A

25135 **120 MINUTES**

1. Which among the following are examples of operant conditioning?
   1. A rat pressing a lever for food
   2. A dog salivating at the sound of a bell
   3. A child being rewarded for completing homework
   4. A bird learning to navigate using the sun

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

2. Homonymy refers to:
   A) One species having multiple names
   B) Multiple species having the same name
   C) Species changing names over time
   D) Naming rules for fossils

3. The term "derived character" in cladistics is a trait:
   A) That evolved before the common ancestor of a clade
   B) That evolved in the common ancestor of a clade
   C) That evolved multiple times in different clades
   D) Shared by all members of a clade

4. The three-domain system was proposed by:
   A) Carl Linnaeus B) Ernst Mayr
   C) Carl Woese D) Charles Darwin

5. Match the following List I with List II

List I	List II
a. Phenetic system	1. Based on the evolutionary history
b. Cladistic system	2. Based on overall similarity
c. Molecular taxonomy	3. Based on genetic and molecular markers
d. Phylogenetic system	4. Based on shared derived characters

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

6. RAPD markers:
   A) Require knowledge of the DNA sequence
   B) Do not require prior knowledge of the DNA sequence
   C) Are not polymorphic
   D) Require restriction enzymes

7. The species of honey bee commonly used in commercial beekeeping in Europe:
   A) Apis mellifera B) Apis cerana
   C) Apis dorsata D) Apis florea

8. Assertion (A): The three-domain system includes Bacteria, Archaea, and Eukarya.
Reason (R): All domains have cells with membrane-bound nuclei.

A) Both A and R are true, and R is the correct explanation of A.
B) Both A and R are true, but R is not the correct explanation of A.
C) A is true, but R is false.
D) A is false, but R is true.

9. The tree of life represents:
A) The evolutionary relationships among species
B) The geographical distribution of species
C) The life span of various organisms
D) None of the above

10. The type of aquaculture which involves the farming of freshwater fish in controlled environments:
A) Mariculture B) Finfish culture
C) Shellfish culture D) Ornamental fish culture

11. The main purpose of Integrated Pest Management (IPM) is to:
A) Use as many pesticides as possible
B) Reduce the pest population below economically damaging levels
C) Eliminate pests entirely
D) Use only organic methods

12. Which of the following is a common pest of stored food grains?
A) Weevil B) Spider mite C) Thrips D) Caterpillar

13. The pathways which is involved in the synthesis of glucose from non-carbohydrate precursors:
A) Glycolysis B) Krebs cycle
C) Gluconeogenesis D) Glycogenesis

14. Beta-oxidation primarily refers to the:
A) Synthesis of fatty acids B) Conversion of glucose to glycogen
C) Breakdown of fatty acids D) Conversion of glycerol to glucose

15. What principle does autoradiography rely on?
A) Light absorption B) Radioactive decay
C) Electron scattering D) Fluorescence

16. What is the primary advantage of using a transmission electron microscope (TEM)?
A) It provides three-dimensional images.
B) It allows observation of live specimens.
C) It achieves high-resolution images at the atomic level.
D) It uses visible light for imaging.

17. In chromatography, the term "retention time" refer to the time:
    A) It takes for a solvent to pass through the column
    B) It takes for a compound to elute from the column
    C) Required for sample preparation
    D) Required for a sample to reach equilibrium

18. The primary use of an atomic absorption spectrophotometer is:
    A) Measuring the concentration of gases
    B) Analyzing radioactive samples
    C) Determining metal concentrations in a solution
    D) Measuring light scattering

19. The type of microscopy which is best for studying the surface structure of specimens:
    A) Light microscopy
    B) Transmission electron microscopy
    C) Scanning electron microscopy
    D) Phase contrast microscopy

20. The term "Zymogen" refers to:
    A) An active enzyme B) An inactive enzyme precursor
    C) A coenzyme D) An enzyme inhibitor

21. The primary function of lipids in biological system is:
    A) Genetic coding
    B) Structural components of membranes
    C) Providing a rapid source of energy
    D) All of the above

22. The main function of the Krebs cycle is to:
    A) Break down glucose into energy
    B) Produce ATP from ADP
    C) Generate electron carriers for the electron transport chain
    D) Synthesize glucose from non-carbohydrate sources

23. Assertion (A): Cnidarians have radial symmetry.
    Reason (R) : Radial symmetry is an adaptation to a sessile lifestyle.

    A) Both A and R are true, and R explains A.
    B) Both A and R are true, but R does not explain A.
    C) A is true, but R is false.
    D) A is false, but R is true.

