Rhodopsin
B) Bathorhodopsin
C) Alfacalcidol
D) Opsins

Q.20 The genes with multiple phenotypic effect:

A) Homologous
B) Heterologous
C) Pleiotropic
D) Polygenic

Q.21 Bombay phenotype is an example of:

A) Pleiotropy
B) Epistasis
C) Co-dominance
D) Incomplete dominance

Q.22 The example of point mutation:

A) Turner's syndrome
B) Down's syndrome
C) Phenylketonuria
D) Aberration

Q.23 All altered alternative forms of a gene, whose number is more than two are called:

A) Co dominant alleles
B) Multiple alleles
C) Jumping genes
D) Homozygous

Q.24 It is an example of chromosomal aberration:

A) Sickle cell anemia
B) Phenylketonuria
C) Jacob's syndrome
D) Alkaptonuria

Q.25 An allele is recessive if it is expressed in:

A) F1 generation
B) Homozygous combination andheterozygous combination
C) Homozygous combination only
D) Heterozygous combination

Q.26 The contrasting pair of trait in Mendelian crosses are called:

A) Factors
B) Fixed genes
C) Paramorphos
D) Allolocus

Q.27 When a tall pea plant (TT) is crossed with a dwarf plant (tt), what will be the F2 generation?
A) All tall plants
B) All dwarf plants
C) 3 tall 1 dwarf
D) 3 dwarf 1 tall

Q.28 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.29 Mendel's dihybrid cross ratio is:
A) 3:1
B) 9:3:3:1
C) 1:1:1:3
D) 3:1:1:2

Q.30 The number of linkage groups in human:
A) 23
B) 46
C) 92
D) 96

Q.31 Expression of ABO blood type antigens depends upon the two gene loci present on:
A) Chromosome no 7and 11
B) Chromosome no 9and 19
C) Chromosome no 10and 20
D) Chromosome 9and4

Q.32 All of the following are true about Bombay phenotype except:
A) Glycosyl transferases
B) Antigen A or B can't adhere to R.B.C
C) Have I^A or I^B genes
D) Genotypically 'O'

Q.33 Most prevalent abnormality of blood clotting factor is of:
A) VII
B) VIII
C) IX
D) X

Q.34 A woman with normal color vision, whose father was red-green color blind, married a red-green color blind man. What is the probability of her first born child being red-green color blind:
A) 0.25
B) 0.50
C) 0.75
D) 1.0

Q.35 In the human ABO blood group system, there are six possible genotypes but only four phenotypes. An explanation of this is that ABO blood groups are controlled by:
A) One gene with two alleles
B) Two genes with two alleles
C) One gene with three alleles
D) One gene with one allele

Q.36 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^O

Q.37 Any inheritable change in chromosome is:
A) Evolution
B) Mutation
C) Inversion
D) Conversion

Q.38 Genes don't settle at one place:
A) Running genes
B) Random genes
C) Jumping genes
D) All of these

Q.39 The percentage of crossing over will be more if:
A) Linked genes are located far apart from each other
B) Linked genes are located close to each other
C) Genes are not linked
D) Genes are located in a different cell

Q.40 Two allelic genes are located on:
A) The same chromosomes
B) Two homologous chromosomes
C) Two non-homologous chromosomes
D) Any two chromosomes

Q.41 In human beings, the color of skin is controlled by:
A) Multiple alleles
B) Lethal genes
C) Polygenic effect
D) None of these

Q.42 Which of the following is genetically dominant in man?
A) Color blindness
B) Rh positive
C) Haemophilia
D) Albinism

Q.43 Mutation that arises due to the change in single base pair of DNA is known as:
A) Point mutation
B) Frameshift mutation
C) Silent mutation
D) Recombination

Q.44 A classical example of point mutation is:
A) Haemophilia
B) Sickle cell anaemia
C) Mangolism
D) Cri-du chat syndrome

Q.45 A pleiotropic gene is one which:
A) Affects one character
B) Affects more than one characters
C) Both A) and B)
D) None of these

Q.46 Select the incorrect statement:
A) Capital latter is used to denote dominant trial.
B) Small latter is used to denote recessive trait.
C) True breeding variety is represented by similar allele pair of gene.
D) Alleles are completely similar forms of the same genes.

