Test Booklet No. _____

**This booklet consists of 100 questions and __ printed pages.**

**RGUCET/2025/23**

**Series** A

# RGUCET 2025
## Common Entrance Test, 2025
## MASTER OF SCIENCE IN BOTANY

**Full Marks: 100** **Time: 2 Hours**

Roll No. | | | | | | | | |

Day and Date of Examination: _____

Signature of Invigilator(s) _____

Signature of Candidate _____

*General Instructions:*

***PLEASE READ ALL THE INSTRUCTIONS CAREFULLY BEFORE MAKING ANY ENTRY.***

1. DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.
2. Candidate must write his/her Roll Number on the space provided.
3. This Test Booklet contains 100 Multiple Choice Questions (MCQs) from the concerned subject. Each question carries 1 mark. There shall be negative marking of 0.25 against each wrong attempt.
4. Please check the Test Booklet to verify that the total pages and total number of questions contained in the test booklet are the same as those printed on the top of the first page. Also check whether the questions are in sequential order or not.
5. Candidates are not permitted to enter into the examination hall after the commencement of the entrance test or leave the examination hall before completion of Examination.
6. Making any identification mark in the OMR Answer Sheet or writing Roll Number anywhere other than the specified places will lead to disqualification of the candidate.
7. Candidates shall maintain silence inside and outside the examination hall. If candidates are found violating the instructions mentioned herein or announced in the examination hall, they will be summarily disqualified from the entrance test.
8. In case of any dispute, the decision of the Entrance Test Committee shall be final and binding.
9. The OMR Answer Sheet consists of two copies, the Original copy and the Student's copy

<table>
<tr><td>1</td><td colspan="4">Which of the following best expresses the meaning of "Complement"?</td><td></td></tr>
<tr><td></td><td>a) Praise</td><td>b) Companion</td><td>c) Tribute</td><td>d) Fraction</td><td>b</td></tr>
<tr><td>2</td><td colspan="4">Select the correct option of the given sentence, which is passive in voice.</td><td></td></tr>
<tr><td></td><td>a) A mistake had committed by him</td><td>b) A mistake was committed by him</td><td>c) A mistake had been committed by him</td><td>d) A mistake has been committed by him</td><td>c</td></tr>
<tr><td>3</td><td colspan="4">Select the odd word from the given set of four alternatives.</td><td></td></tr>
<tr><td></td><td>a) Feasible</td><td>b) Workable</td><td>c) Practicable</td><td>d) Fantastic</td><td>d</td></tr>
<tr><td>4</td><td colspan="4">Select the alternative that has the same relationship as depicted in the original pair of words.<br><br>TRAINING : HEREDITY</td><td></td></tr>
<tr><td></td><td>a)Unnatural : Usual</td><td>b) Ornithologist : Birds</td><td>c) Habits : Instinct</td><td>d) Astute : Ingenious</td><td>c</td></tr>
<tr><td>5</td><td colspan="4">Fill in the blank: He is looking for a job, _____ times are tough.</td><td></td></tr>
<tr><td></td><td>a) and</td><td>b) but</td><td>c) so</td><td>d) in</td><td>b</td></tr>
<tr><td>6</td><td colspan="4">Fill in the blank: May they never have to wake up one day, as thousands of Enron employees did, to find that the lines that _____ art and life have vanished overnight.</td><td></td></tr>
<tr><td></td><td>a) draw</td><td>b) sketch</td><td>c) cartoon</td><td>d) demarcate</td><td>d</td></tr>
<tr><td>7</td><td colspan="4">Choose the correct option:<br>A: Assertion: A verb is necessary in every complete sentence.<br>B: Justification: Verbs are used only to describe nouns.</td><td></td></tr>
<tr><td></td><td>a) Both A and B are true, and J is the correct explanation of A.</td><td>b) Both A and B are true, but B is not the correct explanation of A.</td><td>c) A is true, but B is false.</td><td>d) A is false, but B is true.</td><td>c</td></tr>
<tr><td>8</td><td colspan="4">Match the words in Column A with their synonyms in Column B:<br><br><table><tr><th>Column A</th><th>Column B</th></tr><tr><td>A Begin</td><td>i. Tiny</td></tr><tr><td>B Happy</td><td>ii Silent</td></tr><tr><td>C Small</td><td>iii Start</td></tr><tr><td>D Quiet</td><td>iv Joyful</td></tr></table></td><td></td></tr>
<tr><td></td><td>a) A–3, B–4, C–1, D–2</td><td>b) A–2, B–3, C–4, D–1</td><td>c) A–4, B–1, C–2, D–3</td><td>d) A–1, B–2, C–3, D–4</td><td>a</td></tr>
<tr><td>9</td><td colspan="4">Who won the 2024 Nobel Prize in Physiology or Medicine?</td><td></td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | a) Svante Pääbo | b) Victor Ambros and Gary Ruvkun | c) Emmanuelle Charpentier | d) Jennifer Doudna | (b) |
| 10 | Which gene-editing tool is being used in recent human trials to treat genetic disorders like sickle cell anemia? | | | | |
| | a) RNAi | b) CRISPR-Cas9 | c) ZFNs | d) TALENs | (b) |
| 11 | The Indian government is promoting the cultivation of medicinal plants under which national mission? | | | | |
| | a) Herbal Health Scheme | b) Swasthya Bharat Abhiyan | c) National AYUSH Mission | d) National medicinal plants Mission | (c) |
| 12 | Which of the following items from Arunachal Pradesh received a Geographical Indication (GI) tag in 2024? | | | | |
| | a) Adi Kekir ginger | b) Apatani rice | c) Monpa handicrafts | d) Nyishi textiles | (a) |
| 13 | What was the primary focus of the 'Green Credit Programme' launched by the Indian government in 2024, with significant implications for Arunachal Pradesh? | | | | |
| | a) Wildlife conservation | b) Organic farming | c) Renewable energy adoption | d) Afforestation and biodiversity enhancement | (d) |
| 14 | What is the key objective of the 'Climate-Resilient Agriculture Project' in Arunachal Pradesh? | | | | |
| | a) To increase rice production | b) To introduce drought-resistant crop varieties | c) To promote organic farming | d) To reduce pesticide use | (b) |
| 15 | What will be the distance from a point on the ground to the base of a tower, if the angle of elevation of the top of the tower from that point is 30∘30^\circ30∘ and the height of the tower is 50 meters? | | | | |
| | a) A) 50 m | b) 43.3 m | c) 86.6 m | d) 25 m | (c) |
| 16 | **What is the sum of the interior angles of a decagon?** | | | | |
| | a) 1260° | b) 1440° | c) 1620° | d) 1800° | (b) |
| 17 | **What is the solution to the quadratic equation $x^2 - 5x + 6 = 0$?**<br>A) x = **- 3**<br>B) x = **- 2**<br>C) **x = 3**<br>D) **x = 2** | | | | |
| | a) Both A & B | b) Both B & C | c) Both A & C | d) Both C & D | (d) |
| 18 | What is the correct relationship between the assertion and justification below?<br>**Assertion (A):** The sum of the first 100 natural numbers is 5050.<br>**Justification (B):** The formula for the sum of the first "n" natural numbers is n(n+1)/2. | | | | |
| | a) Both A and B are true, and B is the correct explanation of A. | b) Both A and B are true, but B is not the correct | c) A is true, but B is false. | d) A is false, but B is true. | (a) |

