

CUET PG 2024 Life Science Question Paper with Solutions

Time Allowed :1 Hour 45 Mins	Maximum Marks :300	Total Questions :75
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General Instructions

Read the following instructions very carefully and strictly follow them:

1. The examination duration is 105 minutes. Manage your time effectively to attempt all questions within this period.
2. The total marks for this examination are 300. Aim to maximize your score by strategically answering each question.
3. There are 75 mandatory questions to be attempted in the Life Science paper. Ensure that all questions are answered.
4. Questions may appear in a shuffled order. Do not assume a fixed sequence and focus on each question as you proceed.
5. The marking of answers will be displayed as you answer. Use this feature to monitor your performance and adjust your strategy as needed.
6. You may mark questions for review and edit your answers later. Make sure to allocate time for reviewing marked questions before final submission.
7. Be aware of the detailed section and sub-section guidelines provided in the exam. Understanding these will aid in effectively navigating the exam.

1. The portion of transmembrane proteins that cross the lipid bilayer are usually:

- (A) α -helices
- (B) β -sheet
- (C) Turns
- (D) Loops

Correct Answer: (A) α -helices

Solution: The transmembrane regions of proteins are commonly formed by α -helices because they are hydrophobic and can span the lipid bilayer. β -sheets are less common and are usually found in pore-forming proteins.

Quick Tip

Transmembrane proteins are hydrophobic in nature, allowing them to pass through the lipid bilayer. The α -helical structure is most favorable for spanning the membrane.

2. Match List I with List II:

List I (Enzyme)	List II (Function)
(A) Cytochrome oxidase	(I) Electron transport system
(B) Topoisomerases	(II) Change linking number
(C) Cohesins	(III) DNA Replication
(D) PCNA	(IV) Cell cycle

Choose the correct answer from the options given below:

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (I), (B) - (III), (C) - (IV), (D) - (II)
3. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)
4. (A) - (III), (B) - (II), (C) - (IV), (D) - (I)

Correct Answer: 1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

Solution: - Cytochrome oxidase is a key enzyme in the electron transport chain. - Topoisomerases are enzymes that change the linking number of DNA, crucial for processes like replication and transcription. - Cohesins play a significant role in DNA replication by holding sister chromatids together. - PCNA (Proliferating Cell Nuclear Antigen) is a protein associated with the cell cycle, particularly in DNA synthesis and repair.

Quick Tip

Understanding the functions of enzymes like Cytochrome oxidase, Topoisomerases, Cohesins, and PCNA is essential for matching them correctly with their respective roles.

3. Which of the following enzyme is inhibited by citrate in Krebs's cycle?

- (A) Phospho-fructo kinase II (PFKII)
- (B) Aldolase
- (C) Pyruvate kinase
- (D) Phosphoglycerate mutase (PGM)

Correct Answer: (A) Phospho-fructo kinase II (PFKII)

Solution: Phospho-fructo kinase II (PFKII) is a key enzyme in glycolysis and is inhibited by citrate, an intermediate of the Krebs's cycle, to regulate the metabolic flux between glycolysis and the Krebs's cycle.

Quick Tip

Citrate serves as a feedback inhibitor to regulate glycolysis by inhibiting Phospho-fructo kinase II, ensuring a balance in cellular energy production.

4. Why is the presence of proline destabilizes α -helix?

- (A) Proline residue introduces a destabilizing kink in the α -helix
- (B) In proline, the nitrogen atom is a part of a rigid ring, and rotation about N-C bond is not possible
- (C) The nitrogen atom of a proline residue in a peptide linkage has no substituent hydrogen to

participate in hydrogen bonds with other residues

(D) Proline residue works as a helix linker

Choose the correct answer from the options given below:

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

Correct Answer: (2) (A), (B), and (C) only

Solution: Proline is unique because its structure introduces a kink in the α -helix. This is due to its cyclic nature, which restricts rotation, and the lack of an amide hydrogen that can form hydrogen bonds critical for maintaining helix stability.

Quick Tip

Proline is often termed a "helix breaker" because of its rigid structure that disrupts the regularity of α -helices.

5. Which of the following are components of lipid raft in plasma membrane?

- (A) Cholesterol
- (B) Sphingolipids
- (C) Glycolipids
- (D) Phospholipids

Choose the correct answer from the options given below:

- (1) (A) and (B) only
- (2) (A) and (C) only
- (3) (B) and (C) only
- (4) (C) and (D) only

Correct Answer: (1) (A) and (B) only

Solution: Lipid rafts are specialized microdomains in the plasma membrane, enriched with cholesterol and sphingolipids. They are crucial for various cellular processes like signal transduction and protein trafficking.

Quick Tip

Lipid rafts are dynamic and serve as platforms for cellular signaling, helping in efficient communication between cells.

6. Which of the following enzymes is defective in galactosemia—a fatal genetic disorder in infants?

- (A) Glucokinase
- (B) Galactokinase
- (C) UDP-galactose 4-epimerase
- (D) Galactose-1-phosphate uridylyltransferase

Correct Answer: (D) Galactose-1-phosphate uridylyltransferase

Solution: Galactosemia is most commonly caused by a defect in the enzyme galactose-1-phosphate uridylyltransferase (GALT). This enzyme is crucial for the metabolism of galactose, and its deficiency leads to the accumulation of galactose-1-phosphate, which is toxic to cells.

Quick Tip

Screening for galactosemia in newborns is essential for early diagnosis and management, as untreated cases can lead to severe complications like liver damage, developmental delays, and cataracts.

7. Match List I with List II and choose the correct answer from the options given below:

List I (Vitamin)	List II (Disorder)
(A) Vitamin-A	(I) Night blindness
(B) Vitamin-D	(II) Scurvy
(C) Vitamin-C	(III) Fat-soluble vitamin
(D) Vitamin-K	(IV) Blood clotting

1. - (I), (B) - (III), (C) - (II), (D) - (IV)
2. - (I), (B) - (III), (C) - (II), (D) - (IV)
3. - (I), (B) - (II), (C) - (IV), (D) - (III)
4. - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: 2. - (I), (B) - (III), (C) - (II), (D) - (IV)

Solution:

- Vitamin-A is associated with night blindness as it is essential for proper vision.
- Vitamin-D is a fat-soluble vitamin crucial for calcium absorption and bone health.
- Vitamin-C deficiency causes scurvy due to its role in collagen synthesis.
- Vitamin-K is necessary for blood clotting processes.

