A

25103 **120 MINUTES**

1. Which among the following are 'Long day plants'?
   A) Wheat, oat, sugar beat B) Pepper, cucumber, pea
   C) Wild bean, cotton, maize D) Sun flower, pea, Rice

2. Identify the correct statements:
   1. Xylose is a monosaccharide
   2. Molish test can be used to test carbohydrates
   3. Ribose is a oligo saccharide
   4. Lactose is a non reducing sugar

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

3. Immunoglobulin that mediates hypersensitivity
   A) IgA B) IgD C) IgE D) IgH

4. Identify the correct statement:
   A) NK cells are immune component cells of innate, humoural and cellular immunity
   B) T cells originate in blood vessels
   C) Helper T cells attack the pathogens
   D) Dendritic cells are derived only from Thymus

5. Match the following:

List 1	List 2
a. Polytene chromosome	1. Amphibian Oocyte
b. Lampbrush chromosomes	2. Telocentric
c. Polycentric chromosome	3. Balbiani rings
d. Terminal kinetochore	4. Non localized kinetochores

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

6. Trisomy 21 is:
   A) Turners syndrome B) Cri du chat
   C) Down's syndrome D) Edwards syndrome

7. 'Puff ball fungus' is:
   A) Agaricus B) Ustilago C) Morchella D) Lycoperdon

8. Identify the correct statements:
   1. Brown algae contain laminarin & mannitol
   2. ch1 a, ch1 c, B carotene - Bacillariophyceae
   3. Blue green algae contain cyanophycean starch
   4. Phycoerythrin is present in rhophyceae

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

9. Functions of microtubules are:
   A) Cell division B) Construction of Flagella
   C) Ion transport D) All of these

10. 'Cri du Chat' is caused by:
   A) Absence of one X chromosome
   B) Extra X chromosome
   C) Deletion from chromosome 5
   D) Deletion from chromosome 18

11. Protein gives a brick red colour precipitate in---- reaction.
   A) Ninhydrin B) Glyoxylic acid
   C) Millions D) Biuret

12. Terminalization occurs in:
   A) Pachytene and Diakinesis B) Pachytene
   C) Metaphase & Anaphase D) Diplotene

13. Diaminopimelic acid and teichoic acid be found in:
   A) Prokaryotes B) Eukaryotes C) Yeast D) Plastids

14. Albinism is:
   A) Lacking phenyl alanine hydroxylase
   B) Clamping of cells causes vascular obstruction
   C) Deficiency of an oxidase enzyme
   D) Absence of tyrosinase

15. Vitamin D3 is:
   A) Phylloquinone B) Retinol
   C) Alpha tocopherol D) Cholecalciferol

16. Coenzyme Q is present in:
   A) Plastids B) Mitochondria and microsome
   C) Nucleolus D) Only mitochondria

17. Direct oxidation pathway can also be called:
A) Monophosphate Shunt
B) Pentose phosphate pathway
C) Warburg Dickens pathway
D) All of these

18. In DNA excision repair mechanism:
A) Chromosome stand is removed
B) Altered DNA segment of the DNA is excised and a new patch is synthesized
C) Thymine dimers were removed
D) Core enzyme is excised

19. Identify the correct statement/s:
1. In Rivularia filament is surrounded completely within gelatinous sheath
2. Carpospore is absent in Batrachospermum
3. Chlorella reproduces by non motile spores
4. Chlorococcales are filamentous form

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

20. In the ovary cavity, pollen tube is guided by:
A) Obturator B) Synergrids C) Egg D) Chalaza

21. Minute separable rounded outgrowths of lichen thallus
A) Cilia B) Soralia C) Soredia D) Ascospore

22. An angiosperm family with syngenesious anther :
A) Fabaceae B) Asteraceae
C) Apocynaceae D) Cucurbitaceae

23. Nucleosome – solenoid model was proposed by:
A) Kornberg and Thomas B) Kornberg or Tatum
C) Laderberg and Tatum D) Levitzsky

