



**Instructions:**

**This paper contains two parts, A and B.**

**Part A: 40 multiple choice questions with one answer; Total Marks 100.**

**Part B: 20 multiple choice questions with more than one answer; Total Marks 100.**

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**Answer All Questions Time 2 hours**

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**Part A - Multiple Choice Questions**

**In the questions of this part select the correct or the most appropriate answer and mark that in the answer sheet using an X. For each question there should be only one X mark in the answer sheet.**

(1) Which of the following is most similar in structure to ATP?

- (1) a pentose sugar
- (2) a DNA nucleotide
- (3) an RNA nucleotide
- (4) an amino acid with three phosphate groups attached
- (5) a phospholipid

Answer = 3

(2) Which of the following statements regarding the structure of proteins is true?

1. The hydrogen bonds are required for the formation of the primary structure.
2. The secondary structure is maintained by hydrogen bonds between the R groups.
3. The primary structure is stabilized by hydrogen bonds.
4. The formation of the secondary structure requires the formation of hydrogen bonds, peptide bonds, and disulfide bonds.
5. The stability of the secondary structure is maintained by hydrogen bonds between the backbone atoms

Answer = 5

(3) Which of the following cell organelles is abundant in liver cells for processing and packaging of proteins that are to be secreted?

- (1) Rough endoplasmic reticulum
- (2) Smooth endoplasmic reticulum
- (3) Golgi apparatus
- (4) Lysosomes
- (5) Peroxisomes

Answer= 3

- (4) Which of the following correctly indicates the order of the structures when an ammonium ion moves from the soil into the vacuole of a cell on the surface of a root?
- (1) plasma membrane → primary cell wall → cytoplasm → vacuole
  - (2) secondary cell wall → plasma membrane → primary cell wall → cytoplasm → vacuole
  - (3) primary cell wall → plasma membrane → cytoplasm → vacuole
  - (4) secondary cell wall → primary cell wall → plasma membrane → cytoplasm → vacuole
  - (5) primary cell wall → plasma membrane → cytoplasm → secondary cell wall → vacuole

Answer = 3

- (5) Which of the following statements is true regarding enzymes?
1. Nonprotein cofactors bind tightly to the enzymes
  2. Enzyme function is increased if the 3-D structure or conformation of an enzyme is altered.
  3. Enzyme function is independent of physical and chemical environmental factors such as pH and temperature.
  4. Enzymes increase the rate of chemical reaction by lowering activation energy barriers.
  5. Enzymes increase the rate of chemical reaction by providing activation energy to the substrate.

Answer = 4

- (6) If photosynthetic algae are given CO<sub>2</sub> made with oxygen-18 (<sup>18</sup>O), later tests will show that all compounds made by this algae contain <sup>18</sup>O except
- (1) 3-phosphoglycerate.
  - (2) glyceraldehyde 3-phosphate (G3P).
  - (3) glucose.
  - (4) ribulose biphosphate (RuBP).
  - (5) O<sub>2</sub>.

Answer = 5

- (7) Which of the following statements accurately reflects Lamarck's theory of evolution?
- (1) Parts of the body that are extensively used become larger and stronger, while unused parts deteriorate.
  - (2) Organisms acquire adaptations during their lifetime, and these acquired traits are passed on to their offspring.
  - (3) Giraffes evolved their long necks over many generations as a result of stretching their necks higher to reach leaves on taller branches.
  - (4) Populations of a species vary in characteristics, and each species produces more offspring than their environment can accommodate.
  - (5) Lamarck's theory integrates Mendelian genetics and population genetics with Charles Darwin's theory of natural selection.

Answer = 2

- (8) According to the biological definition of a species, which of the following is the key criterion for identifying a species?
- (1) Morphological characteristics, including body shape and structural features
  - (2) Ability to interact with the non-living components of the environment
  - (3) Common ancestry and sharing a common ancestor
  - (4) Similar ecological niches and interactions with the living components
  - (5) Similarities in genetic material and DNA structure

Answer = 3

- (9) A unique feature of the sperms in seed plants is that they are
- (1) motile for independent movement.
  - (2) produced within the microsporangium.
  - (3) enclosed within a tough pollen wall made of sporopollenin.
  - (4) directly carried into the eggs by pollen tubes.
  - (5) developed into pollen grains.

