

1. Fluidity of a phospholipid bilayer depends on:
 1. Chain length of the fatty acid
 2. Glycoprotein content of the lipid bilayer
 3. Degree of unsaturation of fatty acid
 4. Carbohydrate content of the lipid bilayer

A) 1 only B) 1 & 3 only C) 2 only D) 1 & 2 only
2. Membrane carrier proteins differ from membrane channel proteins by:
 - A) Carrier proteins are glycoproteins and channel proteins are lipoproteins
 - B) Channel proteins can mediate active transport, but carrier proteins cannot
 - C) Carrier proteins can mediate active transport, but channel proteins cannot
 - D) Carrier proteins are synthesized by free ribosomes, but channel proteins are synthesized by bound ribosomes
3. The Watson-Crick double helix model describes the structure of:
 - A) A-DNA B) Z-DNA C) B-DNA D) Triplex DNA
4. A widely used compound for the preparation of stable density gradient is:
 - A) Lactose B) Glucose C) Sucrose D) Maltose
5. Hayflick Limit is:
 - A) The number of meiosis occurs during sexual life cycle of all eukaryotes
 - B) The number of mitosis a cell is capable of undergoing in tissue culture before it stops dividing
 - C) The number of mitosis spindles involved in chromosome separation
 - D) The number of kinetochores on each chromosome during metaphase
6. Which of the following statements are correct?
 1. Cri-du-chat syndrome is due to chromosomal change involving deletion
 2. Klinefelter's syndrome has 44+XXY condition
 3. Down's syndrome is due to extra 21st chromosome
 4. Formation of multivalents in meiosis is due to reciprocal translocation

A) 1 & 3 only B) 1, 2 & 3 only C) 2 & 3 only D) 1, 2, 3 & 4
7. Ames test is based on:
 - A) Reversion of mutations in the histidine (his) operon in the genetically altered strains of *Salmonella typhimurium*
 - B) Reversion of mutations in the lactose (lac) operon in the genetically altered strains of *Salmonella typhimurium*
 - C) Reversion of mutations in the tryptophan(trp) operon in the genetically altered strains of *Salmonella typhimurium*
 - D) Reversion of mutations in the arabinose(ara) operon in the genetically altered strains of *Salmonella typhimurium*

8. Match Group I with Group II
- | <u>Group I</u> | <u>Group II</u> |
|--------------------|--------------------------|
| a) p53 | 1. GTPase |
| b) RB1 | 2. Transcription factor |
| c) NF1 | 3. DNA repair |
| d) BRCA1 and BRCA2 | 4. Cell cycle checkpoint |
- A) a-1, b-3, c-2, d-4 B) a-4, b-1, c-3, d-2
 C) a-2, b-4, c-1, d-3 D) a-2, b-4, c-3, d-1
9. Choose the statement which is correct about gene transcription
- A) The transcript is identical to the coding strand and complementary to the template strand
 B) The transcript is identical to the template strand and complementary to the coding strand
 C) The transcript is identical to both the coding and template strands
 D) None of the above
10. poly(A) tailing is catalyzed by:
- A) 2'-O- methyltransferase B) Polyadenylate polymerase
 C) Guanylyltransferase D) tRNA nucleotidyl transferase
11. The lack of correlation between genome size and genetic complexity is called
- A) Cot curve B) Hardy-Weinberg law
 C) C-value paradox D) Pleiotropy
12. Purified duplex DNA molecules cannot exist in which one of the following forms?
- A) Linear B) Circular and supercoiled
 C) Linear and supercoiled D) Circular and relaxed
13. The complete set of genetic information contained within the members in a population is called:
- A) C-value B) Gene pool
 C) Demes D) Karyotype
14. If the frequency of a homozygous dominant genotype in a randomly mating population is 0.09, what is the frequency of the dominant allele? What is the combined frequency of all other alleles of this gene?
- A) 0.30 and 0.91 B) 0.30 and 0.70
 C) 0.30 and 0.09 D) 0.09 and 0.91
15. Regulatory elements of SOS response in E.coli are:
- A) DNA ligase and XRCC4 B) Dam and Dcm
 C) Rec A and Lex A D) Rec BCD and Lex A

