

# QUESTION BANK

ST. XAVIER'S COLLEGE, MAHUADANR

Department of Botany  
Asst. Prof. Dr. Emasushan Minj

SEMESTER I CORE COURSE –C2  
(BIOMOLECULES AND CELL BIOLOGY)

## Multiple Choice Questions:

1. Which biomolecule is distributed more widely in a cell?
  - a. Chloroplast
  - b. RNA**
  - c. DNA
  - d. Spaherosomes
2. Which is a reducing sugar?
  - a. Galactose**
  - b. Gluconic acid
  - c. Sucrose
  - d.  $\beta$ -methyl galactosidase
3. Most abundant RNA in the cell
  - a. r-RNA**
  - b. m-RNA
  - c. t-RNA
  - d. t-RNA threonine
4. Name the simplest amino acid
  - a. Alanine
  - b. Tyrosine
  - c. Asparagine
  - d. Glycine**
5. Mineral associated with cytochrome is
  - a. Mg
  - b. Cu and Ag
  - c. Fe**
  - d. Cu
6. The most common secondary structure of proteins is
  - a.  $\beta$ -pleated sheet
  - b.  $\beta$ -pleated sheet parallel
  - c.  $\beta$ -pleated sheet non-parallel
  - d.  $\alpha$ -helix**

7. The term enzyme was coined by
  - a. Urey Miller
  - b. Pasteur
  - c. Kuhne**
  - d. Buchner
8.  $\beta$ -oxidation occurs in
  - a. Nucleus
  - b. Cytoplasm
  - c. Mitochondria**
  - d. Chloroplast
9. Koshland's theory of enzyme action is known as
  - a. Lock and key theory
  - b. Reduced fit theory
  - c. Induced fit theory**
  - d. Enzyme coenzyme theory
10. Haemoglobin has
  - a. Primary structure
  - b. Secondary structure
  - c. Tertiary structure
  - d. Quaternary structure
11. Which is the most abundant biomolecule on earth?
  - a. Mineral salts
  - b. Proteins
  - c. Lipids
  - d. Carbohydrates
12. In which of the following an anticodon occurs
  - a. t-RNA**
  - b. m-RNA
  - c. r-RNA
  - d. DNA
13. The fastest enzyme is
  - a. DNA gyrase
  - b. Pepsin
  - c. DNA polymerase
  - d. Carbonic unhydrase**
14. Which of the following is a phospholipid?
  - a. Sterol
  - b. Cholesterol
  - c. Lecithin**
  - d. Steroid

15. One strand of DNA has the following sequence of nucleotide 3' ATTCGCTAT 5' so the other strand of DNA has
- 5' TAAGCGATA 3'
  - 3' TAAGCGATA 5'
  - 5' GACGCGATA 3'
  - 3' GACGCGATA 5'
16. With reference to enzymes, which one of the following statements is true?
- Apoenzyme = Holoenzyme + Coenzyme
  - Holoenzyme = Apoenzyme + Coenzyme**
  - Coenzyme = Apoenzyme + Holoenzyme
  - Holoenzyme = Coenzyme - Apoenzyme
17. Feedback inhibition of enzymes is affected by which of the following
- Enzyme
  - Substrate
  - End products**
  - Intermediate and products
18. Example of a typical homopolysaccharide is
- Lignin
  - Suberin
  - Insulin
  - Starch**
19. Which of the following is not a conjugated protein?
- Peptone**
  - Phosphoprotein
  - Lipoprotein
  - Chromoprotein
20. The effectiveness of an enzyme is affected least by
- Temperature
  - Concentration of the substrate
  - Original activation energy of the system**
  - Concentration of the enzyme
21. Which is an organic compound found in most cells?
- Glucose**
  - Water
  - Sodium chloride
  - Oxygen
22. Enzymes that catalyse inter-conversion of optical, geometrical or positional isomers are
- Ligases
  - Lyases
  - Hydrolases

- d. **Isomerases**
23. The “Repeating Unit” of glycogen is
- Fructose
  - Mannose
  - Glucose**
  - Galactose
24. A basic amino acid among the following is
- Glycine
  - Valine
  - Histidine**
  - Leucine
25. Which of the following is non-reducing sugar?
- Glucose
  - Sucrose**
  - Maltose
  - lactose
26. Deficiency of vitamin B, causes the disease
- Convulsions
  - beri beri**
  - Cheilosis
  - Sterility
27. Which one of the following metals is required as cofactor by all enzymes utilizing ATP in phosphate transfer?
- K
  - Ca
  - He
  - Mg**
28. In aqueous solution, an amino acid exist as
- Cation
  - Anion
  - Zwitter ion**
  - Neutral molecule
29. Proteins are found to have two different types of secondary structures viz.  $\alpha$ -helix and  $\beta$ -pleated sheet structure,  $\alpha$ -helix structure of protein is stabilised by :
- Peptide bonds
  - Van der Waals forces
  - Hydrogen bonds**
  - Dipole-dipole interactions
30. Which of the following acids is a vitamin?
- Aspartic acid