Answer = 3

- (10) Which of the following characteristics is found in Phylum Nematoda and not present in Phylum Annelida?
1. Presence of setae for locomotion.
  2. Triploblastic and bilaterally symmetrical body.
  3. A well-developed nervous system with dorsal cerebral ganglion.
  4. Internal fertilization with the involvement of a clitellum.
  5. Cylindrical body without a true body cavity

Answer = 5.

- (11) When examining an animal tissue under the light microscope, a student observed several cell layers on a basement membrane. This tissue would have been taken most probably from the
- (1) lining of the mouth or skin.
  - (2) nasal passage or anus.
  - (3) thyroid or nephron.
  - (4) vagina or trachea.
  - (5) intestine or salivary glands.

Answer = 1

- (12) Digestion of nucleic acids in man starts in the
- (1) oral cavity.      (2) stomach.      (3) duodenum.      (4) jejunum.      (5) ileum.

Answer = 3

- (13) Fibers in the human diet
- (1) contributes to protecting against colon cancer.
  - (2) are made up of polysaccharides and fatty acids.
  - (3) are used to synthesize fibrous connective tissue.

- (4) provide nutrients such as calcium and potassium.
- (5) serves as a carbon source required for metabolism.

Answer = 1

- (14) Some factors that may be responsible to hypotension (A) and hypertension (B) are given below (P-S).

<b>Condition</b>	<b>Possible contributing factors</b>
A - Hypotension	P – Tension
B - Hypertension	Q – Smoking
	R – Shock
	S – Dengue Hemorrhage fever

Select the response with all correct combinations for hypotension and hypertension and the possible contributing factors.

- (1) P-A, Q-A, R-B, S-A      (2) P-B, Q-B, R-A, S-B      (3) P-A, Q-B, R-B, S-A
- (4) P-B, Q-B, R-A, S-A      (5) P-B, Q-A, R-A, S-A

Answer = 4

- (15) Select the correct statement regarding the breathing of a man.
- (1) Medulla oblongata, pons Varolii and hypothalamus are involved in the homeostatic control of breathing.
  - (2) Relaxation of rib muscles contributes for exhalation.
  - (3) Air is pushed into the lungs during breathing.
  - (4) The volume of the thoracic cavity reduces due to contraction of the diaphragm.
  - (5) Inspiration is an autonomous passive process.

Answer = 2

- (16) Which of the following cells are involved in acquired immunity?
- (A) Lymphocytes    (B) Natural killer cells    (C) Plasma cells    (D) Neutrophils
- (1) A only.                      (2) A and B only.                      (3) A and C only
  - (4) A, B, and C only.    (5) B and D only.

Answer = 3

- (17) Which of the following statements regarding the disorders of the human skeletal system is correct?
- (1) Supplementary foods that contribute to the growth of cartilage reduce the risk of osteoporosis.
  - (2) Hormonal imbalance causes osteoarthritis.
  - (3) Taking adequate amount of calcium in the diet prevents osteoarthritis.
  - (4) Women are at a higher risk of osteoarthritis.
  - (5) Controlling obesity will reduce the risk of osteoporosis.

Answer = 3

(18) The three main types of joints in the human body and their locations are given below.

	<b>Joint</b>	<b>Location</b>
(A)	Hinge joint	Between ribs and thoracic vertebrae
(B)	Pivot joint	Between the skull and the atlas
(C)	Ball and Socket joint	Between scapula and humerus

Which of the above 'Joint – Location' combinations is/are correct?

- (1) A and B only.      (2) A and C only.      (3) A, B and C.  
(4) B and C only.      (5) C only.

Answer = 2

(19) In the human female reproductive system,

- (1) progesterone level is low during the middle of the luteal phase.  
(2) estradiol level is very low at the beginning of the proliferative phase.  
(3) corpus luteum is formed during the proliferative phase.  
(4) LH level is high during the menstrual flow.  
(5) LH surge occurs during the secretory phase.

Answer = 2

(20) Which of the following statements regarding birth controlling methods is/are correct?