24. The growth phase which is characterized by the maximum rate of cell division:
    A) Lag phase B) Exponential (log) phase
    C) Stationary phase D) Death phase

25. The antibiotics which inhibits bacterial protein synthesis:
A) Penicillin B) Tetracycline C) Vancomycin D) Rifampicin

26. Which of the following is a characteristic feature of Gram-negative bacteria?
A) Thick peptidoglycan layer
B) Stains purple in Gram staining
C) Outer membrane containing lipopolysaccharides
D) Lack of a cell wall

27. Assertion (A) : Deuterostomes develop the anus first.
Reason (R) : In deuterostomes, the mouth forms from the blastopore.

A) Both A and R are true, and R explains A.
B) Both A and R are true, but R does not explain A.
C) A is true, but R is false.
D) A is false, but R is true.

28. Which level of organization is characteristic of cnidarians?
A) Cellular level B) Tissue level
C) Organ level D) Organ system level

29. The vector which can carry large fragments of DNA:
A) Plasmids B) Bacteriophages
C) Cosmids D) Shuttle vector

30. According to the Lyon hypothesis, which of the following is true?
A) Both X chromosomes in females are active.
B) One X chromosome in females is randomly inactivated.
C) Males have two active X chromosomes.
D) The Y chromosome in males is inactive.

31. Which of the following disorders is caused by a single gene mutation?
A) Down syndrome B) Turner syndrome
C) Cystic fibrosis D) Klinefelter syndrome

32. Chromosomal anomalies can result in which of the following conditions?
A) Genetic mutations
B) Inborn errors of metabolism
C) Syndromes such as Down syndrome
D) All of the above

33. Shuttle vectors are designed to function in:
A) Only prokaryotic cells B) Only eukaryotic cells
B) Only yeast cells D) Both prokaryotic and eukaryotic cells

34. Which of the following is an example of a sex-linked disorder?
A) Sickle cell anemia B) Hemophilia
C) Cystic fibrosis D) Tay-Sachs disease

35. Which of the following techniques involves introducing recombinant DNA into a host organism?
A) DNA sequencing B) Gene cloning
C) Gene transfer technology D) Chromosome jumping

36. Which of the following best describes Intellectual Property Rights (IPR) in biotechnology?
A) Legal rights to sell agricultural products
B) Protection of inventions and innovations
C) Rights to use genetic material without restrictions
D) Laws governing environmental protection

37. Match the Following List I with List II:

List I	List II
a. Ligands	1. Initiates cellular responses
b. Receptors	2. Transmit signals inside the cell
c. Second messengers	3. Bind to receptors on target cells
d. G-proteins	4. Amplify the signal inside the cell

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

38. In a fragmented forest ecosystem, how would the edge effect most likely alter species composition at the boundary between the forest and an open area?
A) Increase in edge species that thrive in transitional zones
B) Decrease in biodiversity due to reduced habitat size
C) Increase in core species that require deep forest habitats
D) Uniform distribution of species across the edge and core areas

39. Given a population experiencing logistic growth, how would you expect the population growth rate to change as the population approaches its carrying capacity?
A) The growth rate increases exponentially due to abundant resources.
B) The growth rate slows down and stabilizes as resources become limited.
C) The growth rate remains constant regardless of population size.
D) The growth rate decreases sharply to zero as the population overshoots the carrying capacity.

40. Identify the true statement about community ecology :
A) Edge effects always negatively impact the organisms in the habitat.
B) Ecotones are areas that are completely separate from adjacent communities.
C) Community structure does not change over time.
D) Edge effects can lead to increased biodiversity in habitats.

41. In the context of Environmental Impact Assessment (EIA), which statement is true?
A) EIA is only required for large-scale construction projects.
B) EIA involves public participation and stakeholder engagement.
C) EIA guarantees that all environmental impacts will be mitigated.
D) EIA is not necessary for projects with minimal environmental impact.

42. Euchromatin is characterized by:
A) Densely packed DNA B) Active gene transcription
C) Inactive genes D) Visible during cell division

43. Biological magnification is the:
A) Increase in the population of species
B) Accumulation of toxic substances in the higher trophic levels of the food chain
C) Magnification of species' roles in ecosystems
D) Increase in energy at each trophic level

44. In an energy pyramid, which level contains the most energy?
A) Primary consumers B) Secondary consumers
C) Tertiary consumers D) Producers

45. What is an ecotone?
A) A distinct zone of high biodiversity
B) A transition area between two biomes
C) An area with a single species of vegetation
D) The climax community of an ecosystem

46. Which organelle is involved in modifying, sorting, and packaging proteins for secretion?
A) Mitochondria B) Golgi apparatus
C) Ribosome D) Lysosome

47. What structure forms during the cytokinesis of animal cells?
A) Cell plate B) Cleavage furrow
C) Spindle fibers D) Nuclear envelope

48. The type of immunity characterized by the presence of antibodies acquired through vaccination:
A) Innate immunity B) Passive immunity
C) Active immunity D) Natural immunity

49. Which of the following describes the role of the complement system in the immune response?
A) It produces antibodies.
B) It enhances phagocytosis and causes lysis of pathogens.
C) It activates T cells.
D) It is involved in the production of hormones.