<table>
<tr><td></td><td></td><td>explanation of A.</td><td></td><td></td><td></td></tr>
<tr><td>19</td><td colspan="4">Match the statements in List I with the most logically sound implications in List II.
<table>
<tr><th>List I (Statements)</th><th>List II (Implications)</th></tr>
<tr><td>A. If the alarm doesn't ring, and I oversleep, I miss the bus.</td><td>i. Success of the project ensures the manager keeps the job.</td></tr>
<tr><td>B. All tablets are devices. Some devices are not tablets.</td><td>ii. Not all devices are tablets.</td></tr>
<tr><td>C. Either the project succeeds or the manager is replaced.</td><td>iii. A square and a circle cannot be the same shape, but can share properties.</td></tr>
<tr><td>D. No square is a circle, but every square has a center.</td><td>iv. If I catch the bus, then either I didn't oversleep or the alarm rang.</td></tr>
</table></td><td></td></tr>
<tr><td></td><td>a) A–4, B–2, C–1, D–3</td><td>b) A–1, B–3, C–4, D–2</td><td>c) A–4, B–2, C–3, D–1</td><td>d) A–2, B–4, C–1, D–3</td><td>(a)</td></tr>
<tr><td>20</td><td colspan="4">Two classes, A and B, had the same mean score in a mathematics test.The variance of scores in Class A was 225, and in Class B, it was 100.<br><br>Assertion (A): The scores in Class A were more dispersed than those in Class B.<br>Justification (B): A dataset with a higher standard deviation has values that deviate more from the mean.</td><td>Answer option (a,b,c or d)</td></tr>
<tr><td></td><td>a) Both A and B are true, but B is not the correct explanation of A.</td><td>b) A is true, but B is false.</td><td>c) A is false, but B is true.</td><td>d) Both A and B are true, and B is the correct explanation of A.</td><td>(d)</td></tr>
<tr><td>21</td><td colspan="4">In nature, the most abundant group of microbes is</td><td></td></tr>
<tr><td></td><td>a)Bacteria</td><td>b)Fungi</td><td>c) Viruses</td><td>d) Actinomycetes</td><td>(a)</td></tr>
<tr><td>22</td><td colspan="4">Among all microbial groups, the most advanced group is</td><td></td></tr>
<tr><td></td><td>a) Eubacteria</td><td>b) Cyanobacteria</td><td>c) Actinomycetes</td><td>d) Archaebacteria</td><td>(c)</td></tr>
<tr><td>23</td><td colspan="4">Among microbial groups, Actinomycetes are special group of microbes fundamentally having characteristics of _____ with important secondary metabolites</td><td>d)</td></tr>
<tr><td></td><td>a) Fungi like bacteria</td><td>b) Bacteria like fungi</td><td>c) Partly fungi partly bacteria</td><td>d) Soil bacteria having fungi like structures</td><td>(d)</td></tr>
<tr><td>24</td><td colspan="4">In typical bacterial cells,
<table>
<tr><td>A The total number of nuclear chromosome is</td><td>i Encodes all proteins</td></tr>
<tr><td>B The presence of extranuclear DNA is</td><td>ii One ds DNA molecule</td></tr>
<tr><td>C The total number of nuclear chromosome is</td><td>iii Two ds DNA molecules</td></tr>
<tr><td>D Plasmid DNA</td><td>iv Shown by all type of cells</td></tr>
</table></td><td></td></tr>
<tr><td></td><td>a) A & iii</td><td>b) B & iv</td><td>c) C & ii</td><td>d) D & i</td><td>(c)</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| 25 | During bacterial growth and multiplication in a closed medium, the rate of generated cells becomes equal to the rate of dead cells during the growth period of | | | | |
| | a) Lag phase | b) Log phase | c) Stationery phase | d) Decline phase | (c) |
| 26 | Among microbes, antimicrobial compounds known as antibiotics are effective against | | | | |
| | a)Bacteria and Fungi | b) Bacteria, Fungi and Viruses | c) Bacteria and Viruses | d) Bacteria | (d) |
| 27 | The smallest among the following group of microorganisms is | | | | |
| | a) Cyanobacteria | b) Archaebacteria | c) Eubacteria | d) Mycoplasma | (d) |
| 28 | The most primitive among the following group of microorganisms is | | | | |
| | a) Cyanobacteria | b) Eubacteria | c) Archaebacteria | d) Actinomycetes | (c) |
| 29 | Among different groups of microbes in nature, endospore formation are the characteristic features shown mostly by | | | | |
| | a) Archaebacteria | b) Actinobacteria | c) Gram +ve bacteria | d) Gram -ve bacteria | (c) |
| 30 | The term 'algal bloom' is a phenomenon caused by the microbial members belonging to: | | | | |
| | a) Cyanophyceae | b) Chlorophyceae | c) Phyaeophyceae | d) Rodophyceae | (a) |
| 31 | Assertion: Viruses are unique type of microbes exhibiting characters different from all other group of microbes.<br>Justification: All Viruses are obligate parasites because they lack _____<br>Which of the following justification component will make the assertion true? | | | | |
| | a) A True Nucleus | b) Their own enzymes | c) Their own Nucleic acid | d) Their own metabolic machinery | (d) |
| 32 | In bacteria, the presence of basal body in flagella helps the cell function in its medium to | | | | |
| | a) Rotate and propel | b) Tactic movement | c) Tinsel movement | d) Gliding movement | (a) |
| 33 | Complete the statement:<br>Vaccines are immuno-modulating biological preparations by the resultant mechanism of: Vaccines are prepared from microbial _____ | | | | |
| | a) antigens of disease caused by virus | b) antigens of disease caused by viruses and bacteria | c) antibodies of disease caused by virus | d) antibodies of disease caused by bacteria | (b) |
| 34 | In bacteria, the actual event of genetic material transfer from a donor cell to a recipient cell via transduction occurs during | | | | |
| | a) Lytic phase | b) Lysogenic phase | c) Virulent phase | d) Prophage | ( b) |