16. Choose the statements which is/are correct about tRNA:
1. tRNAs have a guanylate residue at the 5' end and a trinucleotide sequence CCA at the 3' end
 2. tRNAs have a 7-methylguanosine residue at the 5' end and a trinucleotide sequence CCA at the 3' end
 3. Aminoacyl-tRNA synthetases attach correct aminoacids to their tRNAs
 4. Peptidyl transferase attach correct aminoacids to their tRNAs
- A) 1 & 3 only B) 1 only C) 1 & 4 only D) 2 & 3 only
17. Type of gene interaction when one gene masks or modifies the expression of another gene at distinct locus is called:
- A) Pleiotropy B) Epistasis C) Interference D) Mosaicism
18. Hemophilia is a recessive X-linked trait in humans. If a heterozygous woman has children with a normal man, what are the odds of having (a) An affected child (b) Four unaffected children in a row?
- A) $\frac{3}{4}$ and $\frac{81}{256}$ B) $\frac{3}{4}$ and $\frac{108}{256}$
 C) $\frac{1}{4}$ and $\frac{81}{256}$ D) $\frac{3}{4}$ and $\frac{27}{256}$
19. *Drosophila melanogaster* has ----- pairs of homologous chromosomes.
- A) 2 B) 4 C) 1 D) 3
20. Choose correct statement/s about cytokinesis:
1. Occurs by constriction in animal cells and by construction in plant cells
 2. Mechanism for cytokinesis is based on contractile ring theory
 3. Occurs by construction in animal cells and by constriction in plant cells
 4. Cell plate is formed in animal cells and midbody is formed in plant cells
- A) 1 only B) 1 & 2 only C) 3 & 4 only D) 2 only
21. A reducing agent which disrupts the disulfide bond to sulfhydryl groups
- A) Urea B) Ethanol
 C) Heavy metals D) β -mercaptoethanol
22. Which of the following statements are correct?
1. 1 A_{260} unit= ~50 microgram/ml of dsDNA
 2. 1 A_{260} unit= ~40 microgram/ml of dsDNA
 3. 1 A_{260} unit= ~40 microgram/ml of ssRNA
 4. 1 A_{260} unit= ~50 microgram/ml of ssRNA
- A) 1 & 3 only B) 1 only C) 2 only D) 2 & 4 only
23. Choose the plant that displays C_3 pathway of carbon assimilation:
- A) Sorghum B) Wheat C) Amaranthus D) Maize

31. Which of the following statements about a plot of Velocity versus substrate concentration for an enzyme that follows Michaelis-Menten kinetics is false?
- A) K_m is the substrate concentration at which $V=1/2 V_{max}$
 B) The shape of the curve is hyperbola
 C) As substrate concentration increases the initial velocity of reaction, V , also increases
 D) At very high substrate concentration, the velocity curve becomes a horizontal line that intersects Y-axis at K_m
32. An inactive precursor of an enzyme is called:
- A) Ribozyme B) Zymogen C) Synzyme D) Isozyme
33. The enzyme used in the leather industry is:
- A) α -Amylase B) Cellulase
 C) Lipases D) Alkaline proteases
34. A broad-based technique used to localize radioisotopes within the tissue sections is:
- A) Mass spectrometry B) Autoradiography
 C) X-ray crystallography D) Atomic force microscopy
35. What is the applied centrifugal field at a point equivalent to 5 cm from the centre of rotation and an angular velocity of 3000 rad s^{-1} ?
- A) $4.5 \times 10^7 \text{ cm s}^{-2}$ B) $4.7 \times 10^5 \text{ cm s}^{-2}$
 C) $1.5 \times 10^7 \text{ cm s}^{-2}$ D) $1.5 \times 10^5 \text{ cm s}^{-2}$
36. Which of the following is a cationic exchanger used in Ion exchange chromatography?
- A) DEAE B) CMC C) Dowex-1 D) Dextran
37. Choose the statements which are correct about Mass spectrometry
1. Separation is based on mass-to-charge ratio
 2. Separation is based on charge-to-mass ratio
 3. Sample is converted into positively charged gaseous ions and accelerated towards a negatively charged plate
 4. Sample is converted into negatively charged gaseous ions and accelerated towards a positively charged plate
- A) 1 & 3 only B) 1 only C) 2 & 4 only D) 1 & 4 only
38. X-ray diffraction is based on:
- A) Refractive index B) Bragg's law
 C) Beer-Lambert's law D) Relaxation
39. Relation between action spectra and light absorption to photosynthetic activity is explained by:
- A) Calvin cycle B) Engelmann's experiment
 C) Hill reaction D) CAM pathway