- (P) Most oral contraceptives for women block progesterone receptors in the uterus.  
(Q) High levels of FSH present in oral contraceptives for women prevent follicle maturation.  
(R) Depo-Provera thickens cervical mucus.  
(1) P only.      (2) P and Q only.      (3) P, Q and R.  
(4) Q and R only.      (5) R only.

Answer = 5

(21) Which of the following statements regarding the human endocrine system is correct?

- (1) ADH is produced by the posterior pituitary.  
(2) Prolactin is a tropic hormone secreted by the anterior pituitary.  
(3) Noradrenalin mediates long-term stress responses.  
(4) Removal of thyroid by surgery will affect the maturation of T lymphocytes.  
(5) Glucocorticoids promote production of glucose from fat.

Answer = 5

(22) Select the correct statement regarding the human ear.

- (1) During hearing sound waves are transmitted to the round window of the inner ear through ear ossicles.  
(2) The nerve impulses generated due to stimulation of auditory receptors located on the tectorial membrane are transmitted through auditory nerve.  
(3) Sound perception occurs in the temporal lobe of the cerebrum.  
(4) Angular movements of the head are detected by the vestibule.  
(5) Melatonin regulates biological rhythms of reproduction.

Answer = 3

- (23) Which if the following animals do **not** have a brain?  
 (A) *Ichthyophis* (B) Sand dollar (C) Rag worm (D) Obelia  
 (1) A and B only. (2) A, B and C only. (3) B and C only.  
 (4) B, C and D only. (5) B and D only.

Answer = 5

- (24) Which of the following parts of the human brain acts / act as relay stations?  
 (A) Cerebellum (B) Mid brain (C) Pons Varolii  
 (1) A and B only. (2) A and C only (3) A, B and C  
 (4) B and C only. (5) C only.

Answer = 4

- (25) Consider the following six evolutionary developments of land plants (**A** to **F**) listed below.

- A. Independent sporophyte**
- B. Egg cell retained by the mother plant**
- C. Petals**
- D. Heterospory**
- E. Seeds**
- F. Megaphylls**

Which of the following is the **correct sequence** of the occurrence of these during the evolution of land plants?

- 1. **A → B → D → F → E → C**
- 2. **A → B → F → E → D → C**
- 3. **B → A → F → D → E → C**
- 4. **B → A → F → E → C → D**
- 5. **A → F → B → D → E → C**

Answer = 3

- (26) Which of the following organisms cannot produce carbohydrates from carbon dioxide?  
 1. *Anabaena* 2. *Utricularia* 3. *Nitrosomonas* 4. *Gracilaria* 5. *Penicillium*

Answer = 5

- (27) Which of the following processes directly uses ATP as the metabolic energy?
- 1. Negative geotropic movements of plant roots
  - 2. Transportation of minerals through the xylem tissue
  - 3. Guttation
  - 4. Absorption of minerals from the soil solution via osmosis.
  - 5. biosynthesis of mRNA in transcription

Answer = 5

(28) Which of the following occurs in the life cycle of a typical angiosperm?

1. Alteration of generations between a haploid and a diploid generation
2. Meiosis during gametogenesis.
3. Formation of a pollen tube which carries female nuclei.
4. Formation of a diploid endosperm
5. Reduction of sporophyte generation.

Answer = 1

(29) Select the response that shows the correct ratio of  $\text{NADH}_2$  :  $\text{FADH}_2$  produced in different steps of cellular respiration when one glucose molecule is oxidised?

1. Glycolysis 2:1, Krebs's Cycle 1:1; Oxidative phosphorylation 1:3
2. Glycolysis 2:0, Krebs's Cycle 6:2; Oxidative phosphorylation 2:0
3. Glycolysis 2:1, Krebs's Cycle 3:2; Oxidative phosphorylation 2:1
4. Glycolysis 0:1, Krebs's Cycle 2:0; Oxidative phosphorylation 1:3
5. Glycolysis 1:1, Krebs's Cycle 3:4; Oxidative phosphorylation 1:3

Answer = 2

(30) Select the **correct statement** on plant responses to environmental signals

1. Red light inhibits seed germination in plants.
2. Exposure to direct sunlight inhibits branching
3. Statoliths play a vital role in positive geotropism
4. Root hair formation is stimulated by ethylene
5. Forest canopy absorbs more far red light compared with red light

Answer = 3

(31) Which of the following statements is correct?