| | | | | | |
|---|---|---|---|---|---|
| 35 | Mycorrhizae are special group of beneficial microbial organisms that are fundamentally | | | | a) |
| | a) Bacteria | b) Fungi | c) Actinomycetes | d) Archaebacteria | (b) |
| 36 | The genome of *Escherichia coli* is primarily organized in which shape? | | | | |
| | a) Linear | b) Circular | c) Double-helix | d) Irregular | b |
| 37 | What structure is formed when homologous chromosomes pair during meiosis? | | | | |
| | a) Centromere | b) Chromatid | c) Bivalent | d) Tetrad | c |
| 38 | What is a linkage group? | | | | |
| | a) A group of homologous chromosomes | b) A group of traits inherited independently | c) A group of genes located on the same chromosome | d)A group of chromosomes in meiosis | c |
| 39 | What do chromosome puffs in polytene chromosomes indicate? | | | | |
| | a) DNA replication | b) Sites of high transcription activity | c) Mutation sites | d) Centromere regions | b |
| 40 | What is the significance of recombination frequency between two genes? | | | | |
| | a) It determines the dominance of a gene | b) It shows the time of gene expression | c) It indicates the physical distance between genes | d) It identifies gene mutations | c |
| 41 | Which structure helps compact DNA by twisting it beyond the double helix? | | | | |
| | a) DNA looping | b) Supercoiling | c) Nucleosome formation | d) DNA replication | b |
| 42 | What is true about gene arrangement on chromosomes? | | | | |
| | a) They are arranged randomly | b) Arranged in circular loops | c) In single linear order like | d) Found only at centromeres | c |