Quick Tip

Vitamins are classified into fat-soluble (A, D, E, K) and water-soluble (B-complex, C) based on their solubility and storage in the body.

8. Identify the correct sequence of the given intermediates formed during glycolysis:

- (A) Fructose 1,6-biphosphate
- (B) Fructose 6 phosphate
- (C) Lactate
- (D) Phosphoenolpyruvate

Choose the correct answer from the options given below:

1. (A), (B), (C), (D)
2. (A), (B), (D), (C)
3. (B), (A), (D), (C)
4. (B), (A), (C), (D)

Correct Answer: (2) (A), (B), (D), (C)

Solution: The correct sequence of intermediates in glycolysis is Fructose 1,6-biphosphate → Fructose 6 phosphate → Phosphoenolpyruvate → Lactate.

Quick Tip

Glycolysis is a series of reactions where glucose is broken down into pyruvate or lactate, generating ATP and NADH.

9. Identify the correct sequence of the given enzymes involved in the TCA cycle:

- (A) Aconitase
- (B) Fumarase
- (C) Malate dehydrogenase
- (D) -ketoglutarate dehydrogenase

Choose the correct answer from the options given below:

1. (A), (B), (C), (D)
2. (A), (D), (B), (C)
3. (B), (A), (D), (C)
4. (C), (B), (D), (A)

Correct Answer: (2) (A), (D), (B), (C)

Solution: The enzymes of the TCA cycle act in a sequence starting with Aconitase → -ketoglutarate dehydrogenase → Fumarase → Malate dehydrogenase.

Quick Tip

The TCA cycle, also known as the Krebs cycle, is a central metabolic pathway that oxidizes acetyl-CoA to CO and generates NADH and FADH.

10. Which of the following is not a fluorescence dye?

- (A) Alexa Fluor
- (B) Green fluorescent protein (GFP)
- (C) Red fluorescent protein (DsRed)
- (D) Xylene cyanol

Correct Answer: (D) Xylene cyanol

Solution: Xylene cyanol is a tracking dye used in gel electrophoresis and is not fluorescent, unlike Alexa Fluor, GFP, and DsRed, which are commonly used fluorescent dyes.

Quick Tip

Xylene cyanol is used to monitor DNA/RNA migration in electrophoresis, not for fluorescence studies.

11. The technique used to identify the specific DNA in bacterial colonies is:

- (A) In-situ hybridization
- (B) Dot blot
- (C) Colony hybridization
- (D) Western hybridization

Correct Answer: (C) Colony hybridization

Solution: Colony hybridization is a technique to detect DNA sequences within colonies by transferring them onto a membrane and using a labeled probe for hybridization.

Quick Tip

Western hybridization is for proteins, while colony hybridization specifically identifies DNA.

12. Which metal is used for electron beam generation in scanning electron microscopy?

- (A) Tungsten (W)
- (B) Magnesium (Mg)
- (C) Mercury (Hg)
- (D) Zinc (Zn)

Correct Answer: (A) Tungsten (W)

Solution: Tungsten is widely used in electron microscopy as a filament material due to its high melting point and durability.

Quick Tip

The tungsten filament is the most commonly used electron source in electron microscopes.

13. What is the role of sodium dodecyl sulfate (SDS) in protein electrophoresis?

- (A) Add net negative charge to the protein
- (B) Separate lipids on the basis of their molecular weight
- (C) Modify native conformation of a protein
- (D) Allows direct destaining of the proteins

Choose the correct answer from the options given below:

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

Correct Answer: (A) and (C) only

Solution: Sodium dodecyl sulfate (SDS) is an anionic detergent that denatures proteins by disrupting non-covalent bonds, thereby modifying their native conformation. It also adds a uniform negative charge to proteins, allowing them to be separated based on size during electrophoresis.

Quick Tip
SDS disrupts protein structures and imparts a uniform negative charge, enabling molecular weight-based separation in SDS-PAGE.

14. Isoelectric focusing allows separation of the proteins according to their:

- (A) pH
- (B) pI
- (C) pKa
- (D) pKb

Correct Answer: (B)

Solution: Isoelectric focusing is a technique used to separate proteins based on their isoelectric point (pI), the pH at which the protein has no net charge and does not migrate in an electric field.

Quick Tip
Proteins are separated in a pH gradient during isoelectric focusing, stopping movement at their pI.

15. Match List I with List II:

List I	List II
(A) Western Blotting	(II) Protein identification
(B) Southern Blotting	(I) DNA identification
(C) Northern Blotting	(IV) RNA identification
(D) Yeast two-hybrid system	(III) Protein-protein interaction

Choose the correct answer from the options given below:

1. (A) - (II), (B) - (I), (C) - (IV), (D) - (III)
2. (A) - (II), (B) - (IV), (C) - (I), (D) - (III)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: 1. (A) - (II), (B) - (I), (C) - (IV), (D) - (III)

Solution: - Western blotting is used for protein identification.

- Southern blotting identifies DNA sequences.
- Northern blotting is for RNA identification.
- Yeast two-hybrid system identifies protein-protein interactions.

Quick Tip

Blotting techniques are named directionally: Southern (DNA), Northern (RNA), Western (Protein).

16. Arrange the given steps involved in polymerase chain reaction (PCR):

- (A) Denaturation
- (B) Annealing
- (C) Extension
- (D) Cycling

Choose the correct answer from the options given below:

1. (A), (B), (C), (D)
2. (A), (C), (B), (D)
3. (B), (A), (D), (C)
4. (C), (B), (D), (A)

Correct Answer: 1. (A), (B), (C), (D)

Solution: The steps of PCR are as follows:

- **Denaturation:** The double-stranded DNA is heated to separate it into two single strands.
- **Annealing:** The temperature is lowered to allow primers to bind to their complementary DNA sequences.
- **Extension:** DNA polymerase extends the primers to form a new strand of DNA.
- **Cycling:** These steps are repeated multiple times to amplify the target DNA sequence.

Quick Tip

PCR consists of three main steps: Denaturation, Annealing, and Extension, which are cycled multiple times to amplify DNA.

17. Vertical gel electrophoresis is routinely used for the separation of-

- (A) Protein
- (B) DNA
- (C) RNA
- (D) Carbohydrate and lipid

Correct Answer: (A) Protein

Solution: Vertical gel electrophoresis is a technique primarily used for protein separation, especially in methods like SDS-PAGE.

Quick Tip

Vertical electrophoresis is typically associated with polyacrylamide gels used for protein separation.

