A

23737 **120 MINUTES**

1. Lattice hypothesis explain:
   A) Bacterial motility B) Virus assembly
   C) Antigen-antibody reaction D) Phagocytosis

2. Cloning in which of the following vectors demands replica plating for screening recombinants?
   A) pUC18 B) λEMBL C) M13mp9 D) pBR322

3. Which among the following is an edible fungus?
   A) Agaricus B) Morchella
   C) Termitomycetes D) All of the above

4. Shake flask culture is a ---- culture.
   A) Batch B) Continuous
   C) Semi fedbatch D) Fedbatch

5. Somaclone production is more possible during:
   A) Indirect organogenesis B) Direct organogenesis
   C) Embryo rescue D) Organ Culture

6. Which is the most probable reason for non-specificity of RAPD markers?
   A) Decamer primer B) Low annealing temperature
   C) Dominant nature D) Varying buffer concentration

7. Glucokinase and Lactate dehydrogenases are referred as isozymes because they---.
   A) Act along the same metabolic pathway
   B) Share same structural features but have different catalytic activities
   C) Catalyse same reaction despite having different chemical structures
   D) Similar catalytic efficiencies

8. What does the following equation represent?

$$V_0 = (-K_m)\frac{V_0}{[S]} + V_{max}$$

   A) Hanes plot equation
   B) Lineweaver Burk equation
   C) Eadie-Hofstee plot equation
   D) Miachelis Menten equation

9. Ketone bodies which are produced in liver are not utilised by hepatic cells. Why?
   A) Absence of acetone
   B) Absence of CoA transferase
   C) Absence of CoA dehydrogenase
   D) Both A & B

10. Chemiosmotic hypothesis of ATP synthesis in chloroplasts is based on:
    A) Accumulation of K^+ ions B) Accumulation of Na ions
    C) Proton gradient D) Membrane potential

11. Which of the following statements are **not** correct about the utilisation of the NADPH generated from the pentose phosphate pathway?
    A) It is used for steroid synthesis
    B) It is used for the regeneration of glutathione to its reduced state
    C) It is used for the synthesis for synthesis of fatty acid
    D) It can be oxidised in the ETC to provide 38 ATPs

12. Which of the following is **not** an essential amino acid?
    A) Leucine B) Methionine C) Serine D) Arginine

13. What are the products of urea cycle?
    A) One molecule of urea, one molecule of ammonia, one molecule of ATP and one molecule of fumaric acid
    B) One molecule of urea, one molecule of AMP, two molecules of ADP and one molecule of fumaric acid
    C) One molecule of aspartic acid, one molecule of ammonia, one molecule of ATP and one molecule of fumaric acid
    D) Two molecules of urea, two molecules of ammonia, one molecule of ATP and one molecule of fumaric acid

14. Which juice secreted by the organs in the alimentary canal plays a vital role in the digestion of fats?
    A) Pancreatic Juice, Saliva
    B) HCL, Mucus
    C) Bile juice, Pancreatic juice
    D) Mucus, Pancreatic juice

15. Enzymes are used for the therapy and maintenance of various diseases. Applications of four major enzymes are mentioned below. Choose the CORRECT applications:
    1. Streptokinase – Facilitate Wound healing
    2. Hyaluronidase – Promotes absorption of drug
    3. Collagenase – Dissolves clot in myocardial infarction
    4. Chymotrypisin – Used for dissolving the ligaments of lens

    A) 2 & 4 only B) 1& 3 only C) 1 & 2 only D) 3 & 4 only

16. In an experiment, 0.1 ml of protein free urea solution is allowed to react with 3ml of a colour reagent containing diacetyl monoxime and acid reagent in equal proportion. It is boiled at 100^0C for 15 minutes and cooled. The concentration of the given sample will be:
    A) Directly proportional to the absorbance of the light
    B) Directly proportional to the absence of light
    C) Indirectly proportional to the pathlength of the light
    D) Directly proportional to the temperature of the reaction

17. Example for a predominant phosphagen or a macroergic compound that is present in vertebral skeletal muscle and brain:
    A) Calcium Phosphate B) Glucose -6- phosphatase
    C) Creatine Phosphate D) Phosphoprotein phosphatase

18. Application of radiotherapy to conquer cancer cells is done by bombarding the tumor cells with ionizing radiation. The basic mechanism involved in killing cancer cells using ionizing radiation is that radiation-----.
    A) Decreases nutritional levels in tumor cells
    B) Cause breaks in the double-stranded DNA molecule
    C) Increases heat sensitivity in tumor cells
    D) Activates immune cells to prevent cancer