Q.47 Mendel found that the F_1 always resembled either one of the parents and that the trait of the other parent was not seen in them. This is due to:
A) Segregation
B) Dominance
C) Partial dominance
D) Unit factor

Q.48 In monohybrid cross, the proportion of 3 : 1 explains:
A) Dominance
B) Segregation
C) Both A) and B)
D) Unit factor

Q.49 In genetics, the use of chequer board (square board) was done by:
A) Mendel
B) Correns
C) Punnet
D) Darwin

Q.50 In F_2 generation, a phenotypic ratio of 1 : 1 : 1 : 1 exhibits:
A) Back cross
B) Monohybrid test cross
C) Lethality
D) Dihybrid test cross

Q.51 Multiple alleles are present:
A) At different loci in the same chromosome
B) In different chromosomes
C) At the same locus in one type of chromosomes
D) None of these

Q.52 An organism with two unlike alleles of the trait is called:

A) Homozygous
B) Hetrozygous
C) Pure line
D) None of these

Q.53 Epistatic gene differs from dominant gene because:

A) Epistatic genes is non-allelic
B) Epistatic gene never expresses itself independently
C) Epistatic and hypostatic genes are present at different loci
D) All of the above

Q.54 An example of quantitative trait in man is:

A) Hair color
B) Eye color
C) Skin color
D) Shape of nose

Q.55 Genotype is:

A) Genetic composition of an organism
B) Genetic composition of a species
C) Genetic composition of plastids
D) Genetic composition of germ cells

Q.56 A gene pair hides the effect of another. The phenomenon is:

A) Dominance
B) Mutation
C) Epistasis
D) None of these

Q.57 When an allele fails to express itself in presence of the other allele, the former is said to be:

A) Recessive
B) Dominant
C) Codominat
D) Complementary

Q.58 RR(Red) flower is crossed with white (WW) one. Offspring RW are pink. This is an example of:

A) Dominant- recessive
B) Supplementary genes
C) Hybrid
D) Incomplete dominace

Q.59 Multiple alleles control inheritance of:

A) Phenyl ketonuria
B) Blood groups
C) Sickle cell anaemia
D) Colour blindness

Q.60 A phenomenon which works opposite to the linkage is:

A) Independent assortment
B) Segregation
C) Crossing over
D) Mutation

ANSWER KEY

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

UNIT 10 BIOTECHNOLOGY EVOLUTION

KIPS SELF ASSESSMENT TEST

Q.1 Recombinant DNA technology is popularly known as:

A) Biotechnology
B) Genetic engineering
C) PCR
D) Gene therapy

Q.2 Many identical copies of genes can be produced by:

A) Gene sequencing
B) Gene expression
C) Gene cloning
D) Gene analysis

Q.3 Palindromic sequence involves:

A) 4 nucleotides only
B) 6 nucleotides only
C) 4-6 nucleotides
D) 4 or 6 nucleotides

Q.4 This enzyme has no role in recombinant DNA technology:

A) Helicase
B) DNA ligase
C) Restriction endonuclease
D) Reverse transcriptase

Q.5 A method used to get copies of DNA in laboratory other than recombinant DNA technology is:

A) RFLPs
B) PCR
C) Gene therapy
D) Maxam-Gilbert Method

Q.6 Which one is not present in *E. coli* naturally?

A) EcoR I
B) Palindromic sequences
C) Plasmid
D) Gene of insulin

Q.7 SCID is due to failure of maturation of:

A) Monocytes
B) Leucocytes
C) Lymphocytes
D) Erythrocytes

Q.8 Naturally restriction endonucleases cut:

A) Viral DNA
B) Human DNA
C) Fungal DNA
D) All A, B, C

Q.9 Restriction endonucleases do not cut bacterial DNA because:

A) It is circular
B) It is specific
C) It is methylated
D) Palindromic sequences are not present

Q.10 Liposomes are produced when_____ are put into solution:

A) Lipoproteins
B) Glycoproteins
C) Glycolipids
D) Phospholipids

Q.11 Cutting of gene of interest from center is accomplished by:

A) Endonuclease enzyme
B) Exonuclease enzyme
C) DNA helicase enzyme
D) DNA ligase enzyme

Q.12 Restriction endonuclease cuts the DNA by cleaving:

A) Glycosidic bonds
B) Phosphodiester bonds
C) Peptide bonds
D) H-bonds

Q.13 The specific type of nucleotide molecule used during DNA sequencing in Sanger's method is:

A) Ribonucleoside triphosphate
B) Deoxyribonucleoside triphosphate
C) Dideoxyribonucleotide triphosphate
D) Dideoxyribonucleoside triphosphate

Q.14 All are biotechnological products produced by transgenic bacteria except:

A) Human growth hormone
B) Tissue plasminogen activator
C) Hemophilia factor VIII
D) Hepatitis C vaccine

Q.15 Which type of plant had been genetically engineered to produce antibodies that delivered radio isotopes to the tumor cells?

