

Time: 3 Hours**Total Marks: 100****SECTION I**

All questions are compulsory.

(40 marks)

Select the most appropriate answer from the alternatives provided for each of the following

- In higher plants, cytochrome c is typically located in
 - Plasma membrane
 - Chloroplasts
 - Mitochondria
 - Cytoplasm
- Ames test is performed to detect:
 - Mutagen
 - pH
 - Nutrient stress
 - Salinity
- Amino acids responsible for N-linked and O-linked glycosylation of proteins are:
 - Asparagine and Aspartic acid
 - Glutamine and serine
 - Glutamic acid and serine
 - Asparagine and Threonine
- An increase in some phenomenon at a constant rate over a specified time period.
 - Geometric growth
 - Exponential
 - Arithmetic growth
 - Nonlinear
- Which of the following plant hormones is incorrectly paired with its function?
 - Cytokinin - promotes senescence
 - Gibberellin - stimulates seed germination
 - Abscisic acid - promotes seed and bud dormancy
 - Ethylene -promotes fruit ripening
- Which of the following factor is least responsible for genetic drift?
 - Migration
 - Founder effect
 - Bottleneck phenomenon
 - Restriction of resources
- Positive selection of T cells ensures:
 - Self tolerance
 - MHC restriction
 - TCR engagements
 - Activation by co-stimulatory signals

8. The role of urea in PAGE separation of DNA is to :
- Act as anion
 - Act as cation
 - Helps to denature the DNA
 - Provide buffer stability of the gel
9. Which of the following membrane lipid constituent can be considered as the lipid marker of inner mitochondrial membrane?
- Lecithin
 - Cardiolipin
 - Ceramide
 - Sphingo-ceramide
10. Which of the following is a mobile electron carrier in the mitochondrial electron transport system?
- NADH dehydrogenase
 - FADH dehydrogenase
 - Ubiquinone
 - Succinate dehydrogenase
11. A Researcher would like to monitor changes in the level of serum protein for which the antibody is available. Which one of the following method is suited for the purpose?
- Immunofluorescence Microscopy
 - Fluorescence *In Situ* Hybridization
 - Enzyme linked Immunosorbent Assay
 - Fluorescence Activated Cell Sorting
12. In stomach, the mucous which protects the epithelial lining of the stomach, is secreted by:
- Parietal cells
 - Microvilli
 - Goblet cells
 - Acinar cells
13. Bacterial DNA polymerase I lacks which of the following activity?
- 5' → 3' polymerase activity
 - 3' → 5' polymerase activity
 - 5' → 3' exonuclease activity
 - 3' → 5' exonuclease activity
14. A cross between a red eyed male fly and a white eyed female fly produces red eyed female and white eyed male progenies. While a reciprocal cross produces all offspring with red eyes. The trait for eye colour is:
- Sex linked trait
 - Sex influenced trait

- c) Sex linked homogametic male
 - d) Sex linked heterogametic male
15. The nucleolus is chemically composed of
- a) RNA, DNA and protein
 - b) RNA and protein only
 - c) DNA and protein only
 - d) Nucleic acids, proteins and phospholipids
16. Globular proteins when treated with organic solvents get denatured. The main interaction which is affected on treatment with organic solvent is :
- a) Hydrogen bonds
 - b) Covalent bonds
 - c) Hydrophobic interactions
 - d) Ionic interactions
17. Homologous structures are:
- a) Anatomically similar and functioning similarly
 - b) Anatomically similar but performing different functions
 - c) Anatomically different but performing similar functions
 - d) Anatomically different and functioning differently
18. Alkaptonuria is an inherited metabolic disorder caused by
- a) Tyrosinase
 - b) Homogentisic acid
 - c) Phenylalanine hydroxylase
 - d) Tryptophan synthetase
19. Which of the following is translocated in the phloem?
- a) Sucrose
 - b) D-Glucose
 - c) D-mannose
 - d) D-fructose
20. Which of the following is an example of a trisaccharide?
- a) Verbascose
 - b) Stachyose
 - c) Raffinose
 - d) Sucralose
21. DNA repair mechanism is absent in:
- a) Nuclear genome
 - b) Mitochondrial genome
 - c) Chloroplast genome
 - d) Both 2 and 3