19. Which of the following is/are applications of adsorption chromatography?
    A) Used for isolation of antibiotics
    B) Used to detect peptides
    C) Used to separate amino acids
    D) All of the above

20. Specify the features of Photosystem I (PSI):
    A) Maximum wavelength of excitement is 700nm
    B) Uses chlorophyll a and b to absorb photon
    C) Uses chlorophyll a to absorb photon energy
    D) Both A and C

21. Which among the following is CORRECT regarding non-polar molecules?
    A) O_2, N_2 and CO are non-polar molecules
    B) O_2, N_2 and CO_2 are non-polar molecules
    C) Possess a positive electric charge in the structure
    D) Dissolves in water

22. The reference electrode of a pH meter is a glass tube which is in contact with the mercuric chloride block. It completes the circuit and is used to provide a stable zero voltage connection. Which solution is utilised to saturate the reference electrode?
    A) NaCl B) KCl
    C) CaCl D) KCl and NaCl

23. Size-exclusion chromatography, also described as gel permeation chromatography, is a technique that separates molecules depending on their size. Which among the following is TRUE?
A) Separation occurs via a specific binding interaction between mobile phase and stationary phase
B) Smaller molecules elute first
C) Larger molecules stay in the porous beads in the column
D) Smaller molecules possess more retention time.

24. The principal argument of ab, $a = 1 + \sqrt{3}i$ and $b = 1/2 + \sqrt{3}/2\ i$ = ?
(where $i = \sqrt{-1}$)
A) 150 B) 120 C) 60 D) 30

25. If a and b are the roots of the equation $2x^2 - 14x + 4 = 0$, then $a^2 + b^2$ is:
A) 53 B) 34 C) 45 D) 41

26. The equation whose roots are $\sqrt{3} - 5$ and $\sqrt{3} + 5$ is:
A) $x^2 - 2\sqrt{3}\,x - 22 = 0$ B) $2x^2 - 2\sqrt{3}\,x - 22 = 0$
C) $2x^2 - 2\sqrt{3}\,x - 28 = 0$ D) $x^2 - 2\sqrt{3}\,x - 28 = 0$

27. The targeted genome editing technology which make use of an RNA for site recognition:
A) CRISPR B) Zinc Finger Nucleases
C) TALENS D) MEGATALES

28. A scientist wants to complete a ligation reaction in five minutes for an experiment to prove a criminal conspiracy and present the result on the same day to the criminal Court of Law. What will be his choice of ligation technology?
A) T4 DNA ligase mediated ligation
B) *E coli* DNA ligase mediated ligation
C) TOPO cloning
D) Homopolymer tailing

29. The maximum capacity of a lambda replacement vector is:
A) 12 Kb B) 6 Kb C) 24 Kb D) 53 Kb

30. The selectable marker which gene helps in Spi Selection:
A) AmpR B) TetR
C) red- and gam- mutation D) CI repressor protein

31. The vectors which are **not** using alpha complementation for recombinant screening:
A) pLITMUS B) pBLUESCRIPT
C) pUC D) pcDNA

32. Identify the thermostable polymerase with proof reading activity:
A) Taq B) Tth C) Pfu D) All of these

33. How many hydrogen bonds are formed by a primer with the sequence 5'agtcggaatt3' on annealing with the template?
A) 12 B) 24 C) 18 D) 10

34. Which among the following is codominant molecular marker?
A) RFLP B) AFLP C) RAPD D) VNTR

35. Select the odd one among the following next generation sequencing platforms:
A) Abi SOLid B) Pyrosequencing
C) Iilumina D) Heliscope

36. Match the following:

a. Apyrase	1. LR clonase
b. Ligation	2. High fidelity
c. Lambda Excisionase	3. Pyrosequencing
d. Pfu	4. ABi SoLid

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

37. Which among the following vectors are particular for animal cell lines?
A) pcDNA B) Charon16A C) PichiaPink D) pSPORT

38. The cis acting region required for T DNA transfer:
A) vir A B) Site specific endonucleases
C) rol locus D) left and right borders

39. The microbe developed as a bioweapon:
A) *Chlostridium* B) *Bacillus anthracis*
C) Variola virus D) All the above

40. Gene campaign initiative was started by:
A) Vandana Siva B) Sudha Murthy
C) Suman Sahai D) Shruti Kapoor

41. State whether the following statements about Biosafety Level two are correct or wrong?
Statement 1: Herpes Simplex virus is BL2 pathogen
Statement 2: Daily decontamination is required in the facility