18. Which is not a unit of radioactivity?

- (A) Gray (gy)
- (B) Roentgen (R)
- (C) Millicurie (mCi)
- (D) Pascal (p)

Correct Answer: (D) Pascal (p)

Solution: Pascal is a unit of pressure, not related to radioactivity. Units like Gray, Roentgen, and Millicurie are associated with measuring radiation and radioactivity.

Quick Tip

Always distinguish between units of radiation (like Gray) and unrelated units like Pascal.

19. In the technique called centrifugation, the centrifugal field (G) is calculated as-

- (A) $G = \omega \times r^2$
- (B) $G = \omega^2 \times r$
- (C) $G = \omega^2 \times r^2$
- (D) $G = \omega \times r$

Correct Answer: (B) $G = \omega^2 \times r$

Solution: The centrifugal field is determined by the square of the angular velocity (ω) multiplied by the radius (r).

Quick Tip

Remember, the formula $G = \omega^2 \times r$ applies to centrifugation, relating angular velocity to radius.

20. Match List I with List II

DNA/RNA modifying enzymes Reactions

(A) DNase I	(I) Cleaves and digests RNA and not DNA
(B) RNase A	(II) Cleaves and digests the RNA strand of RNA-DNA heteroduplex
(C) S1 nuclease	(III) Produces single-stranded nicks in DNA
(D) RNase H	(IV) Degrades single-stranded DNA and RNA

Choose the correct answer from the options given below:

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (III), (B) - (I), (C) - (IV), (D) - (II)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II) **Correct Answer:** 1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

Solution: - DNase I cleaves and digests RNA but not DNA. - RNase A cleaves and digests the RNA strand of RNA-DNA heteroduplex. - S1 nuclease produces single-stranded nicks in DNA. - RNase H degrades single-stranded DNA and RNA.

Quick Tip

Understanding the specificity of each enzyme is key in matching the correct reactions.

21. Number of chromosomes present in *Arabidopsis thaliana* is-

- (A) 8
- (B) 10
- (C) 12
- (D) 14

Correct Answer: (C) 12

Solution: *Arabidopsis thaliana* is a model organism, and its diploid number of chromosomes is 12.

Quick Tip

Chromosomes present in the organisms differ accordingly.

22. What percentage of genes are found in the human genome?

- (A) 25% of the genome
 - (B) 30% of the genome
 - (C) 40% of the genome
 - (D) 45% of the genome
- Correct Answer:** (B) 30% of the genome

Solution: Approximately 30% of the human genome consists of genes, which code for proteins. The rest of the genome consists of regulatory and non-coding sequences.

Quick Tip

Genome present in human organism vary as per the sequence.

23. Match List I with List II

LIST I

LIST II

- | | |
|---------------------|----------------------------|
| (A) Histone erasers | (I) Methyltransferase |
| (B) Histone readers | (II) Deacetylases |
| (C) Histone writers | (III) Topoisomerase |
| (D) DNA Unwinding | (IV) Bromodomains proteins |

Choose the correct answer from the options given below:

1. (A) - (II), (B) - (IV), (C) - (I), (D) - (III)
2. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: 2. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)

Solution: Histone erasers are associated with Methyltransferase activity, histone readers with Topoisomerases, histone writers with Deacetylases, and DNA unwinding is related to Bromodomains proteins.

Quick Tip

The role of each protein or enzyme: Erasers typically modify by adding or removing groups like methyl (Methyltransferase); Readers recognize modifications and interpret them (Topoisomerases); DNA unwinding involves proteins that interact with the DNA structure (Bromodomains proteins).

24. Nucleosome is basically composed of-

- (A) Histone core
- (B) Linker histone
- (C) Core DNA

(D) Linker DNA

Choose the correct answer from the options given below:

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

Correct Answer: 2. (A), (B) and (C) only.

Solution:

Nucleosome is composed of histone core, linker histone, and core DNA. The linker DNA connects the nucleosomes, but is not part of the nucleosome itself.

Quick Tip

The basic structure of the nucleosome consists of the histone core (histone proteins), core DNA wrapped around the histone core, and linker histones that bind to the linker DNA.

25. Arrange according to their lower to higher genome size-

- (A). lambda (λ)
(B). T4
(C). Φ x 174
(D). T7

Choose the correct answer from the options given below:

1. (A), (B), (C), (D).
2. (B), (A), (C), (D).
3. (C), (D), (A), (B).
4. (C), (B), (D), (A).

Correct Answer: 3. (C), (D), (A), (B).

Solution:

The correct order of genome size, from smallest to largest, is: - Φ x 174 has the smallest genome size. - T7 has a medium size genome. - Lambda (λ) comes next. - T4 has the largest genome size.

Quick Tip

In general, bacteriophages like Φ x 174, T7, lambda (λ), and T4 have genome sizes that differ significantly, with Φ x 174 having the smallest and T4 the largest.

26. With the addition of linking number (Lk) by +2 to a relaxed DNA consisting of Lk = 200, which of the following occurs?

- (A) DNA undergo positive supercoiling with the Lk 202
(B) DNA undergo positive supercoiling with the Lk 198
(C) DNA undergo negative supercoiling with the Lk 202
(D) Structure does not change

Correct Answer: (A) DNA undergo positive supercoiling with the Lk 202

Solution: The addition of two units to the linking number (Lk) results in a positive supercoiling. Hence, the DNA undergoes positive supercoiling with Lk 202.

Quick Tip

Positive supercoiling occurs when the linking number is increased, while negative supercoiling happens when the linking number is decreased.

27. What are the function of topoisomerases?

- (A) Repair the chromosome ends
- (B) Form DNA isomers
- (C) Change the Linking Number of DNA
- (D) Form RNA isomers

Correct Answer: (C) Change the Linking Number of DNA

Solution: Topoisomerases are enzymes that modify the topology of DNA by changing the linking number, enabling DNA supercoiling and untangling.

Quick Tip

Topoisomerases help in maintaining the proper structure of DNA by altering its supercoiling, which is essential for processes like DNA replication and transcription.

28. Arrange the given processes involved in nitrogen cycle.

- (A) Ammonia formation
- (B) Organic nitrogen formation
- (C) Soil organic nitrogen formation
- (D) Nitrate formation

Choose the correct answer from the options given below:

1. (A), (B), (C), (D)
2. (A), (B), (D), (C)
3. (B), (A), (D), (C)
4. (B), (C), (A), (D)

Correct Answer: 1. (A), (B), (C), (D)

Solution: The correct sequence of nitrogen cycle steps begins with ammonia formation, followed by organic nitrogen formation, then soil organic nitrogen formation, and finally nitrate formation.