40. The site of ATP synthesis is:
 A) Three β -subunits in F1 ATPase
 B) Three α -subunits in F1 ATPase
 C) The γ , δ and ϵ subunits in F1 ATPase
 D) The 'a' and 'b' subunits of F0 component
41. The most important gene for prokaryotic phylogeny is
 A) 18s rRNA B) 30s rRNA C) 70s rRNA D) 16s rRNA
42. Which of the following are the functions of reverse transcriptase in retroviruses?
 1. It hydrolyzes the host cell's DNA
 2. It uses viral RNA as a template for DNA synthesis
 3. It converts host cell RNA into viral DNA
 4. It uses viral RNA as a template for making complementary RNA strand
 5. It degrades RNA from DNA-RNA hybrid
 A) 2 & 5 only B) 2 & 3 only C) 1, 3 & 4 only D) 1, 3 & 5 only
43. Proteinaceous infectious agents are called:
 A) Virusoid B) Viroid C) Prions D) Virions
44. Match Group I with Group II
- | <u>Group I</u> | <u>Group II</u> |
|------------------|---------------------------------|
| a. Retroviridae | 1. Linear double stranded DNA |
| b. Herpesviridae | 2. Minus strand RNA |
| c. Rhabdoviridae | 3. Circular double stranded DNA |
| d. Baculoviridae | 4. Plus strand RNA |
- A) a-1, b-2, c-3, d-4 B) a-2, b-3, c-4, d-1
 C) a-3, b-4, c-1 d-2 D) a-4, b-1, c-2, d-3
45. In the exponential phase of growth of a bacterial culture, 100 cfu/ml cells increased to 3200 cfu/ml cells in 2 hours. What is the generation time for this bacterium?
 A) 12 minutes B) 15 minutes C) 24 minutes D) 30 minutes
46. Which of the following is a transport medium?
 A) Selenite F broth B) Mc Leod's medium
 C) Stuart's medium D) Mac Conkey's medium
47. The reducing agent used in microbial cell culture medium is:
 A) 0.1% thioglycolate B) 1% peptone
 C) Palladium D) Tetrathionate
48. The test organism used for determining the efficacy of moist heat sterilization is:
 A) *Clostridium tetani* B) *Bacillus stearothermophilus*
 C) *Staphylococcus aureus* D) *Streptococcus faecalis*
49. Cold sterilization involves the use of:
 A) Infrared radiation B) Ultrasonic vibration
 C) Gamma radiation D) Formaldehyde gas

50. The most important antibacterial agents are:
 A) Anionic surface active agents
 B) Cationic surface active agents
 C) Nonionic surface active agents
 D) Amphoteric surface active agents
51. Match Group I with Group II

<u>Group I</u>	<u>Group II</u>
a. IgA	1. Basophils
b. IgE	2. Crosses placenta
c. IgG	3. Secretory component
d. IgM	4. Pentamer

 A) a-3, b-1, c-2, d-4 B) a-3, b-4 c-2, d-1
 C) a-2, b-3, c-1, d-4 D) a-2, b-1, c-3, d-4
52. For class I MHC, which of the following statements are correct?
 1. They are expressed on all nucleated cells
 2. They are made up of a heavy chain and a light chain
 3. They are essential for viral antigen recognition by cytotoxic cells
 4. The genes for HLA class I molecules are located on chromosome 6 and 15
 A) 1 & 3 only B) 1 & 2 only C) 2 & 3 only D) 1, 3 & 4 only
53. Interaction between single paratope with an epitope is called:
 A) Cross-reaction B) Avidity
 C) Affinity D) Serological reactions
54. Type I hypersensitivity is mediated by
 A) IgG B) IgE C) IgM D) IgD
55. Match Group I with Group II