A) Both 1 and 2 are correct B) Both 1 and 2 are wrong
C) 1 is correct and 2 is wrong D) 1 is wrong and 2 is correct

42. Self-incompatibility in plants can be overcome by:
A) Embryo rescue B) Endosperm culture
C) Ovule culture D) Anther culture

43. The easiest method to develop homozygous lines in plants:
A) Doubled Haploids B) Endosperm culture
C) Embryo rescue D) Somatic hybridisation

44. Macerozyme has ----- activitiy.
A) Pectinase
B) Cellulase
C) Pectinase and Hemicellulase
D) Cellulase and Hemicellulase

45. An exclusive protein structure data base:
A) DDJB B) EMBL C) GENBANK D) PIR

46. Which among the following is **not** a Multiple Sequence Alignment Algorithm?
A) MUSLE B) MAFFT C) BLAST D) CLUSTAL

47. The standalone platform for data submission to GENBANK:
A) SEQUIN B) BankIt C) MUSCLE D) MEGA

48. The software which is exclusive for Maximum Parsimony Analysis:
A) Mr Bayes B) RaxML C) PAUP D) MEGA

49. The fulform of UASB:
A) Upflow Anaerobic Sludge Blanket
B) Upwell Anaerobic Sludge Blanket
C) Upwell Aerobic Sludge Blanket
D) Upflow Aerobic Static Blanket

50. The major component in Biogas:
A) Methane B) H_2S C) Acetylene D) Butane

51. IPM stands for:
A) Integrated Plant Management
B) Integrated Pest Management
C) Interventional Pest Management
D) Interventional Plant Management

52. In B20 Biodiesel 20 indicates the percentage of ------.
A) Biodiesel component B) Petroleum component
C) Anti-knocking agents D) Used Cooking Oil

53. If $\log\left(\frac{a}{b}\right) + \log\left(\frac{b}{a}\right) = \log(a + b)$ then:

A) $a + b = 1$ B) $a - b = 1$

C) $a = b$ D) $a^2 - b^2 = 1$

54. Green manure plants belong to which plant family:

A) Asteraceae B) Compositae

C) Leguminosae D) Malvaceae

55. Rushton stirrers are **not** used in fungal bioreactors because it causes -----.

A) non-uniform mixing

B) poor radial mixing

C) poor bulk mixing

D) air bubble flooding with high airflow rates

56. What is the height to diameter ratio of an ideal bioreactor?

A) 3 : 1 B) 2 : 1 C) 4 : 1 D) 5 : 1

57. The commercial citric acid producing microbes are:

A) Aspergillus B) Candida

C) Aspergillus and Candida D) Penicillium

58. The full-form of BASIC:

A) Beginners All Purpose Symbolic Instruction Code

B) Basic All Purpose Symbolic Instruction Code

C) Beginners All Purpose Simple Instruction Code

D) Basic All purpose Simple Instruction Code

59. Which among the following is **not** a measure of central tendency?

A) Mean B) Standard Deviation

C) Median D) Mode

60. Oligonucleotides can be synthesised onto a solid surface by:

A) Photolithography B) UV Crosslinking

C) Oven Baking D) LaseR Ablation

61. Conditions for chilling preservation of fruits and vegetables is temperature nearer to -----.

A) 0^{o}C and 60-65 % humidity

B) 0^{o}C and 85-95 % humidity

C) -20^{o}C and 85-95 % humidity

D) -20^{o}C and 90-99 % humidity

62. Smallest bacteria are:

A) Archaebacteria B) Rickettsiae

C) Chlamydiae D) Mycoplasma

63. A virus will contain:
A) DNA only B) RNA only
C) Either DNA or RNA D) Both DNA and RNA

64. Blood agar can be called a ---- medium.
A) Differential B) Selective
C) Enrichment D) Transport

65. The mechanism of action of penicillin is inhibition of-----.
A) protein synthesis B) peptidoglycan synthesis
C) DNA replication D) lipid synthesis

66. Phagocytosis was first described by:
A) Lister B) Pasteur
C) Metchnikoff D) Ehrlich

67. Immunity obtained by vaccination is ----- immunity.
A) Natural passive B) Artificial passive
C) Natural active D) Artificial active

68. Immunoglobulin class responsible for local immunity:
A) IgG B) IgA C) IgM D) IgD

69. Immunoglobulin class seen in highest concentration in serum:
A) IgG B) IgA C) IgM D) IgD

70. Size of bacterium is commonly expressed in:
A) Micron B) Millimicron C) Nanometer D) Angstrom

71. Example for a sequestered antigen:
A) Lens Protein B) Bilirubin
C) Rheumatoid factor D) C-reactive protein

72. Hybridoma technology is used for the production of:
A) Recombinant vaccines B) Subunit vaccines
C) Monoclonal antibodies D) Reagin antibodies