Quick Tip

Understanding the nitrogen cycle is essential for studying plant nutrition and environmental processes. The correct order is critical for agricultural and ecological applications.

29. The complete proteins produced by an organism at any one time, is called:

- (A) Transcriptome
- (B) Proteome
- (C) Lipidome
- (D) Metagenome

Correct Answer: (B) Proteome

Solution: The complete set of proteins expressed by an organism at any given time is referred to as the proteome, not transcriptome or any other term.

Quick Tip

The proteome represents all the proteins in a cell, tissue, or organism, unlike the transcriptome, which represents all RNA molecules.

30. Retroviruses are enveloped viruses that can be engineered to deliver how many bases of single-stranded RNA?

- (A) 500 bases
- (B) 1000 bases
- (C) 3000 bases
- (D) 8000 bases

Correct Answer: (C) 3000 bases

Solution: Retroviruses can be engineered to deliver approximately 3000 bases of single-stranded RNA for gene therapy applications.

Quick Tip

Retroviruses are often used in gene therapy because of their ability to integrate their RNA genome into the host DNA.

31. Adenoviruses are frequently used in gene delivery experiments. Their average genome size is 36,000 base pairs. Of their total DNA content, up to how much of adenovirus genome can be replaced by foreign DNA?

- (A) 5000 base pairs
- (B) 15,000 base pairs
- (C) 20,000 base pairs
- (D) 30,000 base pairs

Correct Answer: (C) 20,000 base pairs

Solution: Adenoviruses can accommodate up to 20,000 base pairs of foreign DNA in their genome, which makes them a viable option for gene therapy applications.

Quick Tip

Adenoviruses are ideal vectors for gene therapy because they can carry large foreign DNA sequences without compromising their infectivity.

32. Gene gun is one of the popular physical delivery methods. Microparticles that are loaded to deliver DNA are made up of which metal?

- (A) Gold
- (B) Silver
- (C) Copper
- (D) Titanium

Correct Answer: (A) Gold

Solution: Gold is commonly used in gene gun delivery methods, as it provides stability and is efficient for loading DNA into the particles for gene transfer.

Quick Tip

Gold microparticles are used for DNA delivery in gene gun methods because of their ease of handling and biocompatibility.

33. While delivering genes by chemical methods, one popular conjecture about what happens to poly(ethylenimine)/DNA complexes following endocytosis is known as the proton sponge hypothesis, which entails the following steps:

- (A) PEI/DNA complexes are endocytosed.
- (B) V-ATPases will pump protons into the vesicular interior.
- (C) Water will enter the vesicle to balance the osmotic gradient.
- (D) The vesicle will swell due to the entry of ions and water, leading to rupture.

Choose the correct answer from the options given below:

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

Correct Answer: 3. (A) (B) (C) and (D)

Solution: The proton sponge hypothesis suggests that after the PEI/DNA complexes are endocytosed, the V-ATPases pump protons into the vesicle, causing water to enter to balance the osmotic gradient, which eventually leads to the rupture of the vesicle.

Quick Tip

The proton sponge hypothesis is useful for enhancing endosomal escape and improving gene delivery efficiency.

34. Arrange the steps in the correct order as they are involved in RNA interference (RNAi):

- (A) Formation of small interfering RNAs (siRNAs)
- (B) Activation of RNase III-like enzyme Dicer
- (C) Inactivation of target RNA
- (D) Formation of RISC complex

Choose the correct answer from the options given below:

- 1. (A) (B) (C) (D)
- 2. (A) (C) (B) (D)
- 3. (B) (A) (C) (D)
- 4. (C) (B) (D) (A)

Correct Answer: 1. (A) (B) (C) (D)

Solution: RNA interference begins with the formation of siRNAs, followed by the activation of the Dicer enzyme, which processes the RNA. The target RNA is then inactivated, and the RISC complex is formed to mediate the silencing.

Quick Tip
RNA interference is a vital process for gene silencing and can be used for controlling gene expression.

35. Arrange the different steps of transcription in the correct order:

- (A) Transcription bubble formation
- (B) Phosphorylation of CTD tail
- (C) Recruitment of elongation factors
- (D) Dephosphorylation of CTD tail

Choose the correct answer from the options given below:

- 1. (A) (B) (C) (D)
- 2. (A) (C) (B) (D)
- 3. (B) (A) (C) (D)
- 4. (C) (B) (D) (A)

Correct Answer: 1. (A) (B) (C) (D)

Solution: Transcription starts with the formation of the transcription bubble, followed by phosphorylation of the CTD tail. Elongation factors are recruited, and the process ends with the dephosphorylation of the CTD tail.

Quick Tip

The phosphorylation of CTD tail is essential for transcription elongation and recruitment of transcription factors.

36. The complete proteins produced by an organism at any one time, is called:

- (A) Transcriptome
- (B) Proteome
- (C) Lipidome
- (D) Metagenome

Correct Answer: (B) Proteome

Solution: Proteome refers to the complete set of proteins produced by an organism at any given time, distinguishing it from other omics like transcriptome or metagenome.

Quick Tip

The study of the proteome is crucial for understanding protein functions, interactions, and disease mechanisms.

37. In human karyotype, chromosomes are divided into how many groups?

- (A) 3 groups
- (B) 5 groups
- (C) 7 groups
- (D) 9 groups

Correct Answer: (B) 5 groups

Solution: In human karyotype, chromosomes are divided into 5 groups based on their size and position of centromere.

Quick Tip

In human karyotype, chromosomes are grouped into 5 groups: A, B, C, D, and E.

38. In human karyotype, X chromosome belongs to which group?

- (A) A group
- (B) B group
- (C) C group
- (D) D group

Correct Answer: (B) B group

Solution: The X chromosome in human karyotype belongs to the B group, which consists of chromosomes with intermediate size.

Quick Tip

The X chromosome is in the B group, which is located in the middle of the karyotype.

39. Which one of the recombinant DNA techniques is almost obsolete?

- (A) Long DNA synthesis
- (B) DNA sequencing
- (C) Polymerase Chain Reaction
- (D) cDNA cloning

Correct Answer: (D) cDNA cloning

Solution: cDNA cloning is becoming almost obsolete due to advancements in other techniques such as high-throughput sequencing and RNA-seq.

Quick Tip

cDNA cloning was commonly used in gene expression studies but is being replaced by more efficient technologies.