A) Rice
B) Corn
C) Wheat
D) Potato

Q.16 The DNA fingerprinting autoradiograph of a crime scene has been given below:

Which of the given suspect might be involved in crime?

A) Suspect # 1
B) Suspect # 2
C) Suspect # 3
D) Both suspect 2 and 3

Q.17 Commonly used restriction enzyme is:

A) pSC 101
B) pBR 322
C) EcoR1
D) Phage DNA

Q.18 Natural extra-chromosomal circular DNA molecules carrying genes for antibiotic resistance and fertility:

A) Recombinant DNA
B) Chimeric DNA
C) Lambda phage
D) Plasmids

Q.19 The enzyme which seals the foreign DNA into the vector:

A) Restriction endonuclease
B) DNA polymerase
C) DNA ligase
D) DNA mutase

Q.20 To obtain product of desired gene, which organism would be preferred?

A) Plasmid
B) Viruses
C) EcoR1
D) *E. coli*

Q.21 Which of the following is significant feature of PCR?

A) Diagnose viral infections
B) Identify criminals
C) Determine evolution
D) All A, B, C

Q.22 Cystic fibrosis patients lack a gene for transmembrane carrier of:

A) Chloride ions
B) Sodium ions
C) Potassium ions
D) Phosphorous ions

Q.23 **Permeability of bacterial cell can be increased by treating with:**
A) Sodium chloride
B) Calcium chloride
C) Potassium chloride
D) Magnesium chloride

Q.24 **Gene therapy is the insertion of genetic material in the human cell for:**
A) Treatment of diseases
B) New traits
C) Disease resistance
D) Recombination of genes

Q.25 **In hypercholesterolemia, patients lack a receptor for removing cholesterol from:**
A) Lymph
B) Blood
C) Glomerular filtrate
D) Blood cells

Q.26 **In Parkinson's disease, which cells are grafted in brain?**
A) Dopamine producing cells
B) Histamine producing cells
C) Adrenaline producing cells
D) Serotonin producing cells

Q.27 **In PCR, primer sequence is complementary to:**
A) One site of target DNA
B) Both sites of target DNA
C) Three sites of target DNA
D) Promoter site of target DNA

Q.28 **Which one is a preferable vehicle for obtaining a biotechnology product?**
A) Blood
B) Lymph
C) Urine
D) Plasma

Q.29 **Dipeptide sweetener is made by using:**
A) Glycylalanine
B) Phenylglycine
C) Aspirin
D) Phenylalanine

Q.30 **Antibody used to treat genital herpes obtain from:**
A) Corn
B) Soyabean
C) Sugarcane
D) Wheat

Q.31 **Origin of life is explained by all except:**
A) Endosymbiont hypothesis
B) Hydrothermal vent hypothesis
C) Creationism
D) Chemical evolution

Q.32 **Scientist who first time presented concept of evolution with evidences:**
A) Aristotle
B) Linnaeus
C) Lamarck
D) Darwin

Q.33 **Darwin believed in perceived unity of life. It means:**
A) All organisms are unicellular
B) All organisms are similar
C) All organisms have common ancestor
D) All organisms have common cells

Q.34 **In different species, analogous organs evolve to adapt:**
A) Same habitat
B) Different habitat
C) Same nutrition
D) Different ecosystem

Q.35 **Which of the following is not a vestigial organ in human body?**
A) Wisdom teeth
B) Appendix
C) Ear muscle
D) Sacrum

Q.36 **According to Darwin, evolution is result of:**
A) Somatic changes
B) Genetic changes
C) Variations
D) Natural selection

Q.37 It is geographical distribution of species:

A) Zoogeography
B) Biogeography
C) Geology
D) Paleontology

Q.38 Products of gene are:

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

Q.39 The present giraffe has a long neck as compared to its ancestors. Darwin believed it could be due to:

A) Natural selection
B) Inheritance of acquired characters
C) Isolation
D) Migration

Q.40 For evolutionary success, mutations must occur in:

A) Somatic RNA
B) Germ cell DNA
C) Somatic DNA
D) Germplasm RNA

Q.41 Which of the following concept is attributed to Charles Darwin?