- (1) The F1 progeny produced from pure breeding parents are always monohybrids
- (2) Expressing blend phenotypes from a single allele is called incomplete dominance.
- (3) Epistasis results from interactions between genes of same loci.
- (4) An example of non-Mendelian inheritance is polyallelism.
- (5) Inbreeding populations give rise to few heterozygotes.

Answer = 4

32. Which one of the following statements best describes the parents in a testcross?

- (1) Both individuals are heterozygous
- (2) One individual is homozygous
- (3) Both individuals have the dominant phenotype
- (4) Both individuals have the recessive phenotype
- (5) One individual has the dominant phenotype and the other has the recessive phenotype

Answer = 5

33. Which of the following enzymes is involved in forming a short segment of RNA before DNA synthesis begins during DNA replication?

- (1) Ligase
- (2) Helicase
- (3) DNA polymerase I
- (4) DNA polymerase III
- (5) Primase

Answer = 5

34. A point mutation that changes a codon into an amino acid coding for a stop codon is called a

- (1) missense mutation
- (2) substitution mutation
- (3) nonsense mutation
- (4) frameshift mutation
- (5) deletion mutation

Answer = 3

35. Which of the following statements regarding gene cloning is correct?

- (1) The ampicillin resistance gene is always present in all the plasmids.
- (2) Plasmids are absent in yeast cells.
- (3) DNA to be cloned is inserted in the multiple cloning site of the plasmid vector.
- (4) The transformation of cells by plasmids is a very efficient process.
- (5) Ti-plasmid does not contain a plant-selectable marker.

Answer = 3

36. Which of the following statements regarding human genetic characters is correct?

- (1) Cystic fibrosis is an autosomal dominant disorder
- (2) Haemophilia is a Y-linked recessive disorder
- (3) Schizophrenia is an epigenetic inheritance disorder
- (4) Red-green colour blindness is a X-linked recessive disorder.
- (5) Dimples on cheeks are a recessive trait and inherited in Mendelian fashion

Answer = 4

(37) Which of the following man-made industrial gases is considered a greenhouse gas with very high global warming potential?

1. Carbon Monoxide
2. Hydrofluorocarbons
3. Sulfur Dioxide
4. Nitrogen Dioxide
5. Nitrous Oxide

Answer = 2



- (38) Which of the following statements correctly describes the characteristics that enable invasive alien plant species to establish themselves in Sri Lanka?
- (1) Dependence on specialized habitats and human activity for initial introduction.
  - (2) Lower reproductive rates than native plant species restricting expansion.
  - (3) Lack of adaptability and narrow environmental tolerance ranges.
  - (4) Absence of predators in the introduced environment limiting spread.
  - (5) Ability to thrive across diverse habitats and spread rapidly.

Answer = 5

- (39) Which of the following organisms is used for the commercial production of cellulase enzyme?

- (1) *Aspergillus oryzae*
- (2) *Pseudomonas putida*
- (3) *Aspergillus niger*
- (4) *Streptomyces griseus*
- (5) *Bacillus subtilis*

Answer = 3

- (40) Which of the following types of extremophiles can survive in the deep seas?

- (1) Acidophiles and barophiles
- (2) Halophiles and thermophiles
- (3) Psychrophiles and barophiles
- (4) Acidophiles and thermophiles
- (5) Psychrophiles and alkaliphiles

Answer = 3

Part B – Multiple Choice Questions with more than one correct answer

**In the questions of this part, one or more responses is/are correct. Mark the correct response/ responses in the answer sheet. When any response is wrong, no marks shall be awarded to that question.**

(1) Which of the following correctly describes the functions of the smooth endoplasmic reticulum?

- (1) Protein synthesis
- (2) Transport of materials within the cell
- (3) Synthesis of glycoproteins
- (4) Metabolism of carbohydrates
- (5) Storage of calcium ions

Correct Responses: (2), (4), (5)

(2) Which of the following events occur during meiosis but not during mitosis?