40. What is the function of DNA gyrase in circular DNA?

- (A) Negative supercoiling
- (B) Positive supercoiling
- (C) DNA packaging
- (D) DNA degradation

Correct Answer: (A) Negative supercoiling

Solution: DNA gyrase introduces negative supercoiling in circular DNA by inducing breaks and resealing them, which is crucial for DNA replication and transcription.

Quick Tip

DNA gyrase plays a vital role in reducing the tension in DNA by introducing negative supercoiling, making the DNA more accessible.

41. Which of the following are viral diseases?

- (A) Yellow fever
- (B) Hepatitis B
- (C) Chickenpox
- (D) Rabies

Choose the correct answer from the options given below:

1. (A), (B) and (D) only.
2. (A), (B) and (C) only.

3. (B), (C) and (D) only.

4. (A), (B), (C) and (D).

Correct Answer: 4. (A), (B), (C) and (D)

Solution: Yellow fever, Hepatitis B, Chickenpox, and Rabies are all viral diseases. Yellow fever is caused by the Yellow fever virus, Hepatitis B by Hepatitis B virus, Chickenpox by Varicella-zoster virus, and Rabies by Rabies virus.

Quick Tip

Understanding the causative agents of diseases is crucial in identifying and preventing viral infections.

42. Lederberg and Tatum describe the phenomena of-

(A) Transformation

(B) Conjugation

(C) Mutation

(D) Transversion

Choose the correct answer from the options given below:

(A) Transformation

(B) Conjugation

(C) Mutation

(D) Transversion

Correct Answer: (B) Conjugation

Solution: Lederberg and Tatum are credited with discovering the phenomenon of conjugation, where genetic material is transferred between bacterial cells through direct contact, a process distinct from transformation, mutation, or transversion.

Quick Tip

Conjugation is an important mechanism of horizontal gene transfer in bacteria.

43. Match List I with List II

LIST I LIST II

(A) D'Herelle and Twort (I) Bacterial transformation

(B) Beadle and Tatum (II) Penicillin

(C) Fleming (III) One-gene-one-enzyme hypothesis

(D) Griffith (IV) Bacterial viruses

Choose the correct answer from the options given below:

1. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)

2. (A) - (I), (B) - (III), (C) - (IV), (D) - (II)

3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)

4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: 1. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)

Solution: - D'Herelle and Twort are credited with discovering bacteriophages, which are bacterial viruses (IV). - Beadle and Tatum developed the one-gene-one-enzyme hypothesis (III). - Fleming discovered penicillin (II). - Griffith is known for his discovery of bacterial transformation (I).

Quick Tip

The one-gene-one-enzyme hypothesis was a pioneering concept in genetics, linking genes to the synthesis of enzymes.

Question 44: Vaccine is not available for which disease?

- (A) Hepatitis B
- (B) Influenza
- (C) AIDS
- (D) Mumps

Correct Answer: (C) AIDS

Solution: Currently, there is no vaccine available for AIDS, which is caused by the HIV virus. Although there are vaccines for Hepatitis B, Influenza, and Mumps, none exists for AIDS.

Quick Tip

While vaccines are available for many viral infections, ongoing research aims to develop a vaccine for HIV/AIDS. Keep an eye on scientific advancements in this area.

Question 45: Antibody formed immediately after infection is-

- (A) IgM
- (B) IgG
- (C) IgD
- (D) IgE

Correct Answer: (A) IgM

Solution: IgM antibodies are the first antibodies produced by the immune system immediately after an infection. They are the primary response to new infections before IgG is produced.

Quick Tip

IgM is the first antibody to be secreted during an immune response, while IgG appears later and provides long-term immunity.

Question 46: Arrange the steps involved in Gram-stain procedure-

- (A) Staining with Crystal Violet
- (B) Staining with Gram's Iodine

- (C) Decolorization
- (D) Staining with Safranin

Correct Answer: 1. (A) - (B) - (D) - (C)

Solution: The correct order of the Gram stain procedure is as follows:

1. First, the sample is stained with Crystal Violet (A).
2. Then, Gram's iodine is applied (B) to form a complex with the dye.
3. The sample is decolorized (C) using alcohol or acetone to remove excess dye.
4. Finally, the sample is stained with Safranin (D) to counterstain the Gram-negative bacteria.

Quick Tip

Gram-staining is an essential procedure in microbiology that differentiates bacterial species based on the characteristics of their cell walls. Gram-positive bacteria retain the crystal violet stain, while Gram-negative bacteria take up the counterstain, Safranin.

Question 47: Yellow fever is caused due to the human-to-human transmission by-

- (A) *Aedes aegypti*
- (B) *Culex*
- (C) *Dermacentor andersoni*
- (D) *Mycobacterium tuberculosis*

Correct Answer: (A) *Aedes aegypti*

Solution: Yellow fever is a viral disease transmitted primarily by the *Aedes aegypti* mosquito. These mosquitoes become infected by biting a person who has the virus in their blood. Other options like *Culex* and *Dermacentor andersoni* do not transmit the yellow fever virus, and *Mycobacterium tuberculosis* is a bacterium that causes tuberculosis, not yellow fever.

Quick Tip

Yellow fever is transmitted by *Aedes* mosquitoes, not by bacterium or other insects.

Question 48: Amino acid that serves as precursor for formation of the pigment responsible for human skin color is-

- (A) Tryptophan
- (B) Cholesterol
- (C) Tyrosine
- (D) Indoleamine

Correct Answer: (C) Tyrosine

Solution: Tyrosine is the precursor to melanin, the pigment responsible for the color of skin, hair, and eyes in humans. Melanin is produced through a complex biosynthetic pathway, and tyrosine is converted into melanin through enzymatic reactions. Tryptophan is a precursor for

serotonin, cholesterol is involved in steroid hormone synthesis, and indoleamine refers to a class of compounds, but none of them are directly involved in melanin production.

Quick Tip

Tyrosine is the primary amino acid involved in melanin production, which determines skin pigmentation.

Question 49: Match List I with List II

LIST I

LIST II

- | | |
|--------------|---------------|
| (A) Shoulder | (I) Tarsals |
| (B) Thigh | (II) Carpals |
| (C) Wrist | (III) Humerus |
| (D) Ankle | (IV) Femur |

Choose the correct answer from the options given below:

1. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
2. (A) - (II), (B) - (III), (C) - (IV), (D) - (I)
3. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)
4. (A) - (III), (B) - (IV), (C) - (II), (D) - (I)

Correct Answer: 4. (A) - (III), (B) - (IV), (C) - (II), (D) - (I)

Solution: - The shoulder joint involves the humerus bone. - The thigh involves the femur bone. - The wrist involves the carpals bones. - The ankle involves the tarsals bones.