73. Gas - pak is used for:
A) For providing nitrogen gas
B) For providing excess oxygen
C) Aerobic cultivation of bacteria
D) Anaerobic cultivation of bacteria

74. Minimum holding period required for autoclaving at $121^{o}C$:
A) 10 min B) 15 min C) 30min D) 60 min

75. Outcherlony procedure is based on:
A) Radial immunodiffusion B) Double immunodiffusion
C) PAGE D) Immunoelectrophoresis

76. Which of the following has an autoimmune etiology?
A) Contact dermatitis B) Arthus reaction
C) Infectious mononucleosis D) Rheumatoid arthritis

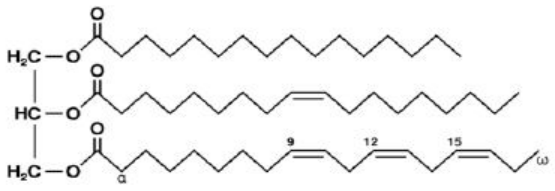
77. HAT medium is used in:
A) Hybridoma technology B) Virus cultivation
C) Vaccine production D) Fermentation

78. Which type of vaccine is hepatitis B vaccine?
A) Killed whole virus vaccine
B) Live attenuated vaccine
C) Subunit vaccine
D) DNA vaccine

79. Gram staining was originally devised by Christian Gram in:
A) 1884 B) 1896 C) 1902 D) 1936

80. Albert's staining is for staining -----.
A) Bacterial flagella B) Endospore
C) Volutin granules D) Bacterial capsule

81. The number of OH group present in the below given fats can be expressed as --- number.



A) Polenske B) Reichert-Meissil
C) Acetyl D) Iodine

82. State whether the two statements given below are correct or wrong:
Statement 1: Philadelphia chromosome is associated with Chronic Myeloid Leukaemia
Statement 2: It is a chromosome 9 and chromosome 22 fusion

A) Both 1 and 2 are correct B) Both 1 and 2 are wrong
C) 1 is correct but 2 is wrong D) 1 is wrong but 2 is correct

83. Identify the **wrong** statement:
A) MAP kinases are serine threonine kinases
B) Cyclin dependent Kinases are closely related to MAP kinases
C) ERKs and JNks are MAP kinases
D) MAP kinases are activated by dephosphorylation

84. Which among the following is an oncogene?
A) RB B) P53 C) APC D) c-myc

85. Identify the correct statement.
A) Segmentation genes of Drosophila influence anterio-posterior axis formation
B) Hunchback is a homeotic gene
C) Hox is a maternal effect gene
D) Caudal is a maternal effect gene

86. The plant hormones involved in flowering:
A) Gibberellin B) Auxins C) Cytokinins D) ABA

87. The antibiotic that suppress prokaryotic replication:
A) Streptomycin B) Ampicillin
C) Nalidixic Acid D) Chloramphenicol

88. Primase is a:
A) RNA polymerase B) DNA polymerase
C) Ribonucleoprotein D) None of the above

89. Intercalating agents cause:
A) Transitions B) Transversion
C) Frame shift D) Nonsense mutation

90. Statement 1: In *E coli*, RNA primer for DNA replication is synthesised by *E coli* RNA polymerase
Statement 2: *E. coli* replication is sensitive to Rifampicin

A) Both the statements are correct and statement 1 is the correct reason for statement 2
B) Both statements are correct and statement 2 is the correct reason for statement 1
C) Both statements are correct, but they are unrelated
D) Statement 1 is wrong, statement 2 is correct

91. In a human population, a rare recessive X linked single gene disorder has a frequency of 0.01% among males. What will the percentage of affected females in the same population?
A) 0.0001 B) 0.001 C) 0.1 D) None of these

92. A hypothetical gene of *E coli* expresses to produce an mRNA of 1200nt long. What is the possible number of introns in this gene?
A) One
B) Two
C) Zero
D) Cannot determine from the given information

93. Which following statement about membrane carbohydrates is **not** true?
A) Some are bound to proteins and some are bound to lipids
B) They show little diversity
C) They are added to proteins in the Golgi apparatus
D) They are important in cell surface recognition reactions

