

**Department: B.Sc. Biotechnology**  
**Class: S.Y. B.Sc.**  
**Semester III**  
**Subject: Cell biology and cytogenetics**  
**Sample Questions**

**Multiple Choice Questions**

1. Myosin VIII and \_\_\_\_\_ are present only in plant cells.
  - a) IX
  - b) X
  - c) XI
  - d) XII
2. Which type of cytoskeletal elements are involved in non-muscle motility?
  - a) microfilaments
  - b) flagella
  - c) intermediate filaments
  - d) microtubules
3. Plus end of microtubule is terminated by \_\_\_\_\_ subunit.
  - a)  $\alpha$  tubulin
  - b)  $\beta$  tubulin
  - c)  $\gamma$  tubulin
  - d)  $\delta$  tubulin
4. Movement of materials in an axon are mediated through \_\_\_\_\_ that serve as cytoskeletal tracks.
  - a) microtubules
  - b) actin filaments
  - c) microfilaments
  - d) intermediate filaments
5. Neurofilaments are the type \_\_\_\_\_ intermediate filaments.
  - a) I
  - b) II
  - c) III
  - d) IV
6. \_\_\_\_\_ is required for microtubule assembly.
  - a) ATP
  - b) GTP
  - c) TTP
  - d) GDP
7. Diameter of microtubule is \_\_\_\_\_.
  - a) 20 nm
  - b) 25 nm
  - c) 30 nm
  - d) 13 nm
8. Each protofilament of microtubule is assembled from dimeric building blocks consisting \_\_\_\_\_ subunits.
  - a)  $\alpha$  tubulin &  $\gamma$  tubulin
  - b)  $\beta$  tubulin &  $\gamma$  tubulin
  - c)  $\gamma$  tubulin &  $\alpha$  tubulin
  - d)  $\alpha$  tubulin &  $\beta$  tubulin
9. How many types of polypeptides are found in intermediate filaments?
  - a) 2
  - b) 5
  - c) 10
  - d) 12

10. Which motor protein superfamily does not move along the microtubules?
  - a) dynein
  - b) kinesin
  - c) myosin
  - d) keratin
11. How many filamentous structures together comprise the cytoskeleton?
  - a) 1
  - b) 2
  - c) 3
  - d) 4
12. Where in a eukaryotic cell, can a microtubule NOT be found?
  - a) Flagella
  - b) Mitotic spindle
  - c) Nucleus
  - d) Cilia
13. The type V intermediate filaments are called \_\_\_\_\_.
  - a) Lamins
  - b) Collagen
  - c) Lignin
  - d) Fibrin
14. All the protofilaments of a microtubule have the same \_\_\_\_\_.
  - a) Polarity
  - b) pH
  - c) Fluorescence
  - d) Torque
15. The core of the cilium is called \_\_\_\_\_.
  - a) Flagellum
  - b) Primary cilium
  - c) Tubulin
  - d) Axoneme
16. Which microtubule-associated motor protein is responsible for the movement of cilia?
  - a) kinesin
  - b) niacin
  - c) myosin
  - d) dynein
17. Aggregation of neurofilaments leads to \_\_\_\_\_.
  - a) vision disorders
  - b) skin disorders
  - c) lung disorders
  - d) neurodegenerative disorders
18. Muscle cells are formed from the fusion of \_\_\_\_\_.
  - a) myoblasts
  - b) fibroblasts
  - c) mast cells
  - d) neurons
19. Cilia and flagella are \_\_\_\_\_.
  - a) Intermediate filaments
  - b) Microfilaments
  - c) Microtubules
  - d) Phospholipids
20. Which of the following are found only in animal cells?
  - a) Intermediate filaments
  - b) Microtubules
  - c) Nucleus
  - d) Microfilaments