Quick Tip

Bone joints and their associated bones is fundamental in human anatomy. The shoulder joint is the humerus, and the thigh is the femur.

Question 50: *The propagation of action potential in myelinated nerve fiber is faster because of*

- (A) Continuous conduction
- (B) Saltatory conduction
- (C) Spontaneous conduction
- (D) Intermittent conduction

Correct Answer: (B) Saltatory conduction

Solution: The propagation of action potential in myelinated nerve fibers is faster due to saltatory conduction, which occurs as the action potential jumps from node to node (Nodes of Ranvier) rather than traveling continuously along the axon. This jumping process significantly speeds up signal transmission.

Quick Tip

Saltatory conduction in myelinated axons increases the speed of nerve signal transmission by enabling faster electrical signal jumps across the axon, making communication more efficient.

Question 51: *Calcitonin is produced by*

- (A) Follicular cells of the thyroid gland
- (B) Parafollicular cells of the thyroid gland
- (C) Parathyroid gland
- (D) Follicular cells of the ovary

Correct Answer: (B) Parafollicular cells of the thyroid gland

Solution: Calcitonin is a hormone produced by the parafollicular cells (also known as C cells) of the thyroid gland. It helps regulate calcium levels in the blood by inhibiting osteoclast activity, thereby lowering calcium concentrations.

Quick Tip

Calcitonin plays a key role in calcium homeostasis by inhibiting bone resorption and promoting calcium deposition, helping to lower blood calcium levels.

Question 52: *The lymphoid stem cells in the bone marrow form*

- (A) Natural killer cells
- (B) Platelets
- (C) B lymphocyte
- (D) Neutrophils

Choose the correct answer from the options given below:

1. (A) and (D)
2. (A) and (C)
3. (A) and (B)
4. (C) and (D)

Correct Answer: (A) and (D)

Solution: Lymphoid stem cells in the bone marrow primarily differentiate into immune cells such as natural killer (NK) cells and B lymphocytes. Platelets and neutrophils are formed from myeloid stem cells, not lymphoid stem cells.

Quick Tip

Lymphoid stem cells give rise to NK cells and B lymphocytes, while myeloid stem cells produce platelets and neutrophils. Understanding this differentiation is key in hematopoiesis.

Question 53: The perforation between left and right atria of a fetal heart is known as -----.

- (A) Foramen ovale
- (B) Ductus arteriosus
- (C) Fossa ovalis
- (D) Ligamentum arteriosum

Correct Answer: (A) Foramen ovale

Solution: The foramen ovale is the hole between the left and right atria of the fetal heart. It allows blood to bypass the lungs as the lungs are not yet functional during fetal circulation. After birth, the foramen ovale closes as the lungs begin to function.

Quick Tip

The foramen ovale is essential in fetal circulation and closes shortly after birth to redirect blood flow through the now-functioning lungs.

Question 54: On the basis of type of body cavity, platyhelminthes can be categorized as -----.

- (A) Aceolomate
- (B) Schizocoelomate
- (C) Pseudocoelomate
- (D) Enterocoelomate

Correct Answer: (A) Aceolomate

Solution: Platyhelminthes, or flatworms, are aceolomates. This means they do not have a true body cavity (coelom). Instead, their body is solid, except for the digestive tract and other internal structures.

Quick Tip

Aceolomates lack a body cavity, unlike pseudocoelomates (which have a false cavity) and coelomates (which have a true body cavity). Flatworms are the classic example of aceolomates.

55. Match List I with List II

LIST I	LIST II
(A) Radiation hybrid mapping	(I) DNA can be cut into large fragments and cloned
(B) Sequence tagged site (STS) mapping	(II) Useful for cloning of overlapping DNA fragments
(C) Chromosome jumping	(III) Fragment genome into large pieces
(D) Chromosome walking	(IV) Applicable to any part of DNA sequence

Choose the correct answer from the options given below:

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (I), (B) - (III), (C) - (IV), (D) - (II)
3. (A) - (II), (B) - (IV), (C) - (III), (D) - (I)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: 1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

Solution: - Radiation hybrid mapping (A) involves the breaking of DNA into large fragments, which are then used for chromosome walking (I). - Sequence tagged site (STS) mapping (B) is used for cloning overlapping DNA fragments, typically up to 200 kb (II). - Chromosome jumping (C) involves fragmenting the genome into large pieces and locating markers and genes (III). - Chromosome walking (D) can be applied to any part of the DNA sequence if sequence information is available (IV).

Quick Tip

Chromosome walking and jumping are essential techniques in mapping genomes. Walking focuses on mapping a continuous region, while jumping allows for skipping segments.

56. A clotting disorder which is sex-linked disease:

- (A) Sickle cell anaemia
- (B) Thalassemia
- (C) Hemophilia
- (D) Albinism

Choose the correct answer from the options given below:

1. (A) and (D)
2. (A) and (C)
3. (A) and (B)
4. (C) and (D)

Correct Answer: (C) Hemophilia

Solution:

Hemophilia is a sex-linked recessive genetic disorder that affects blood clotting, making it difficult for blood to clot properly. It is inherited through the X chromosome.

Quick Tip

Hemophilia is a classic example of an X-linked recessive disorder.

57. Which one of the following is a peat moss?

- (A) Pellia
- (B) Sphagnum
- (C) Marchantia
- (D) Funaria

Correct Answer: (B) Sphagnum

Solution:

Sphagnum, commonly known as peat moss, is a type of moss that forms peat bogs. It is essential for carbon storage in wetland ecosystems and plays a significant role in the global carbon cycle.

Quick Tip

Peat moss (Sphagnum) is often used in horticulture for its water-retaining properties.

58. The basal portion of a mature ligule of *Selaginella* is called:

- (A) Basal sheath
- (B) Lamella
- (C) Glossopodium
- (D) Stalk

Correct Answer: (A) Basal sheath

Solution:

The basal sheath in *Selaginella* is the basal portion of its ligule. It functions to protect and support the plant's sporophylls, contributing to its reproductive strategy.

Quick Tip

The basal sheath in *Selaginella* serves to protect and anchor its reproductive structures.