| | | | | | |
|---|---|---|---|---|---|
| | | | beads on a string | | |
| 43 | Type Questions here for assertion and justification<br><br>A: Assertion: The centromere is essential for the equal segregation of chromosomes during cell division.<br><br>B: Justification: Centromeres serve as the site of kinetochore formation, which attaches to spindle fibers. | | | | |
| | a) Both A and B are true, and B is the correct explanation of A. | b) Both A and B are true, but B is not the correct explanation of A. | c) A is true, but B is false. | d) A is false, but B is true. | a |
| 44 | What is the function of histone H1 in the nucleosome structure? | | | | |
| | a) To bind to linker DNA and stabilize the nucleosome structure | b) To assist in DNA replication | c) To unwind the DNA for transcription | d) To inhibit gene expression | a |
| 45 | Which protein is involved in halting the expression of genes in bacteria by binding to AT-rich DNA regions? | | | | |
| | a) FIS | b) HU | c) H-NS | d) IHF | c |
| 46 | Match the items in Column A with the correct descriptions in Column B:<br><br>Column A: A. Function of euchromatin; B. Histone modification in heterochromatin; C. Function of Sir3 and Sir4 proteins; D. Structure of heterochromatin<br>Column B: i. Hypoacetylated histone tails; ii Highly condensed and tightly packed; iii. Active transcription of DNA to mRNA; iv Promote chromatin silencing | | | | |
| | a)A-i, B- ii,C-iii, D-iv | b)A-ii,B-i,C-iii,D-iv | c)A-iii, B-i, C-iv,D- ii | d)A-iv,B-i,C-ii,D-iii | c |
| 47 | A: Assertion: Telomeres protect the ends of linear chromosomes from degradation and fusion.<br><br>B: Justification: Telomeres consist of mRNA and telomerase enzyme protein. | | | | |
| | a) Both A and R are true, and R is the correct explanation of A. | b) Both A and R are true, but R is not the correct | c) A is true, but R is false. | d)A is false, but R is true. | a |

| | | | | | |
|---|---|---|---|---|---|
| | | explanation of A. | | | |
| 48 | Which of the following proteins is involved in relaxing the supercoil of DNA in prokaryotes during replication? | | | | |
| | a) Histones | b) Topoisomerases | c) RNA polymerase | d) Ribosomes | b |
| 49 | What is the function of histone H1 in the nucleosome structure? | | | | |
| | a) To bind to linker DNA and stabilize the nucleosome structure | b) To assist in DNA replication | c) To unwind the DNA for transcription | d) To inhibit gene expression | a |
| 50 | Which of the following proteins is involved in stimulating DNA-related processes, such as inversion and excision? | | | | |
| | a) HU | b) FIS | c) H-NS | d) IHF | b |
| 51 | Which of the following regions of prokaryotic DNA is involved in DNA replication initiation? | | | | |
| | a) oriC | b) ter | c) dif | d) nucleoid | a |
| 52 | In eukaryotic chromatin, the DNA is wrapped around which of the following? | | | | |
| | a) RNA | b) Histone proteins | c) DNA polymerase | d) Ribosomal proteins | b |
| 53 | Which level of protein structure is primarily responsible for the overall 3D shape and biological activity of a protein? | | | | |
| | a) Primary structure | b) Secondary structure | c) Tertiary structure | d) Quaternary structure | (c) |
| 54 | **Which of the following statements regarding DNA are TRUE?**<br>**A.** The B-DNA which is a right-handed helix has major groove that provides more accessibility for protein binding than the minor groove.<br>**B.** DNA polymerase adds nucleotides to the 3′ end of a growing DNA strand using a 5′ to 3′ polymerization direction.<br>**C.** DNA strands are parallel and identical in base sequence.<br>**D.** Z-DNA is a left-handed helical form of DNA observed under certain conditions. | | | | |
| | a) B, C, and D only | b) A and B only | c) C, and D only | d) A, B, and D only | (d) |
| 55 | **Which of the following statements about lipids are TRUE?**<br>**A.** Phospholipids are amphipathic molecules that spontaneously form bilayers in aqueous environments.<br>**B.** Cholesterol increases membrane fluidity at low temperatures and decreases it at high temperatures.<br>**C.** Triacylglycerols are major components of biological membranes and contribute to membrane fluidity.<br>**D.** Eicosanoids are lipid-derived signaling molecules synthesized from arachidonic acid. | | | | |