21. Cytoskeletal filaments are polymers of \_\_\_\_\_.
- Proteins
  - ribonucleic acids
  - deoxyribonucleic acids
  - carbohydrates
22. Cytoskeleton does not consist \_\_\_\_\_.
- Microfilaments
  - Microtubule
  - Intermediate filament
  - Endoplasmic reticulum
23. The head of the myosin binds the \_\_\_\_\_.
- ATP
  - ADP
  - Actin filament
  - Neurofilament
24. Cross-linking proteins villin and fimbrin are found in \_\_\_\_\_.
- neurons
  - myoblasts
  - microvilli
  - flagella
25. Muscle cells are \_\_\_\_\_.
- Cylindrical shaped
  - Round shape
  - Extreme fragile
  - Irregularly shaped
26. \_\_\_\_\_ is required for microfilament assembly.
- ATP
  - GTP
  - TTP
  - GDP
27. The protein responsible for muscular dystrophy, dystrophin, is a \_\_\_\_\_ protein.
- cross-linking
  - membrane-binding
  - tethering
  - severing
28. \_\_\_\_\_ of the sarcomere remains unaffected during the muscle contraction.
- H zone
  - A band
  - I band
  - H band
29. Each tropomyosin is associated with \_\_\_\_\_ subunits of actin subunits.
- 2
  - 3
  - 7
  - 9
30. The phenomenon of “treadmilling” is observed in microfilaments under the \_\_\_\_\_ state.
- steady
  - isotonic
  - hypertonic
  - thermodynamically favourable
31. Which type of myosin move toward the minus-end of a microfilament?
- myosin I
  - myosin II
  - myosin IV
  - myosin VI

32. The microtubule-binding activity of MAPs is controlled by \_\_\_\_\_.
- phosphorylation
  - oxidation
  - reduction
  - hydrolysis
33. Vimentin is a \_\_\_\_\_.
- intermediate filament
  - inherited disorder
  - neurodegenerative disease
  - microfilament
34. Which of the following prevents sarcomeres from pulling apart during muscle stretching?
- titin
  - vimentin
  - myosin
  - actin
35. Which of the following is energy independent?
- Active transport
  - Primary active transport
  - Secondary active transport
  - Passive transport
36. Which of the following is used by cells to interact with other cells?
- Cell junctions
  - Cell adhesions
  - Cell detectors
  - Cell tubules
37. Structure of DNA and protein found in the nucleus of eukaryotic cells \_\_\_\_\_.
- Nucleic acid
  - Nucleosome
  - Chromatin
  - Tetraplex
38. Which out of the following is not mediated transport?
- Facilitated diffusion
  - Primary active transport
  - Secondary active transport
  - Simple diffusion
39. Which genetic disorder is associated with accumulation of proteoglycans?
- Polysaccharidoses
  - Mucomonosaccharidoses
  - Mucopolysaccharidoses
  - Monosaccharidoses
40. Erythrocyte glucose transporter is an example of \_\_\_\_\_
- Ion driven active transport
  - Facilitated diffusion
  - Active transport
  - Simple diffusion
41. In which of the following means of transport a cell expels large molecules out of it?
- Phagocytosis
  - Exocytosis
  - Endocytosis
  - Diffusion
42. In the plasma membrane, Glycolipids are usually situated in \_\_\_\_\_.
- cannot be predicted, it varies according to the cell types
  - inner leaflet of the plasma membrane
  - the outer leaflet of the plasma membrane
  - evenly distributed in both outer and inner leaves of plasma membrane

43. Microvilli are composed of \_\_\_\_\_.
- red blood cells
  - myosin
  - white blood cells
  - actin
44. Which type of movement occurs when Na/K pump is used?
- Na ions move out of the cell and K<sup>+</sup> move in
  - K<sup>+</sup> ion move out of cell and Na ion move in
  - Na and K<sup>+</sup> ions move inside the cell
  - Na and K<sup>+</sup> move out of the cell
45. What is the source of energy in active transport?
- from sunlight
  - hydrolysis of ATP
  - energy stored in ionic concentration gradient
  - water
46. Gases such as oxygen and carbon dioxide cross the cell membrane by \_\_\_\_\_.
- Passive diffusion
  - Primary active transport
  - specific gas transport proteins
  - Secondary active transport
47. Na<sup>+</sup> glucose transporter is an example of \_\_\_\_\_.
- Symport
  - Antiport
  - Facilitated diffusion
  - ATP driven active transport
48. What is the gap junction in nerves called?
- Chemical synapse
  - Electrical synapse
  - Post synapse
  - Pre synapse
49. Which of the following transports only one kind of substrate?
- Uniport carriers
  - Symport carriers
  - Antiport carriers
  - Membrane proteins
50. What is the function of tight junctions in epithelial cells?
- Separation of fluids
  - Biocatalyst to enzymes
  - Protection
  - Support and structure
51. What ions is required for the function of cadherins?
- Ca<sup>2+</sup>
  - Na<sup>+</sup>
  - K<sup>+</sup>
  - H<sup>+</sup>
52. In what case, the transporters are known as antiporters?
- when 2 substances move in same direction
  - when 2 move in same direction and 1 in opposite
  - when 3 move in same direction
  - when 2 substances move in opposite direction
53. Semipermeable membrane allows \_\_\_\_\_.
- solute to pass
  - solution to pass
  - proteins to pass
  - solvent to pass