- (1) Formation of chiasmata through crossing over between non-sister chromatids
- (2) Alignment of homologous chromosomes at the metaphase plate
- (3) Separation of sister chromatids during anaphase II
- (4) Breakdown of the nuclear envelope at the beginning of prophase
- (5) Condensation of chromatin into visible chromosomes

Answers = 1, 2, 3

(3) Which of the following events occurs/occur during the light-dependent reactions in photosynthesis?

- (1) Excitation of electrons from photosystem II (P680) by photons
- (2) Reduction of NADP to NADPH
- (3) Release of oxygen gas through water splitting
- (4) Synthesis of ATP via photophosphorylation
- (5) Cyclic flow of electrons through photosystem II

Correct Responses= (1), (2), (3), (4)

(4) Which of the following taxonomic criteria is/are commonly used in modern systematics based on the rapid advance of molecular biology and the new information on the evolutionary relationships of organisms?

- (1) The number of stamens and styles of flowers
- (2) The base sequence of ribosomal RNA
- (3) The mode of locomotion
- (4) The presence or absence of red blood cells
- (5) The molecular structure of cellular components

Correct responses: 2, 5

(5) Which of the following characteristics is/are associated with Kingdom Fungi,

- (1) They are absorptive and heterotrophic.
- (2) **Zygomycota fungi contain coenocytic septate mycelium.**
- (3) **All Ascomycota fungi are terrestrial.**

- (4) **Basidiomycota fungi produce** fruiting bodies called basidiocarps.  
(5) In Zygomycota fungi Zygosporangium is produced by plasmogamy and karyogamy.

Correct responses: 1, 4, 5

- (6) Which of the following vitamins act/acts as an antioxidant?  
(1) Vitamin A (2) Vitamin B (3) Vitamin C (4) Vitamin D (5) Vitamin E

Correct responses: 3, 5

- (7) Which of the following statements regarding the circulatory system of animals is/are correct?  
(1) When a circulatory system is present, there should be a heart to pump blood.  
(2) When a heart is present, there should be vessels to bring blood to it.  
(3) Storing oxygen and transporting carbon dioxide are functions of respiratory pigments.  
(4) Hemoglobin is found in invertebrates and vertebrates.  
(5) Each subunit of a hemoglobin molecule carries one oxygen molecule.

Correct responses: 3, 4 and 5

- (8) In the distal convoluted tubule of the human nephron,  
(1) reabsorption of  $\text{Na}^+$  ions is increased under the influence of ADH.  
(2) reabsorption of water is increased under the influence of aldosterone.  
(3) reabsorption of  $\text{K}^+$  ions is increased under the influence of aldosterone.  
(4) reabsorption of water is increased under the influence of ADH.  
(5)  $\text{HCO}_3^-$  ions are secreted and  $\text{H}^+$  ions are reabsorbed.

Correct responses: 2,4

- (9) Which of the following statements regarding the human skeleton is/are correct?  
(1) Fifteen bones of the skull contribute to forming the face.  
(2) Sinuses are present in the frontal and maxillary bones.  
(3) One fontanelle can be observed in the skull of a three-year-old normal healthy child.  
(4) A person whose upper limb has been completely amputated has 29 bones less than that of a normal person in his skeleton.  
(5) The pectoral girdle consists of two bones.

Correct responses: 1,2

- (10) Which of the following statements regarding the human male reproductive system is/are correct?  
(1) Secretions of the bulbourethral glands are alkaline.  
(2) Most of the volume of semen consists of secretions from the prostate glands.  
(3) Testosterone is produced by Leydig cells.  
(4) Secretions of seminal vesicles contain vitamin C.  
(5) Epididymis is formed of a folded duct.

Correct responses: 1,3,4,5

- (11) Select the correct combination/combinations of the endocrine gland and the target organ/tissue of its hormones.

<b>Endocrine gland</b>	-	<b>Target organ/tissue</b>
(1) Parathyroid	-	Kidney
(2) Thymus	-	Blood vessels
(3) Pineal gland	-	Lungs
(4) Pancreas	-	Skeletal muscles
(5) Hypothalamus	-	Gonad

Correct responses: 1, 2, 4

- (12) Which of the following statements regarding action potential is /are correct?
- (1) During depolarization, the inside of the neuron becomes more negative.
  - (2) During repolarization, sodium channels close.
  - (3) During hyperpolarization, the inside of the neuron becomes less negative.
  - (4) During depolarization,  $K^+$  outflow occurs.
  - (5) During hyperpolarization, potassium channels are opened.