<table>
<tr><td></td><td>a)A and D only</td><td>b)B, C, and D only</td><td>c)A, B, and D only</td><td>d)All of the above</td><td>(c)</td></tr>
<tr><td>56</td><td colspan="4">Type Questions here for matching pairs:<br><br><table><tr><td>A. Thiamine</td><td>i. Cofactor for transamination reactions</td></tr><tr><td>B. Pyridoxine</td><td>ii. Coenzyme in oxidative decarboxylation reactions</td></tr><tr><td>C. Ascorbic acid</td><td>iii. Required for hydroxylation of proline and lysine</td></tr><tr><td>D. Cobalamin</td><td>iv. Required for methionine synthase and methylmalonyl-CoA mutase</td></tr></table></td><td></td></tr>
<tr><td></td><td>a)A–iii, B–i, C–ii, D–iv</td><td>b)A–i, B–ii, C–iii, D–iv</td><td>c)A–ii, B–i, C–iv, D–iii</td><td>d)A–ii, B–i, C–iii, D–iv</td><td>(d)</td></tr>
<tr><td>57</td><td colspan="4">Which of the following statements about carbohydrates are TRUE?<br>A. Cellulose and glycogen are both composed of glucose units, but differ in the type of glycosidic linkage.<br>B. Humans can digest cellulose due to the presence of enzymes that hydrolyze β-1,4-glycosidic bonds.<br>C. Glycoproteins and glycolipids are important in cell-cell recognition and signaling.<br>D. Starch consists of both amylose (linear) and amylopectin (branched) components.</td><td></td></tr>
<tr><td></td><td>a)A and D only</td><td>b)A, C, and D only</td><td>c)A, B, and C only</td><td>d)All of them</td><td>(b)</td></tr>
<tr><td>58</td><td colspan="4">Which one of the following statements about the TCA cycle is CORRECT?</td><td></td></tr>
<tr><td></td><td>a) Succinate dehydrogenase is a cytoplasmic enzyme that produces NADH.</td><td>b) Citrate synthase catalyzes the decarboxylation of isocitrate to α-ketoglutarate.</td><td>c) The TCA cycle is solely a catabolic pathway for energy production.</td><td>d) α-Ketoglutarate dehydrogenase requires thiamine pyrophosphate (TPP) as a coenzyme.</td><td>(d)</td></tr>
<tr><td>59</td><td colspan="4">Which one of the following statements about energy metabolism is CORRECT?</td><td></td></tr>
<tr><td></td><td>a) A positive ΔG indicates a spontaneous reaction that requires energy input.</td><td>b) The hydrolysis of ATP is an example of an endergonic reaction.</td><td>c) The coupling of exergonic and endergonic reactions enables the cell to drive energy-requiring processes.</td><td>d) The breakdown of glucose through glycolysis generates energy primarily through oxidative phosphorylation.</td><td>(c)</td></tr>
<tr><td>60</td><td colspan="4">Which of the following statements about glycolysis are TRUE?<br>A. The committed step of glycolysis is catalyzed by phosphofructokinase-1 (PFK-1), which is one of the ten enzymes<br>B. Glycolysis occurs in the mitochondrial matrix and is oxygen-dependent.<br>C. In anaerobic conditions, pyruvate is converted to lactate to regenerate $NAD^+$ for continued glycolysis.</td><td></td></tr>
</table>

<table>
<tr><td></td><td colspan="4">D. The net ATP yield from glycolysis of one glucose molecule is 4 ATP molecules.</td><td></td></tr>
<tr><td></td><td>a)A, B, and C only</td><td>b) A and C only</td><td>c)A, C, and D only</td><td>d)All of the above</td><td>(b)</td></tr>
<tr><td>61</td><td colspan="4">Q: Examine the statements below and choose the correct explanation based on your understanding of the ETS.<br>A: (Assertion): Complex IV of the mitochondrial electron transport chain is responsible for the production of water.<br>B: (Justification): Complex IV (cytochrome c oxidase) transfers electrons to molecular oxygen, which combines with protons to form water.</td><td></td></tr>
<tr><td></td><td>a)Both A and B are true, and B is the correct explanation of A</td><td>b)Both A and B are true, but B is not the correct explanation of A</td><td>c)A is true, but B is false</td><td>d)A is false, but B is true</td><td>(a)</td></tr>
<tr><td>62</td><td colspan="4">Match the components (A–D) involved in ATP synthesis with their functions (i–iv):
<table>
<tr><td>Components</td><td>Functions</td></tr>
<tr><td>A. F<sub>0</sub> subunit of ATP synthase</td><td>i. Proton channel embedded in the inner membrane</td></tr>
<tr><td>B. F<sub>1</sub> subunit of ATP synthase</td><td>ii. Catalyzes conversion of ADP + Pi to ATP</td></tr>
<tr><td>C. Proton-motive force</td><td>iii. Drives rotation of ATP synthase</td></tr>
<tr><td>D. Oligomycin</td><td>iv. Inhibits proton flow through F<sub>0</sub></td></tr>
</table></td><td></td></tr>
<tr><td></td><td>a)A–i, B–ii, C–iii, D–iv</td><td>b)A–ii, B–i, C–iv, D–iii</td><td>c)A–iv, B–ii, C–i, D–iii</td><td>d)A–iii, B–iv, C–ii, D–i</td><td>(a)</td></tr>
<tr><td>63</td><td colspan="4">Which of the following statements about Bioenergetics is correct?<br>A). Assertion: The first law of thermodynamics states that energy cannot be created or destroyed only transformed.<br>B). Justification: This law underpins all biological processes, including metabolism, where energy is constantly transformed from one form to another (e.g., chemical energy to mechanical energy).</td><td></td></tr>
<tr><td></td><td>a) A is True, and B is the correct justification.</td><td>b) A is False, and B is the correct explanation.</td><td>c) A is True, and B is incorrect.</td><td>d) A is False, and B is incorrect.</td><td>(a)</td></tr>
<tr><td>64</td><td colspan="4">Which of the following are correct functions of proteins?<br>A. Proteins store genetic information.<br>B. Proteins provide energy during starvation via gluconeogenesis.<br>C. Proteins act as catalysts in biochemical reactions.<br>D. Proteins store oxygen in muscle cells.</td><td></td></tr>
<tr><td></td><td>a)A and C</td><td>b)B and C</td><td>c)B, C, and D</td><td>d) C only</td><td>( b)</td></tr>
</table>