24. Head quarters of the National Biodiversity Authority is at:
A) Pune B) New Delhi C) Munbai D) Chennai

25. A holoparasite:
A) Viscum B) Rafflesia C) Loranthus D) Santalum

26. The fruit syconium is developed from the inflorescence:
A) Hypanthodium B) Spadix
C) Cyathium D) Umbel

27. If a DNA sample has a melting temperature of 84^{o} C and a second sample has a melting temperature of 89^{o} C, what will be your conclusion regarding the base composition of the two samples:
A) First sample has high GC content
B) First sample has low AT content
C) Second sample has high GC content
D) Second sample has low GC content

28. Tissue culture media with thermolabile constitution is sterilized by:
A) Chromatography B) Pasteurization
C) Dry heat sterilization D) Ultra filteration

29. If one strand of a DNA has a sequence of 5' GTA CTG AAC 3'. What is the sequence on its 3' 5' strand?
A) GAU GUC UUG B) GAT GAC
C) TTC CAT TTG GAC D) CAT GAC TTG

30. Phenotypic ratio in recessive epistasis:
A) 15:1 B) 9:3:4 C) 12:4 D) 9:3:3:1

31. Classical Smog is:
A) Condensation of CO_2
B) Smog formed by SO_2
C) Particulate matter suspended in air
D) Aggregation of NOx and VOCs

32. The term genomics was coined by:
A) T H Roderick B) A Flemming
C) F Sanger D) H Winkler

33. Reciprocal translocation is:
A) A barr body
B) A Short chromosome
C) Robertsonian translocation
D) An Isochromosome

34. Technique used for separation of immunoglobulins is:
A) Paper chromatography B) SDS PAGE
C) Affinity chromatography D) Gas chromatography

35. Advantage of microarrays is
A) Assay provides qualitative data
B) Single color is used in DNA microarray
C) Only certain genes can be analyzed in one test
D) It is very sensitive and rapid and allows for the direct comparison of expression

36. Albinism in plants is caused by:
A) Duplicate recessive genes
B) Recessive epistatic gene
C) Dominant complementary genes
D) Recessive lethal alleles

37. Specimen selected from the original material to serve as nomenclatural type when holotype was **not** designated:
A) Holotype B) Isotype C) Lectotype D) Paratype

38. The product of assimilation and net production efficiency is ---- efficiency.
A) Net assimilation B) Exploitation
C) Assimilation D) Gross production

39. Diploid organism with an extra chromosome is:
A) Monosomy B) Nullisomy C) Trisomy D) Monoploidy

40. Identify the correct statement:
A) Malvaceae generally have ovules on free central placentation
B) Bulbophyllum belongs to Family Orchidaceae
C) *Hopea acuminata* belongs to Family Brassicaceae
D) In Solanaceae the flower is Epigynous

41. Number of nucleotides in yeast alanyl tRNA:
A) 17 B) 67 C) 77 D) 88

42. A non radioactive label used in molecular probe:
A) ^{32}P B) Digoxigenin
C) Palindromes D) Thymidine dimer

43. DDBJ is:
A) Biological database B) Protein sequence database
C) Protein structure database D) Multiple sequence alignment

44. A retro virus is:
A) Herpes virus B) HTLV-1
C) Hepatitis B virus D) Adenovirus

45. Identify the dye yielding plants:
1. Acacia catechu, Curcus sativus, Morinda tinctoria
2. Memecylon umbellatum, Indigofera tinctoria, Cuminum cyminum
3. Ocimumbasilicum, Apium graveolens, Cinnamomum zeylanicum

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

46. Match the following (bacterial features) in List 1 with (corresponding descriptions / roles) in List 2:

List 1	List 2
a. F-pilus	1. Horizontal gene transfer by bacteriophages
b. Flagella	2. Motility structures used for locomotion
c. Transformation	3. Uptake of foreign DNA from the environment
d. Transduction	4. Structure involved in bacterial conjugation

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

47. What role do quorum-sensing molecules play in bacterial biofilms?
A) They allow bacteria to sense nutrient levels in their environment
B) They enable bacteria to recognize and kill neighbouring bacteria
C) They coordinate gene expression in response to population density
D) They inhibit the conjugation process in nearby cells

48. Which of the following best describes the lysogenic cycle of bacteriophages?
A) The phage DNA is immediately replicated and leads to cell lysis
B) The phage DNA is integrated into the host genome and remains dormant
C) The phage uses reverse transcriptase to insert its RNA into the host
D) The phage DNA does not enter the host genome but still kills the host cell