A) Use and disuse of organs is of great importance in 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.42 The animal species on the Galapagos resemble species living on the:

A) North American mainland
B) South American mainland
C) Great Britain
D) Northern Europe

Q.43 Production of more individuals than the environment can support leads to:

A) Struggle for existence
B) Survival of the fittest
C) Natural selection
D) Evolution

Q.44 The tissues of the organisms are petrified by:

A) Silica
B) Calcium carbonate
C) Calcium phosphate
D) Both A and B

Q.45 In which rocks most fossils are found?

A) Metamorphic
B) Igneous
C) Sedimentary
D) All A, B, C

Q.46 What is the number of dominant alleles in a population of 100 individuals with the following genotypes: 30 BB, 60 Bb, 10 bb?

A) 60
B) 90
C) 120
D) 160

Q.47 Allele and genotype frequencies in a population will remain constant from generation to generation in absence of other evolutionary influences, state the law:

A) Evolution
B) Replication
C) Hardy-Weinberg
D) Dominant

Q.48 In the Hardy–Weinberg equation, the homozygous dominant individuals in a population are represented by:

A) p^2
B) $2pq$
C) q^2
D) q

Q.49 According to Darwin, finches found on Galapagos island had distinct characteristics due to:

A) Geographical isolation
B) Developmental anomaly
C) Special creation
D) Inheritance of acquired characteristics

Q.50 Neo Darwinism is the result of reconciliation of Darwin's theory with:

A) Lamarck's work
B) Cuvier's work
C) Lyell's work
D) Mendel's work

Q.51 Which of the following branch first suggested the idea of evolution to Darwin?

A) Zoogeography
B) Biogeography
C) Phytogeography
D) Geography

Q.52 Which of the following animal lives only in America?

A) Kangaroo
B) Armadillos
C) White rat
D) American python

Q.53 Oldest fossils are of:

A) Bacteria
B) Horse
C) Dinosaur
D) Fishes

Q.54 Similarity between the forelimbs of cats, whales, bats and other mammals show that they are:

A) Monophyletic
B) Paraphyletic
C) Polyphyletic
D) Diphyletic

Q.55 Which of the following is not the vestigial structure?

A) Ear of humans
B) 3rd molar of humans
C) Goose bumps
D) Vermiform appendix

Q.56 Which of following structure is common in all vertebrates at embryonic stages?

A) Gill pouches
B) Teeth
C) 4 chambered heart
D) Gills

Q.57 Evolutionary relationship among specie are reflected at molecular level in their:

A) DNA and protein
B) DNA and lipids
C) DNA and carbohydrates
D) DNA and RNA

Q.58 This diagram below shows:

A) Adaptive radiation
B) Genetic drift
C) Founder effect
D) Mutation

Q.59 The factors affecting genetic equilibrium are the following except:

A) Gene flow
B) Mutation
C) Somatic Variation
D) Genetic recombination

Q.60 Survival of the fittest is possible due to:

A) Overproduction
B) Favorable variations
C) Environmental changes
D) Inheritance of acquired characters

ANSWER KEY

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

POST-ASSESSMENT TEST

Q.1 **Membrane which surrounds the vacuole is called:**
A) Plasmalemma
B) Cell wall
C) Tonoplast
D) Protoplast

Q.2 **Ribonuclease is a:**
A) Protein
B) Carbohydrate
C) Nucleic acid
D) Lipid

Q.3 **The most abundant organic molecule on the planet earth is:**
A) Starch
B) Glycogen
C) Glucose
D) Cellulose

Q.4 **_____ is the precursor of steroid hormones.**
A) Cholesterol
B) Fatty acids
C) Glycerol
D) Glycol

Q.5 **Which of the following is the most important biological molecule in living cell?**
A) Proteins
B) Water
C) Carbohydrates
D) Lipids

Q.6 **Energy must be added for chemical reaction to start. This energy is known as the energy of_____.**
A) Entropy
B) Activation
C) Enthalpy
D) Oxidation