94. Which of the following is **not** a second messenger?
A) ATP B) Calcium ions
C) Inositol triphosphate D) Cyclic AMP

95. Linked genes -----.
A) Are on the same chromosome
B) Have allele that assort independently of one another
C) Never show crossing over
D) Always have multiple alleles

96. A clade is -----.
A) A type of phylogenetic tree
B) A group of evolutionary related species that share a common ancestor
C) An extinct species
D) An ancestral species

97. Which among the following is **not** a prezygotic reproductive barrier?
A) Temporal segregation of breeding seasons
B) Hybrid infertility
C) Spatial segregation of mating sites
D) Sperm that cannot penetrate an egg

98. Predation and herbivory are examples of ------ interactions.
A) Antagonistic B) Mutualistic
C) Commensal D) Competitive

99. A group of individuals born at the same time frame are called:
A) A deme B) A subpopulation
C) A cohort D) A taxon

100. Ecological Succesion is the change in-----.
   A) species over time
   B) community composition after a disturbance
   C) a forest as plants grow
   D) the build-up of soil nutrients

101. Which of the following is **not** currently a major cause of species extinction?
   A) Habitat destruction
   B) Rising sea levels
   C) Introduction of exotic predators
   D) Over exploitation

102. Holandric genes are:
   A) X linked B) Y linked
   C) Autosomal D) All the above

103. The polyploidy condition which can be called as an amphidiploids:
   A) AAA B) AAAA C) AABB D) AA

104. How many different types of male gametes are produced by trihybrid?
   A) 9 B) 8 C) 4 D) 6

105. Which among the following is **not** true about Biopol?
   A) It is biodegradable
   B) It is made from PHB
   C) It is soluble in water
   D) It has properties similar to polypropelene

106. The approximate size of Human Genome is:
   A) 6.3 Mega bases B) 6.3 Giga bases
   C) 63 Mega bases D) 63 Giga bases

107. Which among the following is a disadvantage of Bayesian Algorithm compared to Maximum Likelihood?
   A) A specific Mutation Model is required
   B) No specific mutation model is required
   C) Posterior Probability distribution is used
   D) None of the above

108. Which among the following is **not** a domain interaction in multidomain proteins?
   A) Stable Complex B) Nonstable interaction
   C) Transient Interaction D) None of the above

109. Which among the following is **not** true about Yeast Two Hybrid Screen?
A) A specific Bait to Prey interaction is assumed
B) It is a method to study protein-protein interaction.
C) Nonspecific Bait Prey Interactions do not affect the result.
D) A DBD and TAD are the components of yeast two hybrid system

110. Which of the following is **not** patentable in India?
A) Random DNA sequences
B) A plasmid vector
C) An artificial animal Cellline
D) A cloning methodology

111. State whether the two statements given below about plant variety protection in India are correct or wrong:
Statement 1: In Indian Sui Generis system of plant protection plant patents are permitted
Statement 2: Farmers rights to their varieties are inherent in PPVFR act of 2001

A) Both 1 and 2 are correct B) Both 1 and 2 are wrong
C) 1 is correct but 2 is wrong D) 1 is wrong but 2 is correct

112. The full form of UPOV:
A) International Union for the Protection of new Plants
B) International Union for the Protection of new Varieties of Plants
C) International Convention for the protection of new plants
D) International Union for Plant Patent

113. The international agreement which specifies deposition of Microorganisms in IDA:
A) Budapest Treaty B) Kairo Agreement
C) Kyoto Agreement D) PCT

114. Which among the following is patentable in India?
A) An invention involving Nuclear energy
B) A Scientific Principle
C) A combination medicine with known ingredients
D) A new design to an automobile

115. State whether the two statements about Refinement in Indian patenting given below are correct or wrong:
Statement 1: Dimminaco AG case changed the concept of live organism patenting in India
Statement 2: Dimminaco AG case was for patenting a live recombinant organism

A) Both 1 and 2 are correct B) Both 1 and 2 are wrong
C) 1 is correct and 2 is wrong D) 1 is wrong and 2 is correct

116. Geographical Indication registry Office of India is situated at:
A) Kolkatha B) New Delhi C) Mumbai D) Chennai

117. The maximum cell to cell junctions is found in:
A) Hepatocytes B) Cardiomyocytes
C) Nephrocytes D) Epithelial cells

118. Gap junctions are absent in:
A) Erythrocytes B) Cardiocytes
C) Epithelial cells D) Hepatocytes

119. Peroxisomes are produced from:
A) Golgi Bodies B) Mitochondria
C) ER D) Nucleus

120. The polysaccharide absent in plant cell walls:
A) Cellulose B) Pectin
C) Hemicellulose D) Chitin