- b. **Ascorbic acid**
  - c. Adipic acid
  - d. Saccharic acid
31. Nucleic acids are the polymers of \_\_\_\_\_
- a. Nucleosides
  - b. **Nucleotides**
  - c. Bases
  - d. Sugars
32. Each polypeptide in a protein has aminoacids linked with each other in a specific sequence. This sequence of amino acids is said to be \_\_\_\_\_
- a. Primary structure of proteins.
  - b. Secondary structure of proteins.
  - c. Tertiary structure of proteins.
  - d. Quaternary structure of proteins.
33. The sugar present in milk is
- a. Sucrose
  - b. Maltose
  - c. Glucose
  - d. **Lactose**
34. Hydrolysis of sucrose gives
- a. Glucose only
  - b. **Glucose + fructo**
  - c. Glucose and galactose
  - d. Maltose
35. DNA and RNA differ in
- a. Sugar
  - b. Purines
  - c. Pyrimidines
  - d. **Both (a) and (c)**
36. The vitamin present in oils and fats are
- a. **A and D**
  - b. B and C
  - c. A and B
  - d. A and C
37. Carbohydrates are classified on the basis of their behaviour on hydrolysis and also as reducing or non-reducing sugar. Sucrose is a \_\_\_\_\_
- a. Monosaccharide
  - b. Disaccharide
  - c. **Reducing sugar**
  - d. **Non-reducing sugar**

38. Enzymes are \_\_\_\_\_ proteins. (**Globular**)
39. Cellulose is linear polymer of \_\_\_\_\_. ( **$\beta$ -glucose**)
40. Invert sugar is mixture of glucose and fructose and is leavorotatory. (**True**)
41. Name the linkage connecting monosaccha-ride units in polysaccharides.(**Glycosidic linkage**)
42. What are the products of hydrolysis of maltose? (**2 moles of Glucose**)
43. . Match the vitamins given in Column I with the deficiency disease they cause given in Column II

<u>Column I (Vitamins)</u>	<u>Column II (Diseases)</u>
(a) Vitamin A	(i) Pernicious anaemia
(b) Vitamin B <sub>1</sub>	(ii) Increased blood clotting time
(c) Vitamin B <sub>12</sub>	(iii) Xerophthalmia
(d) Vitamin C	(iv) Rickets
(e) Vitamin D	(v) Muscular weakness
(i) Vitamin E	(vi) Night blindness
(g) Vitamin K	(vii) Beri Beri
	(viii) Bleeding gums
	(ix) Osteomalacia

Answer-

- a. (iii) and (vi)
- b. (vii)
- c. (i)
- d. (viii)
- e. (iv) and (i)
- f. (v)
- g. (ii)

44. Which of the following molecules is a typical fatty acid?

- a. A molecule that has an even number of carbon atoms in a branched chain.
  - b. An amphipathic dicarboxylic acid with unconjugated double bonds.
  - c. **A molecule that has one cis double bond in a linear carbon chain.**
  - d. A polar hydrocarbon with that reacts with NaOH to form a salt.
45. Which of the following is a characteristic of both triacylglycerols and glycerophospholipids?
- a. Both contain carboxyl groups and are amphipathic
  - b. **Both contain fatty acids and are saponifiable.**
  - c. Both contain glycerol and ether bonds.
  - d. Both can be negatively charged at cellular pH.
46. Which is a characteristic of all the fatty acid components in this lipid?
- a. **They all contain an unbranched carbon chain.**
  - b. They all contain unconjugated cis double bonds.
  - c. They all are joined to glycerol through an ester bond.
  - d. They all are hydrophilic because they contain oxygen.
47. \_\_\_\_\_ and \_\_\_\_\_ coined the term “Meiosis”.
- a. Van Burin and Hertwig
  - b. Boveri and Stuka
  - c. Walleye and Hofmeister
  - d. **Farmer and Moore**
48. Chromatids coiling in the meiotic and mitotic division is \_\_\_\_\_
- a. Plectonemic in both
  - b. Paranemic in both
  - c. Paranemic in mitosis and plectonemic in meiosis
  - d. **Plectonemic in mitosis and paranemic in meiosis**
49. **When there is an increase in the condensation of chromatin during the process of cell division –**
- a. Heretochromain increases
  - b. Euchromatin increases
  - c. **Differentiation of euchromatin & heterochromatin decreases**
  - d. Differentiation of euchromatin & heterochromatin increases
50. The condensation of chromosomes is observed in \_\_\_\_\_
- a. **Prophase 1**
  - b. Anaphase 1
  - c. Metaphase 1
  - d. None of the above
51. Nuclear DNA replicates in the \_\_\_\_\_ phase.
- a. G2 phase
  - b. M phase
  - c. **S phase**