Q.7 **At the beginning of cell division, each chromosome contains:**
A) 1 chromatid & 1 centromere
B) 2 chromatids & 1 centromere
C) 2 chromatids & 2 centromeres
D) 4 chromatids & 2 centromeres

Q.8 **The active site of an enzyme is formed by a few enzyme's:**
A) R-groups of amino acids
B) - NH_2 groups of amino acids
C) - COOH groups of amino acids
D) Exposed disulphide bonds

Q.9 **Detoxification of the drugs is a function of _____ in a cell.**
A) R.E.R
B) S.E.R
C) Liver cells
D) Lysosome

Q.10 **Which of the following way of transport is due to kinetic energy of substances across a membrane?**
A) Passive transport
B) Endocytosis
C) Active transport
D) Exocytosis

Q.11 **All of the following are double membrane bounded structures except:**
A) Nucleus
B) Golgi vesicle
C) Mitochondria
D) Chloroplasts

Q.12 **An organism is known as animal if it has all of the following properties except:**
A) Eukaryotic
B) Heterogamy
C) Unicellular or multicellular
D) Ingestive heterotrophic

Q.13 **The formation of RNA from DNA is called:**
A) Translation
B) Transcription
C) Reverse transcription
D) Replication

Q.14 **_____ bond is a potential source of chemical energy.**
A) C—H
B) C—C
C) C—N
D) C = O

Q.15 Synthesis and transport of proteins is carried out by:
A) S.E.R
B) R.E.R
C) Golgi complex
D) Lysosomes

Q.16 How many chromosomes are present in an onion cell?
A) 14
B) 16
C) 18
D) 26

Q.17 Photophosphorylation occurs in:
A) Chloroplast
B) Mitochondria
C) Ribosome
D) Peroxisomes

Q.18 The molecule used by most of the animals for long-term energy storage is:
A) Glycogen
B) Starch
C) Fat
D) Cholesterol

Q.19 The biological term for throat is:
A) Pharynx
B) Oesophagus
C) Nasal cavity
D) Mouth

Q.20 Exchange of gases in humans and their environment is called:
A) Respiration
B) Cellular respiration
C) Organismic respiration
D) Aerobic respiration

Q.21 Carbon monoxide binds with:
A) Haem group of hemoglobin
B) Globin part of hemoglobin
C) Sodium ions in plasma
D) Globin part of myoglobin

Q.22 The functional unit of human lungs is:
A) Alveolus
B) Air sac
C) Bronchiole
D) Parabronchus

Q.23 Renal corpuscle constitutes:
A) Glomerulus
B) Bowman's capsule
C) Loop of Henle
D) Both A and B

Q.24 Aldosterone ensures reabsorption of Na^+ ions at:
A) Descending limb of loop of Henle
B) Ascending limb of loop of Henle
C) Proximal convoluted tubule
D) Distal convoluted tubule

Q.25 The erythrocytes burst when placed in _____ solution.
A) Hypotonic solution
B) Hypertonic solution
C) Isotonic solution
D) None of these

Q.26 A receptor may be:
A) A nerve ending
B) A cell
C) An organ
D) All A, B, C

Q.27 The effectors in the human body which respond to a stimulus are:
A) Glands only
B) Muscles only
C) Both muscles and glands
D) Bones

Q.28 Body temperature is basically under control of the:
A) Cerebrum
B) Cerebellum
C) Pons
D) Hypothalamus

Q.29 The primary function of testes is:
A) Spermatogenesis
B) Beard growth
C) Oogenesis
D) Storage of sperms

Q.30 Menstruation is triggered by an abrupt decline in the levels of:
A) Estrogen
B) Progesterone
C) FSH
D) LH

Q.31 The transformation of spermatid into mature sperm is called:
A) Spermatogenesis
B) Spermiogenesis
C) Oogenesis
D) Gamesomeness

Q.32 The hormone essential for the successful production of sperms:
A) LH
B) Oxytocin
C) Testosterone
D) PTH

Q.33 The ion that must be present for the binding of cross bridges is _____ ions.
A) Ca^{++}
B) Na^{+}
C) Fe^{++}
D) K^{+}

Q.34 The hormones in the human body are produced by:
A) Brain
B) Liver
C) Pancreas
D) Endocrine glands