Correct responses: 2,5

- (13) Select the correct statement/statements regarding the periderm of plant stems.

1. The epidermis is replaced by the periderm while plant roots and stems undergo secondary growth
2. Periderm can be found in the mature parts of the herbaceous stems.
3. Periderm can be found in gymnosperms
4. It is developed by the activity of the cork cambium
5. It can be found in the stems of monocotyledonous plants

Answers : 1, 3, 4

- (14) A lab practical was conducted to determine the solute potential of epidermal peel of *Rhoeo* leaf cells. Five solutions with different sucrose molarities were prepared - 0.15 M, 0.20 M, 0.25 M, 0.30 M, and 0.35 M. Epidermal peels were placed in each solution for 20 minutes to reach equilibrium. The percentage plasmolysis was then observed under the microscope and the results noted. Which of the following conclusions can be drawn from the experiment?

- (1) The solute potential of the *Rhoeo* epidermal cells equals the solute potential of the sucrose solution at which 50% plasmolysis was observed
- (2) The solute potential of the *Rhoeo* cells becomes more negative as the sucrose molarity increases
- (3) Lower concentration sucrose solutions are hypertonic to the cell sap
- (4) The percentage plasmolysis increases with increasing sucrose molarity
- (5) Plasmolysis occurs due to water moving out of the cells by osmosis

Answers = 1, 4, 5

(15) Which of the following **statement/ statements is/are correct** regarding the plant life cycles?

1. Bryophytes represent a monosporangiate lineage in the plant kingdom
2. Pterophytes possess independent gametophytic and sporophytic generations in their life cycle.
3. Lycophytes show evolutionary tendencies to the seed habit.
4. Possessing of reproductive cones in conifers separate two sexes spatially.
5. Angiosperms require external water for fertilization.

**Answers: 1,2,3,5**

16. Which of the following statements regarding Polymerase Chain Reaction (PCR) is/are correct?

- (1) After four cycles of PCR, 16 DNA duplexes are produced from one DNA duplex
- (2) *Escherichia coli* is used to extract the polymerase for PCR
- (3) Double-stranded DNA serves as the template
- (4) Annealing is the first step in PCR
- (5) Primers generally consist of 200-300 nucleotides

Answers = 1

17. Select the correct statement/statements regarding cross of a true-breeding pea plant with yellow-round seeds with a true-breeding pea plant with green-wrinkled seeds

- (1) The cross-produced yellow-round seeds in all dihybrid F1 plants
- (2) Four different types of gametes are formed from F1 generation
- (3) There are 12 equally probable ways in which the alleles can combine to produce the F2 generation
- (4) The majority of plants in the F2 generation were with yellow-round seeds
- (5) F2 generation does not produce green-round seeds

Answers = 1,2,4

18. Select the correct statement/statements regarding recombinant DNA technology.

- (1) Golden rice is a genetically modified crop
- (2) Bacteriophages are used as a vector for cloning
- (3) Insulin is produced by recombinant DNA technology
- (4) Restriction endonucleases are widely used in recombinant DNA technology
- (5) PCR is one of the tools used in recombinant DNA technology

Answers = 1, 2, 3, 4, 5

(19) Select correct statement/statements regarding international environmental conventions.

1. CITES aims to conserve biodiversity, emphasizing the fair and equitable sharing of benefits arising from genetic resources.
2. The primary goal of the Convention on Biological Diversity (CBD) is to address the prevention of pollution in the marine environment
3. The Convention on Wetlands (Ramsar Convention) provides a framework for the conservation of wetlands with a focus on limiting overexploitation.

4. MARPOL aims to minimize oil spillage from ships to preserve the marine environment.
5. CITES requires prior permission for the export of listed species, ensuring that their export will not be detrimental to their survival.

Answers – 4 and 5

20. Which of the following combinations regarding disease and the vaccine type used for its control is/are correct?

1. Rabies- subunit vaccine
2. Chickenpox- inactivated vaccine
3. Cholera- inactivated vaccine
4. Diphtheria- subunit vaccine
5. Polio- live attenuated vaccine

Answer = 3,4