49. Viroids differ from viruses in that Viroids:
A) Lack a protein coat
B) Have double-stranded DNA as genetic material
C) Replicate in animal cells only
D) Have complex capsid structures

50. Which type of life cycle is characteristic of the green algae, Ulva (Chlorophyceae)?
A) Diplontic B) Haplontic
C) Haplodiplontic D) None of these

51. Match the following (Pteridophytes) in List 1 with (general characteristics) in List 2:

List 1	List 2
a. Psilopsida	1. Microphyllous leaves, sporangia borne in cones
b. Lycopsida	2. Primitive pterydophytes with dichotomous branching
c. Sphenopsida	3. Jointed stems with whorls of microphylls
d. Pteropsida	4. Large megaphyllous leaves (fronds)

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

52. Which extinct fossil gymnosperm group had reproductive structures resembling those of cycads but showed evidence of flower-like organs?
A) Ginkgoales B) Bennettitales
C) Cordaitales D) Coniferales

53. The wood which is non-functional in water conduction, darker in colour:
A) Heart wood B) Sap wood C) Soft wood D) Hard wood

54. Match the following (staining methods) in List 1with (cellular components they are used to localize) in List 2

List 1	List 2
a. PAS (Periodic Acid-Schiff)	1. Proteins
b. Sudan Black	2. Lipids
c. Coomassie Brilliant Blue	3. Carbohydrates
d. Toluidine Blue	4. Nucleic acids

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

55. Which among the following is Commonly used for routine plant tissue fixation?
A) FAA (Formalin-Acetic-Alcohol)
B) Carnoy's fluid
C) Flemming's fluid
D) Glutaraldehyde

56. A specialized use of Sledge microtome is:
A) Sectioning of frozen tissues
B) Sectioning for electron microscopy
C) General thin sectioning for light microscopy
D) Sectioning of large and hard tissues

57. Apospory in plant reproduction is:
A) Formation of an embryo without fertilization
B) Development of a diploid embryo without meiosis
C) Development of an embryo from an unfertilized egg
D) Formation of a gametophyte from sporophyte cells without meiosis

58. ----- signalling pathway is activated by the perception of light in plants.
A) Auxin sign B) Ethylene
C) Phytochrome D) Gibberellin

59. The significance of the patch clamp technique in plant physiology research is:
A) It measures stomatal conductance.
B) It investigates ion channel activity.
C) It quantifies photosynthetic efficiency.
D) It analyses hormone levels in tissues.

60. In response to chilling stress, which of the following proteins is known to be upregulated in plants?
A) Heat shock proteins B) Chaperonins
C) Desaturase enzymes D) Lipoxygenases

61. The type of plant growth which is primarily regulated by the balance between auxins and cytokinins:
A) Apical dominance B) Lateral root formation
C) Leaf senescence D) Fruit development

62. The primary function of the enzyme GOGAT in nitrogen metabolism is to:
A) Convert nitrate to ammonium
B) Reduce nitrite to ammonium
C) Incorporate ammonium into organic compounds
D) Produce glutamate from α-ketoglutarate

63. What role does calcium play in plant cells?
A) It facilitates the transport of water
B) It mediates signal transduction pathways
C) It regulates stomatal closure
D) All of these

64. In the context of the soil-plant-atmosphere continuum, what primarily drives water movement in plants?
A) Capillarity B) Transpiration pull
C) Active transport D) Osmotic pressure

65. The aquaporins in plants:
A) Serve as channels for nutrient uptake
B) Facilitate the passive movement of water across membranes
C) Are involved in the transport of ions and small solutes
D) Generate ATP through photophosphorylation

66. Match the following (stages of flowering) in List 1 with (mechanisms) in List 2:

List 1	List 2
a. Floral induction	1. Development of floral structures from meristematic tissue
b. Floral evocation	2. Transition from vegetative to flowering stage
c. Morphogenesis	3. Activation of flowering genes in response to environmental cues
d. Floral organ identity	4. Determination of the type and arrangement of floral organs

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

67. Movement of nutrients through specific channels or carriers is:
A) Passive transport B) Facilitated diffusion
C) Active transport D) Apparent free space