Q.35 The All-or-None principle of the muscle contraction of muscle fiber refers to a maximum contraction: or no contraction of:
A) Muscle
B) Muscle bundle
C) Muscle fibre
D) Muscle fibrils

Q.36 Oxytocin hormone is released from the:
A) Adenohypophysis
B) Neurohypophysis
C) Hypophysis cerebri
D) Anterior lobe of pituitary gland

Q.37 Insulin is secreted from:
A) α-cells
B) β-cells
C) Delta cells
D) Neurosecretory cells

Q.38 Vaccination can produce _____ immunity in our body.
A) Naturally induced active
B) Naturally induced passive
C) Artificially induced active
D) Artificially induced passive

Q.39 The regions of an antibody that make it distinct from all other kinds of antibodies are its:
A) Variable regions
B) Constant regions
C) Mutated regions
D) Bifurcated regions

Q.40 Lymphocytes that activate B-cells to divide are:
A) Activator B-cells
B) Cytotoxic T-Cells
C) Helper T cells
D) Macrophages

Q.41 T-lymphocytes are matured in thymus glands. They are produced in:
A) Thymus glands
B) Bone marrow
C) Pancreases
D) Heart

Q.42 The chemical nature of antibody is:
A) Glycoproteins
B) Glycolipids
C) Lipoproteins
D) Polysaccharides

Q.43 What is the approximate ratio of ATP synthesized during anaerobic and aerobic respiration in a eukaryotic cell?
A) 1:2
B) 1:10
C) 1:18
D) 1:38

Q.44 Glycolysis and fermentation take place in the:
A) Mitochondria and cytoplasm respectively C) Mitochondria
B) Cytoplasm and mitochondria respectively D) Cytoplasm

Q.45 Which is not required for Tricarboxylic acid cycle?
A) NAD^+ C) FAD^+
B) $NADPH_2$ D) GDP

Q.46 CO_2 fixation occurs at/in:
A) Thylakoid C) F_1-particles
B) Matrix D) Stroma

Q.47 Why is RuBP important in the process of photosynthesis?
A) It is an acceptor molecule for CO_2 C) It is an acceptor for H^+
B) It is a source of H^+ ions D) It is an intermediate in sucrose formation

Q.48 Restriction endonucleases were isolated from:
A) Bacteria C) Viruses
B) Yeast D) Paramecium

Q.49 In PCR, how many nucleotides are present in Okazaki fragments:
A) 100 – 200 C) 2000 – 4000
B) 1000 – 2000 D) None of the above

Q.50 The enzyme is used to join the desired gene into the plasmid DNA during genetic engineering:
A) RNA polymerase C) DNA polymerase
B) DNA ligase D) Taq polymerase

Q.51 The 1st human hormone produced by recombinant DNA technology was:
A) Oestrogen C) Cortisone
B) Testosterone D) Insulin

Q.52 Which of the following increases variation within a gene pool?
A) Gene mutation C) Random mating
B) Crossing over D) Vegetative propagation

Q.53 _____ are more common in human males than females.
A) X-linked dominant traits C) Y-linked dominant traits
B) X-linked recessive traits D) Autosmal linked recessive traits

Q.54 Which of the following is an unsaturated fatty acid?
A) Acetic acid C) Oleic acid
B) Butyric acid D) Palmitic acid

Q.55 Which of the following is a purine?
A) Cytosine C) Uracil
B) Thymine D) Guanine

Q.56 In HIV viruses, reverse transcriptase converts single stranded RNA into double stranded viral DNA. This process is called:
A) Translation C) Replication
B) Duplication D) Reverse transcription

Q.57 An animal containing foreign gene in it is called:
A) Transgenic plant C) Transgenic animal
B) Transgenic bacteria D) Recombinant cell

Q.58 Electron microscope employs:
A) Fluorchromes C) Polarizer and analyser filters
B) Objective and ocular lenses D) Electromagnetic lenses

Q.59 Neurotransmitter secreted at neuromuscular junction is:
A) Dopamine
B) Serotonin
C) Androgen
D) Acetylcholine

Q.60 Reflex action is always:
A) Voluntary
B) Inhibitory
C) Protective
D) Complex

Q.61 Germ line cells of the ovary produce:
A) Follicle cells
B) Nurse cells
C) Spermatogonia
D) Oogonia