- d. None of the above
52. \_\_\_\_\_ is a form of cell division which results in the creation of gametes or sex cells.
- a. Mitosis
  - b. Meiosis**
  - c. Miosis
  - d. None of the above
53. \_\_\_\_ is the number of DNA in the chromosome at the G2 stage of the cell cycle
- a. 1
  - b. 2**
  - c. 3
  - d. 0
54. The stage which serves as a connecting link between meiosis 1 and meiosis 2
- a. Interphase 2
  - b. Interphase 1
  - c. Interkineses**
  - d. None of the above
55. The longest stage in the cell cycle is
- a. Interphase**
  - b. Anaphase
  - c. Metaphase
  - d. None of the above
56. The \_\_\_\_\_ state implies the exit of cells from the cell cycle
- a. S
  - b. G1
  - c. G2
  - d. G0**
57. Synapsis is defined as the pairing of \_\_\_\_\_
- a. Acentric chromosomes
  - b. Non-homologous chromosomes
  - c. Any chromosomes
  - d. Homologous chromosomes**
58. Mitosis can be observed in \_\_\_\_\_
- a. Polyploid individual
  - b. Diploid individual
  - c. Haploid individual**
  - d. Both (1,) (2) and (3)
59. The spindle apparatus is formed during the \_\_\_\_\_ phase of mitosis.
- a. Telophase
  - b. Metaphase**



- c. Prophase
  - d. Anaphase
60. Cyclin is associated with \_\_\_\_\_
- a. Leptospirosis
  - b. Glycolysis
  - c. Cylosis
  - d. Mitosis**
61. If an individual wants to view diakinesis, which of these would be
- a. Hair
  - b. Leaf
  - c. Onion root
  - d. Flower bud**
62. Chromosome structure can be observed best during \_\_\_\_\_
- a. Anaphase
  - b. Metaphase**
  - c. Prophase
  - d. None of the above
63. Blue green Algae are:
- a. Prokaryotes**
  - b. Eukaryotes
  - c. Both a) and b)
  - d. Neither a) nor b)
64. Name the process in which the membrane of a vesicle can fuse with the plasma membrane and extrude its contents to the surrounding medium?
- a. Endocytosis
  - b. Osmosis
  - c. Diffusion
  - d. Exocytosis**
65. The jelly like substance present inside the cell is known as:
- a. Ectoplasm
  - b. Nucleoplasm
  - c. Cytoplasm**
  - d. None of the above
66. Name the process in which the passage of water goes from a region of higher concentration to a region of lower concentration through a semi permeable membrane?
- a. Diffusion
  - b. Osmosis**
  - c. Neither a) nor b)
  - d. Both a) and b)

67. Name the process in which the ingestion of material by the cells is done through the plasma membrane?
- Egestion
  - Diffusion
  - Endocytosis**
  - Osmosis
68. Name an Organelle which serves as a primary packaging area for molecules that will be distributed throughout the cell?
- Mitochondria
  - Golgi apparatus**
  - Vacuole
  - Plastids
69. Extrinsic system of blood clotting is initiated by
- Factor-III**
  - Factor-VIII
  - Factor-II
  - Factor-I
70. Homeostasis means
- Control of internal environment of the body
  - Adaptation with the environment
  - Constant environment of the body**
  - All of the above
71. Enzymes bringing about hydrolysis of esters and peptides are :
- Transferases
  - Lyases
  - Hydrolases**
  - All of the above
72. Dialysis causes
- Separation of colloids from crystalloids**
  - Purification of colloids
  - Precipitation of colloids
  - None of the above
73. Who discovered blood groups
- F. Galton
  - Carl Linnaeus**
  - C. Landsteiner
  - Edward Jenner
74. Aerobic respiration is performed by :
- Glyoxisomes
  - Mitochondria**