68. Match the following (light receptors) in List 1 with (functions) in List 2:

List 1	List 2
a. Phytochromes	1. Regulate phototropism and stomatal opening
b. Cryptochromes	2. Detect red/far-red light to control flowering
c. Phototropins	3. Protect against photodamage
d. Carotenoids	4. Regulate blue light responses

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

69. Match the following (plant hormones) in List 1 with (roles) in List 2:

List I	List II
a. Auxins	1. Promote bolting and reverse dwarfism
b. Gibberellins	2. Inhibit growth and induce seed dormancy
c. Cytokinins	3. Stimulate elongation and flowering
d. Abscisic acid	4. Regulate lateral bud growth and leaf senescence

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

70. The statistical test which is most appropriate for comparing means of more than two groups:
A) Chi-square test B) T-test
C) Regression analysis D) Analysis of variance (ANOVA)

71. In a spectrophotometer, the purpose of using a monochromator is to:
A) Detect light intensity changes
B) Filter the emitted light into specific wavelengths
C) Amplify the sample signal
D) Measure the mass of molecules

72. The microscope technique ideal for visualizing live cells without staining:
A) Fluorescence microscopy
B) Scanning electron microscopy (SEM)
C) Phase-contrast microscopy
D) Transmission electron microscopy (TEM)

73. The parameter which measures the spontaneity of a biochemical reaction:
A) Enthalpy (ΔH) B) Free energy (ΔG)
C) Entropy (ΔS) D) Activation energy (Ea)

74. The enzyme responsible for catalysing the breakdown of hydrogen peroxide into water and oxygen:
A) Superoxide dismutase B) Peroxidase
C) Catalase D) Glutathione reductase

75. The vitamins which acts as a coenzyme for carboxylation reactions:
A) Vitamin B1 (Thiamine)
B) Vitamin B7 (Biotin)
C) Vitamin B12 (Cobalamin)
D) Vitamin C (Ascorbic acid)

76. In an enzyme catalysed reaction, a low Km value indicate high:
A) Substrate affinity B) Reaction rate
C) Turnover number D) Product formation

77. The purine which is the primary precursor in purine nucleotide biosynthesis:
A) Guanine B) Hypoxanthine
C) Xanthine D) Inosine monophosphate (IMP)

78. Which lipid category does phosphatidylcholine belong to?
A) Glycolipids B) Sphingolipids
C) Glycerophospholipids D) Sterols

79. The unusual amino acid which is typically found in collagen:
A) Selenocysteine B) Hydroxyproline
C) γ-carboxyglutamate D) N-formyl methionine

80. The Ramachandran plot primarily provides information about which of the following aspects of protein structure?
A) Protein folding pathway
B) Tertiary structure formation
C) Permissible dihedral angles of amino acid residues
D) Amino acid side chain interactions

81. The pair which correctly represents a buffer system in living organisms:
A) Sodium bicarbonate and hydrochloric acid
B) Ammonium and ammonium chloride
C) Acetate and acetic acid
D) Ammonia and sulfuric acid

82. The method of vegetative propagation involves the use of rooted stem cutting:
A) Layering B) Grafting C) Budding D) Cutting

83. The method commonly used to produce monoclonal antibodies:
A) Immunoprecipitation B) ELISA
C) Hybridoma technology D) Western blot

84. The major histocompatibility complex (MHC) class I molecules present antigens to which type of immune cell?
A) T helper cells B) Cytotoxic T cells
C) B cells D) Natural killer cells

85. Which of the following is **not** a requirement for maintaining Hardy-Weinberg equilibrium in a population?
A) No mutations B) Large population size
C) Non-random mating D) No migration

86. The operon model which illustrates negative control and involves attenuation to regulate gene expression:
A) Lac operon B) Trp operon
C) Arabinose operon D) SOS response operon

87. What is the role of the Kozak sequence in eukaryotic translation?
A) It serves as the binding site for ribosomal subunits
B) It marks the end of mRNA transcription
C) It initiates DNA replication
D) It facilitates the initiation of translation by helping ribosomes locate the start codon

88. The DNA repair mechanism which is primarily involved in correcting pyrimidine dimers induced by UV light:
A) Mismatch repair B) Base excision repair
C) Nucleotide excision repair D) Direct repair