59. Vessels are present in:

- (A) Cycas
- (B) Zamia
- (C) Ginkgo
- (D) Gnetum

Correct Answer: (D) Gnetum

Solution:

Gnetum is a gymnosperm that possesses vessels, a feature typical of angiosperms, but not found in most other gymnosperms like *Cycas* or *Zamia*.

Quick Tip

The presence of vessels is a defining characteristic of Gnetum and is considered an evolutionarily advanced trait in gymnosperms.

60. Match List I with List II

LIST I (Transposons) LIST II (Organism)

(A) Pelement	(I) Drosophila
(B) LINE and SINE	(II) Human
(C) Ty element	(III) Yeast
(D) Tn element	(IV) Bacteria

Choose the correct answer from the options given below:

1. (A) - (I), (B) - (IV), (C) - (III), (D) - (II)
2. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
3. (A) - (II), (B) - (I), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: 2. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

Solution:

- (A) **Pelement** is a transposon found in Drosophila. Hence, (A) corresponds to (I).
- (B) **LINE and SINE** are long and short interspersed nuclear elements commonly found in humans, making (B) match with (II).
- (C) **Ty element** is a transposon found in yeast, so (C) corresponds to (III).
- (D) **Tn element** is a bacterial transposon, hence (D) corresponds to (IV).

Quick Tip

In biological systems, transposons are important for studying gene mobility and genetic variations across organisms. The matching of transposons to organisms requires familiarity with which organisms harbor specific types of transposable elements.

61. The peptidyl transferase enzyme activity is located in the

- (A) Variable loop of tRNA
- (B) Large ribosomal subunit
- (C) Acceptor arm of tRNA
- (D) Small ribosomal subunit

Correct Answer: (B) Large ribosomal subunit

Solution:

Peptidyl transferase is the enzyme that catalyzes the formation of peptide bonds during protein synthesis. This enzyme activity is located in the large ribosomal subunit, which is responsible for catalyzing the formation of peptide bonds between amino acids in the polypeptide chain. The small ribosomal subunit is responsible for mRNA binding and decoding, while the variable loop and the acceptor arm of tRNA are involved in the recognition and binding of amino acids, but not in catalysis.

Quick Tip

Remember, the peptidyl transferase activity is located in the large ribosomal subunit and is essential for protein synthesis.

62. Transcription factors that mediate the binding of RNA polymerase to DNA template are

- (A) TFIIA
- (B) TATA box
- (C) TFIIB
- (D) Small nuclear ribonucleoproteins

Choose the correct answer from the options given below:

1. (A) and (D)
2. (A) and (C)
3. (C) and (D)
4. (B) and (D)

Correct Answer: (1) (A) and (D)

Solution:

The transcription factors that mediate the binding of RNA polymerase to the DNA template include TFIIA and small nuclear ribonucleoproteins (snRNPs). TFIIA is a general transcription factor that helps RNA polymerase II bind to the promoter region of DNA. Small nuclear ribonucleoproteins are involved in the splicing of pre-mRNA and can also play a role in facilitating the binding of RNA polymerase. The TATA box and TFIIB are important for transcription initiation but do not directly mediate the binding of RNA polymerase to the DNA template.

Quick Tip

TFIIA and small nuclear ribonucleoproteins help in the binding of RNA polymerase to DNA during transcription initiation.

63. The histone that links two histone octamers is:

- (A) H1
- (B) H4
- (C) H2A
- (D) H2B

Correct Answer: (A) H1

Solution: Histone H1 is known as the linker histone because it helps link the two nucleosome units together by binding to the DNA between them, stabilizing the nucleosome structure. It plays an important role in the higher-order packaging of the chromatin.

Quick Tip

Histone H1 is not part of the octamer core but acts to stabilize DNA wrapping.

64. tRNA is synthesized by:

- (A) RNA polymerase I
- (B) RNA polymerase II
- (C) Ribosomes
- (D) RNA polymerase III

Correct Answer: (D) RNA polymerase III

Solution: tRNA is synthesized by RNA polymerase III, which is responsible for transcribing small RNA molecules like tRNAs and 5S rRNA. RNA polymerase I synthesizes rRNA, and RNA polymerase II synthesizes mRNA.

Quick Tip

The different RNA polymerases transcribe different types of RNA in eukaryotes.

65. The gene transmission from a male parent to a female offspring (“child”) to a male “grandchild” is called:

- (A) Crisscross inheritance
- (B) X linked inheritance
- (C) Y linked inheritance
- (D) Chromosomal inheritance

Correct Answer: (A) Crisscross inheritance

Solution: Crisscross inheritance refers to the transmission of a gene from a father to his daughter and then from the daughter to her son. This is typically seen in X-linked genes where the gene is passed down in a pattern where male offspring inherit the gene from their mother and female offspring inherit it from their father.

Quick Tip

Crisscross inheritance is characteristic of X-linked recessive traits.

66. Which of the following statement is true for Barr body?

- (A) It is a highly condensed chromosome.
- (B) It is an active X chromosome.
- (C) It is equivalent to the single Y chromosome of the male.
- (D) It is equivalent to the two X chromosomes of the female.

Correct Answer: (A) It is a highly condensed chromosome.

Solution: The Barr body is a highly condensed, inactive X chromosome found in female cells. It is a mechanism for dosage compensation in females, ensuring that both X chromosomes are not active simultaneously. Only one of the X chromosomes in females is active, and the other is condensed into a Barr body.

Quick Tip
Barr bodies are found only in females with more than one X chromosome.

67. Which of the following combinations of statements are true about C4 cycle?

- (A) Malic acid formed in the chloroplast of mesophyll cells
- (B) Malic acid is transported to the chloroplast of bundle sheath cells
- (C) Pyruvic acid produced in mesophyll cells move to the chloroplast of bundle sheath cells
- (D) Malic acid is transported to the chloroplast of mesophyll cells

Choose the correct answer from the options given below:

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

Correct Answer: 4. (B), (C) and (D) only

Solution: In the C4 cycle, malic acid is formed in mesophyll cells and is transported to the bundle sheath cells. In the bundle sheath cells, the malic acid is decarboxylated to release CO₂ for the Calvin cycle. Pyruvic acid is also produced in mesophyll cells and moves to the bundle sheath cells to regenerate the phosphoenolpyruvate used in the initial fixation step. Finally, malic acid is not transported back to the mesophyll chloroplast; it is carried to the bundle sheath cells for decarboxylation.

Quick Tip

The C4 pathway is a strategy used by plants to increase the efficiency of carbon fixation under conditions of high light and temperature.