- c. Lysosomes
  - d. Chloroplast
75. Bile reduces the surface tension and causes
- a. Emulsification of fat
  - b. Digestion of fat
  - c. Absorption of fat
  - d. **All of the above**
76. A unit membrane is about :
- a. 50-60 Å thick
  - b. 60-75 Å thick
  - c. **75-100 Å thick**
  - d. 100-120 Å thick
77. Coenzyme is :
- a. Always a protein
  - b. Often a metal
  - c. Always an inorganic compound
  - d. **Often a vitamin**
78. Enzyme exist in the cells as-
- a. Solid
  - b. Crystals
  - c. **Colloid**
  - d. None of the above
79. An enzyme brings about :
- a. **Reduction in activation energy**
  - b. Increase in reaction time
  - c. Increase in activation energy
  - d. All the above
80. Most accepted structural model of plasma membrane is
- a. Sandwich model
  - b. Unit membrane model
  - c. **Fluid-mosaic model**
  - d. None of the above
81. Lipid bi layer is
- a. Hydrophilic
  - b. Hydrophobic
  - c. **Hydrophilic and hydrophobic**
  - d. Depends on the surrounding medium
82. Which of the following membrane has the largest amount of proteins
- a. Erythrocyte membrane
  - b. Myelin sheath membrane

- c. **Inner mitochondrial membrane**
  - d. Outer mitochondrial membrane
83. High lipid content is a characteristic of
- a. Erythrocyte membrane
  - b. **Myelin sheath membrane**
  - c. Inner mitochondrial membrane
  - d. Outer mitochondrial membrane
84. The distribution of intrinsic proteins in the cell membrane is
- a. Symmetrical
  - b. **Assymetrical**
  - c. Random
  - d. Uniform
85. In cell membrane, carbohydrates in glycoproteins or glycolipids are oriented
- a. **Towards outside**
  - b. Towards inside
  - c. Towards outside and inside
  - d. Randomly distributed
86. The plasma membrane is impermeable to all molecules except
- a. Glucose
  - b. ATP
  - c. **Urea**
  - d. K<sup>+</sup>
87. Transverse diffusion (flip-flop) is the movement of \_\_\_\_\_
- a. cholesterol molecule
  - b. amino acid
  - c. protein
  - d. **phospholipid**
88. The mobility of integral proteins can be measured by physical state of the \_\_\_\_\_
- a. Amino acids
  - b. External phospholipids
  - c. **Membrane phospholipids**
  - d. Membrane appendages
89. Two cells can be operated in such a way that leads to a common continuous plasma membrane of both.
- a. **True**
  - b. False
90. The erythrocyte has a \_\_\_\_\_ shape.
- a. Spherical
  - b. Convex

- c. Concave
  - d. **Bi-concave**
91. Which of the following genetic diseases is caused by mutations in a membrane protein?
- a. Alzheimer's disease
  - b. Parkinson's disease
  - c. Anemia
  - d. **Hemolytic anemia**
92. The erythrocyte glucose transport is an example of
- a. Simple diffusion
  - b. Active diffusion
  - c. **Facilitated diffusion**
  - d. Ion driven active transport
93. Which of the following transport induces conformational change in protein
- a. Simple diffusion
  - b. Active diffusion
  - c. **Facilitated diffusion**
  - d. Ion driven active transport
94. Clathrin coated pits are associated with
- a. Phagocytosis
  - b. Pinocytosis
  - c. **Receptor mediated endocytosis**
  - d. Exocytosis
95. Enzyme increases the rate of reaction by lowering the activation energy.
- a. **True**
  - b. False
96. What is the nature of an enzyme?
- a. Vitamin
  - b. Lipid
  - c. Carbohydrate
  - d. **Protein**
97. Name the coenzyme of riboflavin (B2)?
- a. NAD or NADP
  - b. **FAD and FMN**
  - c. Coenzyme A
  - d. Thiamine pyrophosphate
98. If enthalpy change for a reaction is zero, then  $\Delta G^\circ$  equals to
- a.  **$-T\Delta S^\circ$**
  - b.  $T\Delta S^\circ$
  - c.  $-\Delta H^\circ$
  - d.  $\ln k_{eq}$

99. What does first law of thermodynamics state?
- Energy can neither be destroyed nor created**
  - Energy cannot be 100 percent efficiently transformed from one type to another
  - All living organisms are composed of cells
  - Input of heat energy increases the rate of movement of atoms and molecules
100. The study of energy relationships and conversions in biological systems is called as
- Biophysics
  - Biotechnology
  - Bioenergetics**
  - Microbiology

### **SHORT QUESTIONS**

1. What do you mean by chemical bonds? Explain its types and their importance.
2. Give brief account on water and its properties?
3. Define lipid and its function?
4. Explain saturated and unsaturated fatty acids?
5. Define Triacylglycerols?
6. What do you mean by phospholipid/ phosphoglycerides?
7. What do you mean by essential fatty acids?
8. What do you mean by denaturation of protein?
9. Explain biological roles of proteins?
10. What do you mean by protein folding?
11. Explain structure and function of nucleotides?
12. What is nitrogenous base?
13. Give short account on types of nitrogenous bases?
14. What are functions of nucleotide?
15. Give brief account on B-DNA?
16. Comparative study on B and Z-DNA?
17. Define RNA as genetic material?