<table>
<tr><td>65</td><td colspan="4">Match the biomolecules in Column A with their primary functions in Column B.
<table>
<tr><td>Column A (Biomolecule)</td><td>Column B (Function)</td></tr>
<tr><td>A) Protein</td><td>i) Storage of genetic information</td></tr>
<tr><td>B) DNA</td><td>ii) Catalyst of biochemical reactions</td></tr>
<tr><td>C) Lipid</td><td>iii) Long-term energy storage</td></tr>
<tr><td>D) Vitamin C</td><td>iv) Antioxidant and collagen synthesis</td></tr>
</table></td><td></td></tr>
<tr><td></td><td>a)A–ii, B–i, C–iii, D–iv</td><td>b)A–i, B–ii, C–iv, D–iii</td><td>c)A–iii, B–i, C–ii, D–iv</td><td>d)A–ii, B–iii, C–i, D–iv</td><td>(a)</td></tr>
<tr><td>66</td><td colspan="4">Which of the following correctly describes the fluid mosaic model of biological membranes?</td><td></td></tr>
<tr><td></td><td>a) Membranes are rigid structures with a stable lipid bilayer and no movement of proteins within the layer</td><td>b) Proteins are evenly distributed across the membrane and form a continuous layer, not allowing lateral movement.</td><td>c) The lipid bilayer is composed of phospholipids, cholesterol, and proteins that are free to move laterally, providing membrane fluidity</td><td>d) Only the lipid components of the membrane are free to move laterally, while proteins are immobile and embedded in fixed positions.</td><td>(c)</td></tr>
<tr><td>67</td><td colspan="4">Which of the following statements about the enzyme fatty acid synthase (FAS) in humans is correct?<br>A) Assertion: Fatty acid synthase is primarily localized in the mitochondrial inner membrane and relies on $FADH_2$ for its reductive steps.<br>B) Justification: Fatty acid synthase is localized in the cytosol and uses NADPH for the reductive steps, not $FADH_2$.</td><td></td></tr>
<tr><td></td><td>a) A) is True, and B is the correct justification.</td><td>b) A) is False, and B is the correct explanation.</td><td>c) A) is True, and B is incorrect.</td><td>d)A) is False, and B is incorrect.</td><td>( b)</td></tr>
<tr><td>68</td><td colspan="4">Which of the following is the primary function of the sodium-potassium pump ($Na^+/K^+$-ATPase) in maintaining cellular homeostasis?</td><td></td></tr>
<tr><td></td><td>a)It pumps sodium ions into the cell and potassium ions out of the cell, utilizing energy from ATP hydrolysis.</td><td>b)It helps in the active transport of glucose across the cell membrane by coupling sodium and potassium ion movement.</td><td>c)It helps maintain the resting membrane potential by moving ions against their concentration gradients, using ATP.</td><td>d)It is involved in the uptake of amino acids into the cell by secondary active transport, coupled with sodium ion gradient.</td><td>(c,)</td></tr>
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|---|---|---|---|---|---|
| 69 | Which is the most appropriate percentage of ethyl alcohol for surface sterilization during in-vitro plant regeneration? | | | | |
| | a) 70% | b) 80% | c) 90% | d) 100% | (a) |
| 70 | During organogenesis, some culture cells undergo developmental error and form anomalous organ-like structures known as | | | | |
| | a) Embryoids | b) Organoids | c)Meristemoids | d) Explants | (b) |
| 71 | Identify the correct hormone to lower the starch content in bud-forming cells for bud initiation- | | | | |
| | a) Gibberellins | b) Cytokinin | c) Auxin | d) Ethylene | (a) |
| 72 | An example of scientific technology used to understand, combat, and potentially manipulate antibiotic-resistant bacteria is- | | | | |
| | a) Superbac | b) Superdrug | c)Superbug | d) Supervir | (c) |
| 73 | Choose the correct true (T) and false (F)statements:<br><br>A. Insulin- First hormone artificially produced<br>B. Auxin -for invitro shoot regeneration<br>C. Caulogenesis- Induction of adventitious roots<br>D. Edible vaccines- Genetically modified edible plants | | | | |
| | a) A&B | b) B&C | c)A&D | d) C&D | (c) |
| 74 | During plant tissue culture specialized cells lose their differentiated characteristics and become an undifferentiated state under aseptic culture due to | | | | |
| | a) Differentiation | b) Dedifferentiation | c) Redifferentiation | d) Organogenesis | (b) |
| 75 | Match the standard temperature for storage of biological materials:<br>A. Solid carbon dioxide — i -196 °C<br>B. Low-temperature deep freezers — ii -80 °C<br>C. Vapor phase nitrogen — iii -79 °C<br>D. Liquid nitrogen — iv -150 °C | | | | |
| | a) i, ii, iii & iv | b) ii, iii, iv & i | c) iii, ii, iv & i | d) iv, i, ii & iii | (c) |
| 76 | A cybrid produced during somatic hybridization is a hybrid cell that contains | | | | |
| | a) The nucleus of one parent and the cytoplasm of one parent | b) The nucleus of one parent and the cytoplasm of both parents | c) The nucleus of both parents and the cytoplasm of both parents | d) The nucleus of both parents and the cytoplasm of one parent | (b) |
| 77 | An enzyme used to cut DNA at specific nucleotide sequences during recombinant DNA technology is- | | | | |
| | a) DNA ligase | b) Restriction endonucleases | c) RNA polymerase | d) DNA polymerase | (b) |
| 78 | In desiccated synthetic seeds, the encapsulating material prevents the growth of microorganisms and is non-toxic to embryos is usually made of- | | | | |
| | a) Alginate | b) Polyoxyethylene | c) Ethyl alcohol | d) Polyester | (b) |