<u>Group I</u>	<u>Group II</u>
a. Isograft	1. Graft from one body part to another of the same individual
b. Allograft	2. Graft between individuals from different species
c. Xenograft	3. Graft between genetically identical individuals
d. Autograft	4. Graft between genetically different individuals within a species

 A) a-4, b-2, c-3, d-1 B) a-3, b-4, c-2, d-1
 C) a-3, b-2, c-4, d-1 D) a-3, b-1, c-4, d-2
56. Myasthenia gravis is an autoimmune disease caused by
 A) Autoantibodies against cell nuclei and intracytoplasmic cell constituents
 B) Autoantibodies against acetyl choline receptor on myoneural junction
 C) Autoantibodies against cells of the zona glomerulosa
 D) Autoantibodies against parietal cells of the gastric mucosa

57. Antibiotic used for the selection of hybridoma is:
 A) Neomycin B) Tetracycline
 C) Aminopterin D) Actinomycin D
58. A drug used for the treatment of AIDS:
 A) Propanolol B) Azidothymidine
 C) Cimetidine D) Hirudin
59. An algorithm used in Computer Aided Drug Discovery is
 A) Monte Carlo simulation B) Ras Mol
 C) CATH D) Chime
60. The first recombinant antigen vaccine approved for human usage is for:
 A) HIV B) Hepatitis B C) Polio D) Influenza
61. The amber codon is:
 A) UGA B) UAA C) AUG D) UAG
62. Which of the following is a database software?
 A) MySQL B) MS Word C) Lotus 1-2-3 D) iTunes
63. The most commonly used algae as SCP for human use is:
 A) Chlorella B) Scenedesmus C) Candida D) Spirulina
64. Choose the statements which are true?
 1. DDBJ is a nucleotide sequence database
 2. PDB is a protein sequence database
 3. EMBL is a model organism database
 4. KEGG is a metabolite database
 A) 1 & 2 only B) 2 & 3 only C) 1, 2 & 4 only D) 1, 2 & 3 only
65. tBLASTn represents
 A) Protein query sequence against translated nucleotide sequence database
 B) Translated nucleotide query sequence against protein sequence database
 C) Translated nucleotide query sequence against translated nucleotide database
 D) Nucleotide query sequence against nucleotide sequence database
66. The most commonly used multiple alignment software is
 A) FASTA B) BLAST C) PAM D) CLUSTAL
67. Choose the correct statements about Chi-square test:
 1. The chi-square test is used for testing the goodness of fit
 2. The chi-square test is used to test the independence of two attributes
 3. The chi-square test is used for testing the significance of correlation
 4. The chi-square test is used for testing variance of a normal population
 A) 1, 2 & 4 only B) 1 & 3 only
 C) 2 & 3 only D) 3 & 4 only

68. The most widely used method for measuring the degree of correlation between two variables where one of the variables is independent and the other one is dependent
 A) Spearman's coefficient B) Yule's coefficient
 C) Karl Pearson's coefficient D) Multiple correlation coefficient
69. Find the harmonic mean of the numbers 4, 5 and 10
 A) 6.45 B) 5.45 C) 1.83 D) 3.83
70. The legislation regarding the patents are governed by
 A) Indian Patent Act, 1980 B) Indian Patent Act, 1972
 C) Indian Patent Act, 2000 D) Indian Patent Act, 1970
71. The Intellectual Property Right used for protecting instructions on a computer chip is
 A) Copyright B) Geographical indications
 C) Layout design D) Trademarks
72. A biodiesel producing plant
 A) Casurina equisetifolia B) Euphorbia lathyris
 C) Melia azadirachta D) Eucalyptus globulus
73. The Act to provide for the establishment of an effective system for protection of plant varieties, the rights of farmers and to encourage the development of new varieties of plants:
 A) PPVFR Act, 2001 B) PPVFR Act, 1984
 C) PPVFR Act, 1999 D) PPVFR Act, 2007
74. The Kornberg enzyme is:
 A) DNA polymerase II B) DNA polymerase I
 C) Taq DNA polymerase D) T4 polynucleotide kinase
75. Sma I and Xma I are
 A) Neoschizomers B) Isoschizomers
 C) Isocaudomers D) Isomers
76. Which of the following is the proper order for the vectors in terms of increasing cloning capacity?
 A) BAC, Cosmid, Phage, Plasmid, YAC
 B) YAC, BAC, Cosmid, Phage, Plasmid
 C) Plasmid, Phage, Cosmid, BAC, YAC
 D) Plasmid, Cosmid, Phage, BAC, YAC
77. The PCR method used for locating the precise start and end points of gene transcripts is:
 A) qRT-PCR B) RACE C) Nested PCR D) RT-PCR
78. Expression of a eukaryotic gene in prokaryotes involves:
 A) Shine-Dalgarno sequence in mRNA
 B) Absence of introns
 C) Regulatory elements upstream of the gene
 D) All the above