89. In DNA replication, the enzyme responsible for resolving the end replication problem in eukaryotes is:
A) DNA helicase B) Topoisomerase
C) Telomerase D) DNA polymerase δ

90. In cell signalling, G-protein coupled receptors (GPCRs) primarily activate which secondary messenger molecule?
A) cAMP B) Calcium ions
C) Phosphoinositide D) DAG (diacylglycerol)

91. The histone modification which is primarily associated with transcriptional activation in eukaryotic cells:
A) Histone acetylation B) Histone methylation (lysine 9)
C) Histone ubiquitination D) Histone phosphorylation

92. During apoptosis, which of the following is a key effector molecule responsible for executing the apoptotic cascade?
A) Caspases B) Bax C) p53 D) Cytochrome C

93. The protein associated with the regulation of spindle assembly checkpoints during mitosis:
A) Cohesin B) Cyclin B
C) Separase D) APC/C (Anaphase Promoting Complex)

94. A key structural feature of the eukaryotic cell membrane:
A) Presence of peptidoglycan
B) Asymmetrical distribution of lipids
C) Double-stranded RNA integration
D) Symmetrical arrangement of proteins and lipids

95. Which of the following is **not** a characteristic of alpha diversity?
A) Species richness
B) Genetic variation within a population
C) Species evenness
D) Community diversity within a habitat

96. The international treaty which aims to protect endangered species of plants and animals through trade regulations:
A) Kyoto Protocol
B) Bonn Convention
C) CITES
D) Ramsar Convention

97. A method used in phytosociology for classifying plant communities:
A) Gleason's Individualistic Concept
B) Clementsian Concept of Climax
C) Island Biogeography Theory
D) Raunkiaer's Life Form Classification

98. Match the following (DNA Repair Mechanisms) in List 1 with (specific functions) in List2:

List 1	List 2
a. Base Excision Repair	1. Fixes bulky, helix-distorting lesions
b. Nucleotide Excision Repair	2. Corrects single-base mutations
c. Mismatch Repair	3. Fixes incorrect base pairing
d. Direct Repair	4. Reverses chemical changes in bases

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

99. Match the following (Signal Transduction Pathways) in List 1 with (associated signalling molecules) in List 2:

List 1	List 2
a. G-protein coupled receptors (GPCRs)	1. Steroid hormones
b. Tyrosine kinase receptors	2. Growth factors
c. Ion channel linked receptors	3. Neurotransmitters
d. Intracellular receptors	4. Secondary messengers

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

100. Match the following (Genetic Mutations) in List 1 with (corresponding descriptions) in List 2:

List 1	List 2
a. Missense mutation	1. Introduces a premature stop codon
b. Nonsense mutation	2. No change in the amino acid sequence
c. Frameshift mutation	3. Alters the amino acid sequence
d. Silent mutation	4. Caused by insertion or deletion of nucleotides

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

101. Match the following (Cell Signalling Molecules) in List 1 with (receptors) in List 2:

List 1	List 2
a. Acetylcholine	1. G-protein coupled receptors
b. Insulin	2. Ligand-gated ion channels
c. Epidermal growth factor (EGF)	3. Tyrosine kinase receptors
d. Cortisol	4. Intracellular receptors

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

102. Match the following (Chromatins) in List 1 with(characteristics) in List 2:

List 1	List 2
a. Euchromatin	1. Densely packed, transcriptionally inactive
b. Heterochromatin	2. Loosely packed, transcriptionally active
c. Constitutive heterochromatin	3. Always inactive and found at centromeres
d. Facultative heterochromatin	4. Can switch between active and inactive states

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

103. Match the following (ecological concepts) in List 1 with (examples) in List 2:

List 1	List 2
a. Keystone Species	1. Sea otters in kelp forests
b. Invasive Species	2. Zebra mussels in North America
c. Endangered Species	3. Amur leopard
d. Indicator Species	4. Lichens indicating air quality

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

104. Which of the following methods is **not** typically associated with gene transfer in plants?

A) Electroporation B) Agrobacterium-mediated transformation
C) Gene gun (biolistics) D) RNAi technology

105. In the context of microbial biotechnology, biotransformation is the:
A) Conversion of biomass into energy
B) Process by which microorganisms alter the chemical structure of compounds
C) Genetic modification of microorganisms for industrial use
D) Application of antibiotics in disease control