<table>
<tr><td>79</td><td colspan="4">Which of the following statements are FALSE:<br><br>A. Insulin produced by recombinant DNA technology is identical to human insulin.<br>B. Restriction enzymes are used to break DNA at specific sequences.<br>C. Once a gene is inserted into an organism, it always expresses itself<br>D. Cloning and genetic engineering are the same process</td><td></td></tr>
<tr><td></td><td>a) C&D</td><td>b) A&B</td><td>c) B&C</td><td>d)A&D</td><td>(a)</td></tr>
<tr><td>80</td><td colspan="4">Choose the correct permeating cryoprotectants that can penetrate cell membranes and protect cells from damage during freezing and thawing.</td><td></td></tr>
<tr><td></td><td>a) Glycerol& Dimethyl sulfoxide</td><td>b) Ethylene glycol&Polyvinyl pyrrolidone</td><td>c) Propylene glycol & Glycerol</td><td>d) Polyethylene glycol&Polyvinyl pyrrolidone</td><td>(a)</td></tr>
<tr><td>81</td><td colspan="4">ELISA (Enzyme-Linked Immunosorbent Assay) is commonly used for:</td><td></td></tr>
<tr><td></td><td>a) Cloning genes</td><td>b) Detection of HIV infection</td><td>c) Protein synthesis</td><td>d) DNA sequencing</td><td>(b)</td></tr>
<tr><td>82</td><td colspan="4">The chromosome number of the haploid plantlets by androgenesis can be doubled by creating homozygous diploid plants using.</td><td></td></tr>
<tr><td></td><td>a) Cytokinin</td><td>b) Auxin</td><td>c) Colchicine</td><td>d) Activated charcoal</td><td>(c)</td></tr>
<tr><td>83</td><td colspan="4">Match the following:<br><br><table><tr><td>A. DNA ligase</td><td>i. Sealed the sugar-phosphate backbone of DNA fragments after they had been joined.</td></tr><tr><td>B. Restriction endonuclease</td><td>ii. The DNA fragments have sticky ends due to</td></tr><tr><td>C. Methylase</td><td>iii. Not required for DNA cloning</td></tr><tr><td>D. Unpaired bases</td><td>iv. Responsible for restricting the growth of viruses</td></tr></table></td><td></td></tr>
<tr><td></td><td>a) i, ii, iii & iv</td><td>b) i, iii, iv, &ii</td><td>c) i, iii, i & iv</td><td>d) i, iv, iii & ii</td><td>(d)</td></tr>
<tr><td>84</td><td colspan="4">During DNA isolation from a plant cell, why is chilled ethanol preferred?</td><td></td></tr>
<tr><td></td><td>a) To break down the DNA into fragments</td><td>b) To enhance DNA precipitation and prevent enzyme degradation</td><td>c) To diminish DNA precipitation and activate enzyme degradation</td><td>d) To enhance DNA degradation and prevent enzyme catalytic activity</td><td>(b)</td></tr>
<tr><td>85</td><td colspan="4">Which microscope provides a 3D image of the surface of specimens?</td><td>Answer option (a,b,c or d)</td></tr>
<tr><td></td><td>a)Fluorescence microscope</td><td>b)SEM</td><td>c)TEM</td><td>d)Compound microscope</td><td>(b)</td></tr>
<tr><td>86</td><td colspan="4">In gel electrophoresis, DNA fragments migrate towards:</td><td>Answer option (a,b,c or d)</td></tr>
</table>