79. Automated DNA sequencing use:
 A) Fluorescent labelled ddNTPs
 B) Fluorescent labelled dNTPs
 C) Radiolabelled dNTPs
 D) Radiolabelled ddNTPs
80. Green Fluorescent Protein is isolated from:
 A) *Photinus pyralis* B) *Aequorea Victoria*
 C) *Pyrococcus furiosus* D) *Thermus aquaticus*
81. DNA profiling or DNA fingerprinting exploits
 A) Expressed Sequence Tag B) Variable Number of Tandem Repeats
 C) Simple Tandem Repeats D) Simple Sequence Repeats
82. A hybridization based molecular marker is:
 A) RAPD B) RFLP C) AFLP D) SSLP
83. Gene therapy is used for the treatment of:
 1. SCID 2. SIDS
 3. Cystic fibrosis 4. Sickle cell anemia
 A) 1 & 2 only B) 1, 3 & 4 only C) 1, 2 & 3 only D) 2 & 3 only
84. The production of gene-targeted knockout mice involves the following steps in the order:
 1. Isolation and culturing of embryonic stem cells
 2. Introduction of a mutant gene into the cultured ES cells and selection of homologous recombinant cells
 3. Mating of chimeric offspring heterozygous for the disrupted gene
 4. Injection of homologous recombinant ES cells into a recipient mouse blastocyst
 A) 1, 2, 3 & 4 B) 1, 2, 4 & 3 C) 1, 3, 2 & 4 D) 1, 3, 4 & 2
85. Which of the following are the characteristics of Type II restriction endonucleases?
 1. Bifunctional enzyme with both endonuclease and methylase activity
 2. Contains two identical subunits
 3. Restriction requires ATP and Mg^{2+}
 4. Cleavage site is at or near restriction site
 A) 1 & 2 only B) 2 & 4 only C) 1 & 4 only D) 3 & 4 only
86. The ability of a single cell to divide and produce all the differentiated cells in an organism is called:
 A) Somatic embryogenesis B) Totipotency
 C) De-differentiation D) Somaclonal variation
87. Which of the following is true regarding Downstream processing
 A) The cost of downstream processing is more than the manufacturing cost
 B) Rotary drum vacuum filters are commonly used in downstream processing
 C) Flocculation and floatation are used for the recovery of microbial biomass
 D) All of the above