18. Explain law of thermodynamics?
19. What are differences between endergonic and exergonic reaction?
20. What do you mean by couple reaction?
21. What do you mean by redox reaction?
22. Define ATP as energy currency molecule and its role?
23. Define concept of free energy?
24. Define what is holoenzyme?
25. Define what is apoenzyme?
26. What do you mean by cofactors?
27. What do you mean by coenzymes?
28. What do you mean by prosthetic group?
29. What are features of an active site?
30. What is substrate specificity?
31. Define cell with suitable structure?
32. Give an account on endosymbiotic theory?
33. Give an account on prokaryotic cell?
34. Give an account on eukaryotic cell?
35. Give comparative study on prokaryotic and eukaryotic cells?
36. Give brief account on plant cell wall and its function?
37. Define fluid mosaic model?
38. Give an account on chemical composition of plasma membrane?
39. Define membrane transport in Plasma membrane and types?
40. What do you mean by passive transport?
41. What do you mean by endocytosis?
42. What do you mean by exocytosis?

43. What are the types of transport in plasma membrane?
44. Give comparative study on endocytosis and exocytosis?
45. What do you mean by nucleus?
46. What do you mean by nuclear pore complex?
47. Give structural organization of nucleus?
48. Define microtubules filament and its role?
49. What do you mean by intermediary filaments?
50. Define what is chloroplast?
51. Give short account on mitochondria?
52. Give short account on peroxisome?
53. Define semi-autonomous nature of mitochondria?
54. Define semi-autonomous nature of chloroplast?
55. Give short note on endomembrane system in eukaryotic cell?
56. Define Endoplasmic reticulum with suitable diagram?
57. Define Golgi apparatus with suitable diagram?
58. Explain protein folding in Endoplasmic reticulum?
59. Give short account on smooth and rough endoplasmic reticulum?
60. What do you mean by Endoplasmic reticulum?
61. What do you mean by Golgi body?
62. What do you mean by Golgi body protein sorting?
63. Explain Golgi body protein export?
64. Give short account on lysosome?
65. Define eukaryotic cell cycle and deal with different phases?
66. What do you mean by cell cycle checkpoints?
67. What do you mean by cell division?



## **ESSAY TYPE QUESTIONS**

1. What is carbohydrate? Discuss what the different types of carbohydrate. Detail study on nomenclature and classification of carbohydrate?
2. Explain major classes of storage and structural lipid?
3. Give detail account on DNA? Discuss types and significant.
4. Give an essay on t-RNA? With suitable structure, properties and significance.
5. Enumerate law of thermodynamics?
6. Explain ATP as energy currency molecule?
7. Enumerate the kinetics of enzyme catalyzed reaction/ Michaelis Menten Equation?
8. What do mean by lock and key hypothesis? Describe Induced Fit Theory.
9. Enumerate the classification of enzyme and their mechanism of action?
10. Give comparative study on prokaryotic and eukaryotic cells? Discuss the endosymbiotic theory.
11. Define what is cell? Elaborate the characteristics, types and origin.
12. Enumerate the characteristic features of prokaryotic and eukaryotic cells?
13. Define Plasma membrane? Discuss an accepted model and significant properties of plasma membrane.
14. Enumerate the membrane transport mechanism of Plasma membrane?
15. Give detail account on endocytosis and exocytosis?
16. Define Plasma membrane? Explain what are the different models proposed.
17. Explain structural organization of nucleus and its function? Discuss Nuclear Pore Complex.
18. What is cytoskeleton? Discuss what are the types of cytoskeleton fibers?
19. Give detail account on semi-autonomous nature of Mitochondria and chloroplast?
20. Define Endoplasmic Reticulum? Give detail account on targeting and insertion of protein?
21. Give detail account on Insertion of protein into Endoplasmic Reticulum membrane?

22. What is Golgi apparatus? Describe structural organization and protein export system?
23. What is eukaryotic cell division? How many types of cell division occur in living organism? Discuss the significance of each type of cell division.
24. Give detail account on mitosis cell division?
25. Give detail account on meiosis cell division?
26. Give detail account on cell cycle and various phases? Explain what are the checkpoints and its regulation?