54. What is the key role of fibroblasts?
- Protecting the cell
  - Producing extracellular matrix
  - Producing lytic enzymes
  - Providing structure
55. Which component is present in the cell wall of fungi?
- Cellulose
  - Hemicellulose
  - Chitin
  - Pectin
56. Which of the following protein is present in large amount in tight junctions?
- Albumin
  - Globulin
  - Claudin
  - Elastin
57. Aquaporin's are protein tunnels that allow which important molecule to travel across a cell membrane?
- Water
  - Oxygen
  - Calcium
  - Carbon dioxide
58. Which of the following proteins does not function in cell-cell interaction?
- Integrin
  - Cadherin
  - Selectin
  - Cytochrome c
59. Which of the following induces conformational change in protein?
- Uniport
  - Symport
  - Antiport
  - Facilitated diffusion
60. Glycocalyx is associated with \_\_\_\_\_.
- Cell wall
  - Plasma membrane
  - Nucleus
  - Ribosomes
61. The main role of carbohydrate in cell membrane is \_\_\_\_\_.
- Adhesion
  - Recognition
  - Locomotion
  - Reception
62. Which of the following proteins forms channels that permit electrical communication between cells across gap junctions?
- Tubulin
  - Connexin
  - Cadherin
  - Catenin
63. Which of the following is odd one out?
- Elastin
  - Collagen
  - Spectrins
  - Proteoglycans
64. \_\_\_\_\_ is a characteristic feature of epithelial cells of the intestine.
- Glottis
  - Pilus
  - Bolus

- d) Microvilli
65. Integrin membrane proteins found only in \_\_\_\_\_.
- a) Plants
  - b) Fungi
  - c) Animals
  - d) Viruses
66. In the plasma membrane, lipid molecules are arranged in \_\_\_\_\_.
- a) head parallel
  - b) alternate
  - c) scattered
  - d) series
67. Which of the following proteins are abundant in the extracellular matrix?
- a) Collagen
  - b) Actin
  - c) Myosin
  - d) Tubulin
68. \_\_\_\_\_ inversions reduce crossing over in \_\_\_\_\_
- a) Paracentric, Heterozygous
  - b) Pericentric, Heterozygous
  - c) Paracentric, homozygous
  - d) Pericentric homozygous
69. Which of the following is not true about inversion?
- a) Inverted chromosomes are generally viable
  - b) Inversion can cause chromosome breakage
  - c) Two DNA strands with an inverted segment will not pair
  - d) Inversion including centromere is known as paracentric
70. A Y linked gene \_\_\_\_\_.
- a) Is expressed only when homozygous
  - b) Is present near the telomere of long arm in human
  - c) Is carried by mother
  - d) Expressed only in men
71. Which human chromosomes are involved in Down's syndrome?
- a) 6
  - b) 21
  - c) 8
  - d) X and Y
72. Which of the following pairing will not occur during meiosis of tetraploid?
- a) Two bivalent
  - b) One bivalent and two univalent
  - c) Trivalent and univalent
  - d) Quadrivalent
73. Aneuploidy is usually deleterious as \_\_\_\_\_.
- a) Chromosomal pairing is hampered
  - b) Gene balance is disrupted
  - c) Size of individual may vary
  - d) Chromosomal disintegration is increased
74. A non-disjunction in the 1<sup>st</sup> phase of meiosis will lead to \_\_\_\_\_.
- a) Monosomy
  - b) Nullisomy
  - c) Disomy
  - d) Trisomy
75. Chromosome \_\_\_\_\_ trisomy leads to Edward's syndrome.
- a) 12
  - b) 13