106. The database specifically designed for protein sequence data:
A) EMBL B) GENBANK
C) SWISS-PROT D) DDBJ

107. What does the BLAST algorithm primarily do?
A) Aligns protein structures
B) Identifies homologous sequences
C) Analyses metabolic pathways
D) Constructs phylogenetic trees

108. Which of the following is **not** a type of sequence alignment analysis?
A) Global alignment B) Local alignment
C) Phylogenetic alignment D) Pair wise analysis

109. In bioinformatics, the term "genome annotation" refer to:
A) The process of sequencing DNA
B) The identification of functional elements in the genome
C) The assembly of genomic data into databases
D) The comparison of genomes from different organisms

110. The primary mechanism of systemic acquired resistance (SAR) in plants is:
A) Localized cell death at the infection site
B) Activation of defense genes throughout the plant
C) Production of phytoalexins
D) Mechanical barrier formation

111. Match the following (genetic markers) in List 1 with (descriptions) in List 2:

List1	List 2
a. RFLP	1. Variation in the number of repeats of a sequence
b. SSR	2. Variation in DNA sequence length
c. SNP	3. Single nucleotide change
d. AFLP	4. Amplified fragment length polymorphism

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

112. Match the following (plant diseases) in List 1 with (causal organisms) in List 2:

List1	List 2
a. False smut of Paddy	1. Fungus (Ustilaginales)
b. Powdery mildew of Rubber	2. Fungus (Erysiphales)
c. Coffee rust	3. Fungus (Hemileia vastatrix)
d. Yellow vein mosaic	4. Virus (geminivirus)

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

113. Match the following (biotechnological applications) in List 1 with (uses) in List 2:

List1	List 2
a. Bt cotton	1. Pest-resistant crop
b. Golden rice	2. Vitamin A enrichment
c. Flavr Savr tomato	3. Delayed ripening
d. Herbicide-resistant soybeans	4. Tolerance to herbicides

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

114. Match the following (components of the plant immune system) in List 1with (functions) in List 2:

List 1	List 2
a. Systemic acquired resistance	1. Localized defense against pathogens
b. Induced systemic resistance	2. Long-term response to infection
c. Phytoalexins	3. Compounds that inhibit pathogen growth
d. Mechanical barriers	4. Physical defense against pests

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

115. Which among the following statements are true related to stains in micro technique?

1. **Acridine Orange** is a synthetic dye belonging to the triarylmethane class, used in staining bacterial endospores.
2. **Eosin** is an acidic dye composed of brominated fluorescein, stains cytoplasm and extracellular structures in tissues, imparting a pink or red colour. It is often used as a counterstain in combination with hematoxylin in H & E staining.
3. **Hematoxylin** is a basic dye derived from the heartwood of certain trees and undergoes oxidation to form hematein, staining nuclei blue or purple.
4. **Malachite Green** is used in fluorescence microscopy for vital staining of live cells.

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

116. Regarding photorespiration, which statements are accurate?
1. It occurs when oxygen levels are high and carbon dioxide levels are low
2. It results in the production of glycolate & hydroxy pyruvate
3. RuBisCO can fix both carbon dioxide and oxygen
4. Photorespiration occur in mitochondria

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

117. Match the following (signal transduction) in List 1with (roles) in List 2:

List 1	List 2
a. Signal perception	1. Involves molecules like Ca^{2+} and cAMP
b. Signal amplification	2. Increases the strength of the signal within the cell
c. Second messengers	3. Initial detection of the signal by receptors
d. Signal transduction pathways	4. Series of biochemical reactions leading to a cellular response

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

118. In Raunkiaer's system of plant classification, which form of plant has its perennating buds at or near the ground?
A) Phanerophyte
B) Hemicryptophyte
C) Chamaephyte
D) Therophyte

119. A key distinguishing characteristic of the Gleasonian view of community structure is that communities are:
A) Highly structured and predictable
B) Random associations of species
C) Always in equilibrium
D) Hierarchical

120. The concept of ecads and ecotypes is most relevant to:
A) Genetic diversity
B) Ecosystem stability
C) Ecological succession
D) Habitat conservation

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