Q.62 Distal opening of uterus is:
A) Cervix
B) Fallopian tube
C) External genitilia
D) Vulva

Q.63 On puberty, development of primary follicles is stimulated by:
A) ICSH
B) FSH
C) LH
D) Estrogen

Q.64 A muscle condition resulting from the accumulation of lactic acid and ionic imbalance is called:
A) Tetany
B) Muscle fatigue
C) Cramp
D) Tetanus

Q.65 H zone is mid-section of:
A) A band
B) I band
C) Z band
D) M line

Q.66 Basic unit of taxonomic hierarchy is:
A) Species
B) Kingdom
C) Class
D) Phylum

Q.67 We can find a gene on chromosome through its:
A) Locus
B) Origin
C) Sequence
D) Protein

Q.68 Inner medulla is highly concentrated part of kidney. This hypertonicity can be attributed to presence of:
A) Water
B) Glucose
C) ADH
D) Urea

Q.69 A body change that does not occur in case of increase in body temperature:
A) Heat dissipation
B) Sweat gland inhibition
C) Evaporative cooling
D) Vasodilation at skin

Q.70 Peripheral branch of sensory neuron is often called as:
A) Dendrite
B) Dendron
C) Soma
D) Axon

Q.71 Nerve impulse can also be called as wave of:
A) Polarization
B) Repolarization
C) Depolarization
D) Hyperpolarization

Q.72 A gland that plays main role in regulation of blood glucose level is:
A) Thyroid
B) Parathyroid
C) Pancreas
D) Adrenal

Q.73 In a diploid population of 500 plants, 120 plants are homozygous dominant for flower colour and 180 are heterozygous. What will be the number of recessive alleles in that population?
A) 180
B) 700
C) 380
D) 580

Q.74 If probability of round seeded plant is 3/4 and green seeded plant is 1/4 then joint probability of wrinkled green will be:

A) 1/16
B) 3/16
C) 9/16
D) 16/16

Q.75 Movement of water is correctly represented by

A) Cortex→Root hair (Epidermis)→Xylem →Endodermis→Pericycle
B) Root hair (Epidermis) →Endodermis→Xylem→Pericycle→Cortex
C) Root hair (Epidermis) →Cortex→Endodermis→Pericycle→Xylem
D) Xylem→Cortex→Endodermis→Pericycle→Root hair (Epidermis)

Q.76 A person that can clearly differentiate red and blue colour but not green has:

A) Protanopia
B) Protanomalous
C) Deuteranopia
D) Tritanopia

Q.77 Non disjunction may occur at _____ division.

A) 1st meiotic
B) 2nd meiotic
C) Both A and B
D) Binary fission

Q.78 Treatment of heredity disorders by gene manipulations is called:

A) Biotechnology
B) Genetic engineering
C) Gene therapy
D) Radio therapy

Q.79 A trait whose alleles are present in both male and female but expresses more in one sex than other:

A) Sex linked trait
B) Sex limited trait
C) Sex influenced trait
D) Y linked trait

Q.80 The most important function of _____ hormone is cell division in apical meristem of young plants.

A) Gibberellins
B) Ethylene
C) Cytokinins
D) Auxins

ANSWER KEY

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

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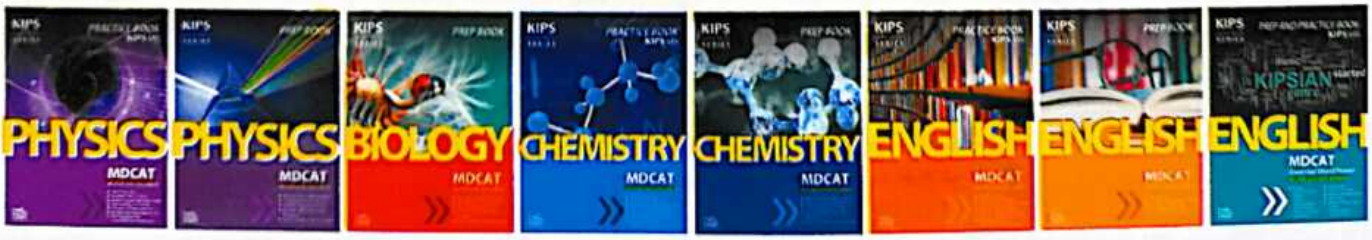

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