88. Development of brittle, glassy and water soaked shoot under in vitro conditions is called:
 A) Morphological variations B) Somaclonal variations
 C) Vitrification D) Guttation
89. Production of virus free germplasm can be accomplished by:
 A) Haploid culture B) Embryo culture
 C) Meristem culture D) Somatic embryogenesis
90. Choose the statement/s which are correct about anther culture
 1. In pathway I uninucleate pollen divides symmetrically and both the vegetative and generative cells undergo further division.
 2. In pathway II uninucleate pollen divides unequally and embryos originate from the generative cell alone.
 3. In pathway III uninucleate pollen divides unequally and embryo originates from the vegetative cell alone.
 4. In pathway IV uninucleate pollen divides unequally and both the vegetative and generative cells undergo further division
 A) 1 & 4 only B) 1, 2, 3 & 4 C) 2 & 3 only D) 1, 2 & 4 only
91. The most commonly used fusogen for protoplast fusion is
 A) Pectinase B) High pH and low Ca^{2+}
 C) Polyethylene glycol D) Low pH and high Ca^{2+}
92. Cybrids are:
 A) Plants with nucleus of one species but cytoplasm from both parental species
 B) Plants with cytoplasm of one species but nucleus from both parental species
 C) Plants with nucleus and cytoplasm from both parental species
 D) None of the above
93. Border sequences need to be incorporated into the design of plasmid vectors for Agrobacterium mediated transformation to ensure:
 A) Greater promoter efficiency
 B) Oncogene deactivation
 C) Efficient replication of the plasmid
 D) Integration of the gene of interest into the host gene
94. Match Group I with Group II

<u>Group I</u>	<u>Group II</u>
a. Azadirachtin	1. Digitalis lanata
b. Digoxin	2. Taxus buccata
c. Taxol	3. Dioscorea deltoidea
d. Diosgenin	4. Azadirachta indica

 A) a-4, b-3, c-2, d-1 B) a-4, b-2, c-1, d-3
 C) a-3, b-4, c-2, d-1 D) a-4, b-1, c-2, d-3

95. GMPs refers to:
 A) Global Monitoring Practices
 B) Genetically Modified Plants
 C) Good Manufacturing Practices
 D) Guidance for Manufacturing Pharmaceuticals
96. *Flavr Savr* tomatoes were developed by introducing an antisense copy of the gene for:
 A) Polyhydroxybutyrate B) Polygalacturonase
 C) EPSP D) Lycopene cyclase
97. Which of the following is an anchorage-independent cell line?
 A) MCF7 B) MDA MB 231
 C) K562 D) PC-3
98. Heat inactivation of Foetal Bovine Serum is done at
 A) 56⁰C for 30 min B) 37⁰C for 60 min
 C) 56⁰C for 10 min D) 37⁰C for 15 min
99. Viability of cells in animal cell culture can be determined by:
 1. Bradford's assay 2. Trypan Blue assay
 3. Comet assay 4. MTT assay
 A) 2 only B) 1 & 2 only C) 2 & 4 only D) 1 & 3 only
100. In animal cell culture the CO₂ levels in the incubators are usually maintained at:
 A) 2 % B) 1 % C) 5 % D) 10 %
101. The pH indicator in animal cell culture medium is:
 A) HEPES B) Phenol Red C) FBS D) L-Glutamine
102. The nucleopolyhedrosis viruses (NPV) are widely used as a biopesticide for the control of:
 A) Culex larvae B) Boll worm C) Aphids D) Citrus mites
103. The prominent Indian botanist noted chiefly for his invention of the technique of test-tube fertilization of angiosperms:
 A) P Maheswari B) Goral Gandhi
 C) N Guha D) A K Dutta
104. The major constituent of photochemical smog is
 A) Carbon monoxide B) Ozone
 C) Lead D) Sulfur dioxide
105. An International agreement designed to protect the stratospheric ozone layer is
 A) Copenhagen Protocol B) Kyoto Protocol
 C) Montreal Protocol D) Paris Summit

116. Absorption of UV light at 280 nm by purified proteins is due to the aminoacids:
A) Methionine and Valine B) Tryptophan and Tyrosine
C) Histidine and Cysteine D) Glycine and Lysine
117. Sugars that differ only by the stereochemistry at a single carbon (other than the anomeric carbon) are called:
A) Enantiomers B) Anomers C) Isomers D) Epimers
118. Most cancer cells exhibit increased glycolysis for generation of ATP as a main source of their energy supply. This phenomenon is known as:
A) Pasteur effect B) Emerson enhancement effect
C) Warburg effect D) None of the above
119. The largest secondary lymphoid organ is:
A) Spleen B) Thymus C) MALT D) Lymph nodes
120. The major immunoglobulin found in the colostrums of milk in nursing mothers:
A) IgG B) IgM C) IgD D) IgA
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