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<tr><td></td><td>a)They do not move</td><td>b) Both electrodes</td><td>c)Negative electrode</td><td>d)Positive electrode</td><td>(d)</td></tr>
<tr><td>87</td><td colspan="4">A: Assertion - Gel electrophoresis separates DNA based on size.<br>B: Justification- DNA is positively charged and moves toward the negative electrode.</td><td>Answer option (a,b,c or d)</td></tr>
<tr><td></td><td>a) Both A and B are true, and B is the correct explanation of A</td><td>b)Both A and B are true, but B is not the correct explanation of A</td><td>c)A is true, but B is false</td><td>d)Both A and B are false</td><td>(c)</td></tr>
<tr><td>88</td><td colspan="4">Match the Following:<br><br><table><tr><td>A. SDS-PAGE</td><td>i. Cuts thin sections of biological tissues</td></tr><tr><td>B. Chromatography</td><td>ii. Separates proteins by size</td></tr><tr><td>C. Centrifugation</td><td>iii. TLC</td></tr><tr><td>D. Microtome</td><td>iv. Separates components by density</td></tr></table></td><td></td></tr>
<tr><td></td><td>a) A=i, B=ii, C=iii, D=iv,</td><td>b) A=i, B=iii, C=iv, D=ii,</td><td>c) A=ii, B=i, C=iv, D=iii,</td><td>d) A=ii, B=iii, C=iv, D=i</td><td>(d)</td></tr>
<tr><td>89</td><td colspan="4">qPCR is used primarily for:</td><td></td></tr>
<tr><td></td><td>a)Protein separation</td><td>b)RNA transcription</td><td>c)DNA amplification</td><td>d)Protein synthesis</td><td>(c)</td></tr>
<tr><td>90</td><td colspan="4">Which of the following statements are TRUE?<br><br>A. In phase contrast microscopy, an annular diaphragm is used to enhance contrast in transparent specimens<br>B. In Southern blotting, RNA is transferred onto a membrane<br>C. In spectroscopy, absorbance decreases with increasing concentration of the solute<br>D. PCR can be used to amplify nucleotides</td><td></td></tr>
<tr><td></td><td>a) A&D</td><td>b) A&B</td><td>c) B&C</td><td>d) B&D</td><td>(a)</td></tr>
<tr><td>91</td><td colspan="4">Match the Following:<br><br><table><tr><td>Column A</td><td>Column B</td></tr><tr><td>A. Phase-contrast microscopy</td><td>i. Visualizes live cells without staining</td></tr><tr><td>B. Transmission electron microscope</td><td>ii. Uses fluorescent dyes to visualize specific structures or molecules within the specimen</td></tr><tr><td>C. Scanning electron microscope</td><td>iii. Uses electron beams to visualize internal structures of specimens</td></tr><tr><td>D. Fluorescence microscope</td><td>iv. Used for observing the surface features of specimens in 3D</td></tr></table></td><td></td></tr>
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| | | | | | |
|---|---|---|---|---|---|
| | a) A=i, B=ii, C=iii, D=iv | b) A=i, B=iii, C=iv, D=ii | c) A=ii, B=i, C=iv, D=iii | d) A=iv, B=i, C=iii, D=iv | b |
| 92 | In Mass Spectrometry, the mass-to-charge ratio is used to determine | | | | |
| | a) The chemical structure of a compound | b) The molecular weight of a compound | c) The number of protons in a molecule | d) The polarity of the compound | b |
| 93 | Resolution in microscopy refers to | | | | |
| | a)The total magnification of the specimen | b)The amount of light that passes through the specimen | c)The ability to distinguish two points as distinct and separate | d)The color contrast between different parts of the specimen | c |
| 94 | In phase contrast microscopy, the specimen is: | | | | Answer option (a,b,c or d) |
| | a)Stained with a fluorescent dye | b) visualized using annular diaphragm | c)Prepared using a metal coating | d)Labeled with a radioisotope | b |
| 95 | Match the Following:<br><br>Column A: A. Southern blot; B.Western blot; C. Northern blot; D. Eastern blot<br>Column B: i. Detection of proteins; ii Detection of DNA; iii. detect post-translational modifications (PTMs) on proteins; iv. Detection of RNA | | | | Answer option (a,b,c or d) |
| | a) A=ii, B=i, C=iv, D=iii, | b) A=i, B=iii, C=iv, D=ii, | c) A=ii, B=i, C=ii, D=iv, | d) A=iv, B=i, C=iii, D=ii, | a |
| 96 | The higher the agarose concentration, the: | | | | Answer option (a,b,c or d) |
| | a) Lower the clarity of DNA bands | b) Better the separation of small DNA fragments | c) Greater the resolution for large DNA fragments | d) Faster the migration of DNA | b |
| 97 | Which of the following statements are FALSE?<br><br>A. In blotting, transfer may occur through capillary action, vacuum, or electroblotting, not just diffusion.<br>B. In western blotting, transfer occur through **electroblotting**<br>C. Spectrophotometers cannot measure infra-red regions<br>D. Taq polymerase is **essential** for DNA synthesis in PCR | | | | Answer option (a,b,c or d) |
| | a) A&B | b) B&C | c)B&D | d) C&D | (d) |
| 98 | Which technique is used to separate DNA fragments by size? | | | | Answer option (a,b,c or d) |
| | a) Gas Chromatography | b) Agar Chromatography | c) Gel electrophoresis | d) Centrifugation | c |

<table>
<tr><td>99</td><td colspan="4">Match the Following:<br><br><table><tr><td>A. Rate-zonal centrifugation</td><td>i. Separates components by varying centrifugal forces and time.</td></tr><tr><td>B. Differential pelleting</td><td>ii. separate particles based on their size and shape by utilizing a density gradient</td></tr><tr><td>C. Analytical centrifugation</td><td>iii. Provides data about the particle size distribution and sedimentation behaviour in a sample</td></tr><tr><td>D. Isopycnic centrifugation</td><td>iv. Particles reach a position where their density matches that of the surrounding medium.</td></tr></table></td><td>Answer option (a,b,c or d)</td></tr>
<tr><td></td><td>a) A=i, B=ii, C=iv, D=iii</td><td>b) A=i, B=ii, C=iii, D=iv</td><td>c) A=ii, B=i, C=iii, D=iv</td><td>d) A=ii, B=i, C=iv, D=iii</td><td>c</td></tr>
<tr><td>100</td><td colspan="4">The Beer-Lambert law is used in:</td><td>Answer option (a,b,c or d)</td></tr>
<tr><td></td><td>a) Electrophoresis</td><td>b) Microtomy</td><td>c) UV Vis Spectroscopy</td><td>d) Microscopy</td><td>c</td></tr>
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