- c) 18  
d) 21
76. What is pedigree analysis?  
a) Record of inheritance pattern  
b) Linkage map  
c) Quantitative genetic  
d) Polygene analysis
77. Colchicine is used to cause \_\_\_\_\_.  
a) Mitotic non-disjunction  
b) Meiotic non-disjunction  
c) Mitotic disjunction  
d) Meiotic disjunction
78. The appearance of a recessive phenotype due to deletion of dominant gene is called \_\_\_\_\_.  
a) Hemi-dominance  
b) Pseudo dominance  
c) Imperfect dominance  
d) Co-dominance
79. Mammals have \_\_\_\_\_ type of sex determination.  
a) XX/ XY  
b) XX/ XO  
c) ZZ/ ZY  
d) Genic
80. Euploidy is a chromosomal variation in \_\_\_\_\_.  
a) Size  
b) Position of genes  
c) Number  
d) Structure
81. Which of the following is not the character of the person suffering from Turner's syndrome?  
a) Short stature  
b) Poor breast development  
c) Well developed ovaries  
d) No menstruation
82. If an organism has 14 chromosomes, the number of chromosomes generated by nullisomy will be \_\_\_\_\_.  
a) 15  
b) 7  
c) 13  
d) 12
83. Double cross over involving \_\_\_\_\_ strands result in 100% recombinant strands.  
a) 1  
b) 2  
c) 3  
d) 4
84. Turner's syndrome is a result of \_\_\_\_\_.  
a) Nullisomy  
b) Monosomy  
c) Trisomy  
d) Polysomy
85. In which year, Down's syndrome was described?  
a) 1866  
b) 1986  
c) 1898  
d) 1968
86. Which of the following is an example of trisomy \_\_\_\_\_.  
a) Endosperm

- b) Klinefelter
  - c) Turner
  - d) Xeroderma
87. *Drosophila* follows which of these modes of sex determination?
- a) XX /XY
  - b) XX/ XO
  - c) ZZ/ ZW
  - d) MM/NN
88. Genes of sex linked characters are located on the \_\_\_\_\_.
- a) Chromosome 18
  - b) Chromosome 13
  - c) Chromosome 14
  - d) Sex chromosome
89. In ZZ/ZW system which of the following is true?
- a) All organisms have ZZ chromosome
  - b) The chromosomes are shaped like Z
  - c) Females have ZW constitution
  - d) Male is heterozygous
90. Which of the following is X-linked recessive disorder?
- a) Color blindness
  - b) Sickle cell anemia
  - c) PTC tasting
  - d) Albinism
91. Patau syndrome is a result of which of the following?
- a) Non-disjunction of sex chromosome in female
  - b) Non- disjunction of sex chromosome in male
  - c) Non-disjunction of chromosome 21
  - d) Non-disjunction of chromosome 13
92. How many sex chromosomes are present in a human being?
- a) 1 pair
  - b) 2 pairs
  - c) 3 pairs
  - d) 4 pairs
93. C-value in genome represents \_\_\_\_\_.
- a) Genetic disorders
  - b) Phenotypic variation
  - c) Amount of DNA present in the genome
  - d) Qualitative traits
94. How many autosomes are present in a human being?
- a) 23 pairs
  - b) 22 pairs
  - c) 21 pairs
  - d) 24 pairs
95. Which of the following is less condensed, less stained portion of chromatin?
- a) Metaphase
  - b) Interphase
  - c) Heterochromatin
  - d) Euchromatin
96. On which of the following chromosomal disorders are based on?
- a) Mutant allele and their defective products
  - b) Imbalance in chromosome number and chromosome arrangement
  - c) Mutant allele and chromosome arrangement
  - d) Mutant allele and imbalance in chromosome number
97. What is the unit of a genetic map?
- a) Centimeter

- b) Nanometer
  - c) Angstrom
  - d) Centimorgan
98. Which of the following designation has given to human female chromosomes?
- a) XX
  - b) XY
  - c) XO
  - d) ZZ
99. Barr bodies are found \_\_\_\_\_.
- a) In the cytoplasm of female
  - b) In the nuclei of female
  - c) In the cytoplasm of male
  - d) In the nuclei of male
100. The tetrad is four spores of \_\_\_\_\_.
- a) Human chromosome
  - b) Stem cells
  - c) Yeast
  - d) Monkey