22. Allosteric inhibition of an enzyme involves which of the following?
- Binding of an inhibitor to a site other than the substrate binding site
 - Binding of an inhibitor competitively to the substrate binding site
 - Binding of an inhibitor noncompetitively to the substrate binding site
 - Cooperative binding of substrate to an enzyme with four or more subunits
23. Drugs that either stabilize or depolymerize microtubules can be used in cancer chemotherapy. Which of the following is correct concerning such drugs?
- They prevent chromatin condensation.
 - They prevent movement of tumor cells into other tissues.
 - They interfere with mitosis.
 - They interfere with endocytosis
24. Which of the following will result if the level of potassium ions in a solution bathing a nerve cell is raised tenfold while the cell is at its resting state?
- The decrease in the normal K^+ gradient will cause partial depolarization.
 - The amplification of the normal K^+ gradient will cause partial hyperpolarization.
 - The added extracellular K^+ will accelerate Na^+/K^+ pumping and cause partial depolarization.
 - The elevated K^+ will promote Ca^{2+} channel opening and produce partial hyperpolarization.
25. Crossing over between non-sister chromatids along with exchange of material takes place during
- Diplojene
 - Pachytene
 - Zygotene
 - Diakinensis
26. For a double stranded DNA molecule, which one of the following base-ratios will always be equal to 1
- $(A + T) / (G + C)$
 - $(A + G) / (T + C)$
 - C / T
 - G / A
27. Exogenous antigens bind strongly with
- Class I MHC molecules
 - Class II MHC molecules
 - CD 3
 - CD 4
28. The water vapour present in a unit volume of air is called :
- Relative humidity
 - Static humidity
 - Absolute humidity
 - Total humidity

29. Active transport is uniquely characterized by:
- Transport of cholesterol
 - Transport of a molecule into the cell when the concentration of the molecule is higher outside the cell than inside the cell.
 - Transport of a molecular that requires the cell to extend energy to drive a thermodynamically unfavorable process.
 - Transport of a molecular that is a needed metabolite in the cell
 - Transport of a molecular that is a toxic waste product.
30. A human cell containing 22 autosomes and a Y chromosome is
- a sperm
 - an egg
 - a somatic cell of a female
 - a somatic cell of a male
31. Which sequence represents increasing levels of chromosomal organization, from most dispersed to most condensed?
- nucleosomes -30 nm filaments-supercoiled loops – mitotic chromosomes
 - nucleosomes - supercoiled loops – 30 nm filaments- mitotic chromosomes
 - nucleosomes -30 nm filaments– mitotic chromosomes -supercoiled loops
 - mitotic chromosomes -30 nm filaments-supercoiled loops – nucleosomes
32. Which of the following cell junctions is responsible for metabolic coupling?
- Tight junction
 - Gap junction
 - Adherens junction
 - Desmosome
33. What is the probability of drawing an ace from a bunch of playing cards?
- 1/10
 - 1/13
 - 1/52
 - 1/4
34. Which one of the following is not considered as a part of the endomembrane system?
- Vacuole
 - Lysosome
 - Golgi body
 - Peroxisome
35. Hydra shows morphallactic regeneration and involves which one of the following signal transduction pathway in its axis formation?
- Wnt/ β catenin pathway
 - Retinoic acid pathway
 - FGF pathway
 - Delta Notch pathway

36. Which is the enzyme responsible for replication of the genome of AIDS virus
- Ligases
 - Reverse Transcriptase
 - Restriction endonuclease
 - Polymerase
37. Isomers of a substance have the same
- Empirical formula
 - Structural formula
 - Physical Properties
 - Chemical properties.
38. A command file is actually a
- Database
 - Computer memory
 - Computer program
 - Micro substitution.
39. Membrane carrier proteins differ from membrane channel proteins by which of the following characteristics?
- Carrier proteins transport molecules down their electrochemical gradient, while channel proteins transport molecules against their electrochemical gradient.
 - Carrier proteins can mediate active transport, while channel proteins cannot.
 - Carrier proteins do not bind to the material transported, while channel proteins do.
 - Carrier proteins are synthesized on free cytoplasmic ribosomes, while channel proteins are synthesized on ribosomes bound to the endoplasmic reticulum
40. The enzyme reverse transcriptase is useful in the generation of cDNA libraries for which of the following reasons?
- It is sensitive to high temperatures and so can be readily "killed" by heat treatment when the reaction is completed.
 - It does not require a primer to initiate polymerization as do most DNA polymerases.
 - It is insensitive to high temperatures and so can survive the many cycles of heating required to perform the polymerase chain reaction.
 - It is an RNA-dependent DNA polymerase.

SECTION II

Attempt **ANY THREE** of the following

(30 marks)

- What is the Major Histocompatibility Complex? Describe its organization and importance in immune responses
- Give the principle of ELISA test and give its applications.

3. The scores of two batsmen A and B in ten innings during a certain season are :

A	32	28	47	63	71	39	10	60	96	14
B	19	31	48	53	67	90	10	62	40	80

Find (using coefficient of variation) which of the two batsmen, A or B, is more consistent in scoring

4. Draw a neat labeled diagram to show the various parts of the eye.
5. What are the challenges you foresee while developing a drug from a plant known for his medicinal value?

SECTION III

Attempt **ANY TWO** of the following;

(30 marks)

1. Explain kinetics of enzyme catalyzed reactions with respect to the Michaelis Menten kinetics
2. Enumerate various renewable energy resources and add a note on biofuels.
3. List five natural plant growth regulators. Write a note on the physiological functions and agricultural/horticultural applications of any two of them.
4. What are genetically modified organisms? Using a suitable example describe any one GMO and give its importance.