68. Which of the following statement is true for X linked recessive inheritance?

- (A) All sons of a normal mother should show the trait
- (B) All sons of an affected mother should show the trait
- (C) Many more females than males should exhibit the trait
- (D) All daughters of a normal mother should show the trait

Choose the correct answer from the options given below:

1. (A) only
2. (B) only
3. (C) only
4. (D) only

Correct Answer: 2. (B) only

Solution: In X-linked recessive inheritance, an affected mother will pass the affected X chromosome to all of her sons, resulting in all sons showing the trait. Sons inherit only one X chromosome from their mother, and males are hemizygous for the X chromosome. Therefore, they will express the trait if they inherit the X chromosome carrying the defective gene.

Quick Tip

For X-linked recessive traits, males are more likely to be affected than females because males only have one X chromosome, whereas females need two copies of the defective gene to express the trait.

69. Match List I with List II

LIST I (Condition)

- (A) Color blindness
- (B) Hemophilia B
- (C) Hemophilia A
- (D) G-6-PD deficiency

LIST II (Characteristics)

- (I) deficiency of clotting factor VIII
- (II) Insensitivity to green and red light
- (III) deficiency of clotting factor IX
- (IV) severe anemic condition

Choose the correct answer from the options given below:

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (II), (B) - (I), (C) - (III), (D) - (IV)
3. (A) - (IV), (B) - (I), (C) - (II), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (II), (D) - (I)

Correct Answer: 2. (A) - (II), (B) - (I), (C) - (III), (D) - (IV)

Solution: - **Color blindness** is associated with *insensitivity to green and red light*. - **Hemophilia B** is caused by *deficiency of clotting factor IX*. - **Hemophilia A** is caused by *deficiency of clotting factor VIII*. - **G-6-PD deficiency** causes a *severe anemic condition*.

Quick Tip

In X-linked conditions like color blindness, the gene causing the condition is located on the X chromosome. Males are more commonly affected because they have only one X chromosome.

70. Non-vascular land plants are called:

- (A) Pteridophytes
- (B) Gymnosperms
- (C) Angiosperms
- (D) Bryophytes

Correct Answer: (D) Bryophytes

Solution: Bryophytes are non-vascular land plants that lack specialized tissues for water and nutrient conduction. They include mosses, liverworts, and hornworts. These plants thrive in moist environments due to their lack of vascular tissues.

Quick Tip

Bryophytes are the simplest land plants and are typically small due to their lack of vascular systems.

71. Taxol medicine used in treatment of cancer is extracted from:

- (A) *Taxus brevifolia*
- (B) *Ephedra* sp.
- (C) *Pinus roxburghii*
- (D) *Catharanthus roseus*

Correct Answer: (A) *Taxus brevifolia*

Solution: Taxol is a chemotherapy drug used in the treatment of cancer, particularly breast and ovarian cancers. It is derived from the bark of the Pacific yew tree, **Taxus brevifolia**. This plant contains paclitaxel, which is the active component in Taxol.

Quick Tip

Taxol works by inhibiting cell division, making it effective against rapidly dividing cancer cells.

72. The leaves used for wrapping tobacco in a 'bidi' are:

- (A) Tea leaves
- (B) Tendu leaves
- (C) Curry leaves
- (D) Basil leaves

Correct Answer: (B) Tendu leaves

Solution: Tendu leaves, derived from the *Diospyros lotus* plant, are commonly used for wrapping tobacco in bidis. These leaves are chosen because of their texture and flexibility, making them ideal for creating the characteristic bidi.

Quick Tip

Tendu leaves are also used in traditional medicine in some cultures and play an important role in local economies.

73. Choose the correct sequence of electron transport during electron transport chain of light reaction:

- (A) Pheophytin
- (B) Plastoquinone
- (C) Cytb6-f complex
- (D) Plastocyanin

Choose the correct answer from the options given below:

1. (A) - (B), (C), (D)
2. (A) - (B), (D), (C)
3. (B), (A), (D), (C)
4. (C), (B), (D), (A)

Correct Answer: 1. (A) - (B), (C), (D)

Solution: In the light reaction of photosynthesis, the electron transport chain begins with Pheophytin, which is the first electron acceptor. The electrons are then transferred to Plastoquinone, followed by Cytb6-f complex, and finally to Plastocyanin, completing the chain of electron transport. This sequence is vital for the formation of NADPH and ATP during photosynthesis.

Quick Tip

Sequence in the electron transport chain during the light reaction to understand the flow of electrons for the production of ATP and NADPH.

74. Match List I with List II

LIST I (Photoperiodism)

(A) Short Day Plants (SDP)

(B) PR

(C) Long Day Plants (LDP)

(D) PFR

LIST II (Explanation)

(I) day light period of 14-16 hours

(II) absorbs light at 730-735nm

(III) dark period of about 14-16 hours

(IV) absorbs light at 660-665nm

Choose the correct answer from the options given below:

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

2. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)

3. (A) - (II), (B) - (III), (C) - (IV), (D) - (I)

4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Correct Answer: 1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

Solution: - Short Day Plants (SDP) typically require a long dark period of 14-16 hours, which is explained by option III. - PR (phytochrome red) absorbs light in the range of 730-735nm, as described by option II. - Long Day Plants (LDP) require a shorter dark period and a longer light period, explained by option I. - PFR (phytochrome far-red) absorbs light at 660-665nm, explained by option IV.

Quick Tip

Phytochromes (PR and PFR) play a significant role in regulating photoperiodism in plants. PR absorbs light in the far-red spectrum, and PFR absorbs light in the red spectrum.

75. Following are the steps involved in processing of green tea:

(A) Fermentation and drying

(B) Twisting and rolling of leaves to facilitate break up

(C) Initial removal of moisture content

(D) Crushing, Tearing and Curling by CTC method

Choose the correct answer from the options given below:

1. (A) - (B), (C), (D)

2. (A) - (B), (D), (C)

3. (C), (B), (D), (A)

4. (B), (A), (D), (C)

Correct Answer: 2. (A) - (B), (D), (C)

Solution: In the processing of green tea, the first step involves the initial removal of moisture content (C). Then, the leaves are twisted and rolled (B) to facilitate break-up. After that,

the leaves go through the CTC (Crushing, Tearing, and Curling) method (D), followed by fermentation and drying (A) to preserve the flavor and quality of the tea.

Quick Tip

The CTC method plays an important role in determining the texture and flavor of processed green tea.