50. In experimental embryology, constriction experiments are primarily used to study the:
A) Effects of environmental factors on development
B) Mechanisms of cell communication
C) Effects of physical forces on embryo formation
D) Process of gene regulation

51. Which of the following best describes "potency" in embryonic cells?
A) The ability of cells to perform specific functions
B) The range of cell types a stem cell can differentiate into
C) The potential for cells to undergo apoptosis
D) The process of cell division and growth

52. Major Histocompatibility Complex (MHC) molecules are crucial for the:
A) Recognition of self vs. non-self by immune cells.
B) Production of antibodies.
C) Activation of complement proteins.
D) Direct killing of pathogens.

53. An example of a primary immunodeficiency disorder is:
A) Allergic rhinitis
B) Systemic lupus erythematosus
C) Severe combined immunodeficiency (SCID)
D) Rheumatoid arthritis

54. Codominance is best exemplified in:
A) Flower color in snapdragons
B) Blood type AB in humans
C) Height in pea plants
D) All of the above

55. Complementary gene action occurs when:
A) Two genes interact to produce a single trait
B) One gene masks the effect of another
C) Both genes contribute equally to the phenotype
D) None of the above

56. The Rh blood group system is an example of:
A) Multiple alleles B) Incomplete dominance
C) Codominance D) Both A and C

57. Which of the following correctly describes the process of signal transduction for steroid hormones?
A) They bind to cell surface receptors and activate second messengers.
B) They diffuse through the plasma membrane and bind to intracellular receptors.
C) They are stored in vesicles until needed for release.
D) They are modified by the liver before entering the bloodstream.

58. Crossing over occurs during which stage of meiosis?
A) Prophase I B) Metaphase II
C) Anaphase I D) Telophase II

59. Kappa particles in Paramecium are associated with:
A) Mitochondrial inheritance B) Cytoplasmic inheritance
C) Nuclear inheritance D) None of the above

60. Homology modeling in bioinformatics refers to:
A) Constructing phylogenetic trees
B) Aligning DNA sequences to identify similarities
C) Predicting RNA secondary structures
D) Predicting protein structures based on known structures of related proteins

61. The purpose of microarrays in genomics and proteomics is to:
A) Predict RNA structures
B) Compare the expression levels of thousands of genes or proteins simultaneously
C) Predict protein tertiary structures
D) Align DNA sequences

62. The algorithm which is commonly used for sequence alignment:
A) PDB B) GenBank
C) Swiss-PROT D) BLAST

63. Pinocytosis is a form of:
A) Osmosis B) Diffusion
C) Active transport D) Bulk transport

64. The phase in cell cycle that shows greatest variation in duration:
A) G1 phase B) G2 phase C) S phase D) None of these

65. In ECG the P-Q interval represents:
A) Auricular diastole B) Ventricular diastole
C) Auricular systole D) Ventricular systole

66. In electron transport chain, terminal cytochrome donating electrons to Oxygen is:
A) a3 B) c C) a D) b

67. All the following amino acids are essential **except**:
A) Lysine B) Phenyl alanine
C) Methionine D) Tyrosine

68. The endocrine gland that becomes inactive during old age:
A) Thyroid B) Thymus C) Pineal D) Pituitary

69. Sphingosine is the backbone of all the following **except**:
A) Ceramide B) Cerebroside C) Ganglioside D) Lecithin

70. Which organism is known as jelly fish?
A) Physalia B) Tilapia C) Obelia D) Aurelia

71. Main function of semicircular canals is:
A) Maintain equilibrium of body
B) Perceive sound vibrations from outside
C) Transmit sound waves to middle ear
D) None of the above

72. Coral reef of horse shoe-shape, not enclosing any island but having a central lagoon is:
A) Barrier reef B) Atoll
C) Fringing reef D) None of these

73. Example for catadromous migration in fishes :
A) Anguilla B) Salmon C) Petromyzon D) All of these

74. The largest 'carbon sink' on earth:
A) Ocean B) Forest C) Soil D) Deserts

75. Match the following List I with List II :

List I	List II
a. Kaziranga National Park	1. Uttarakhand
b. Valmiki National Park	2. Bihar
c. Corbett National Park	3. Rajasthan
d. Ranthambhore National Park	4. Assam

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

76. Which among the following is **not** a greenhouse gas?
A) Carbon dioxide B) Nitrous oxide
C) Nitrogen dioxide D) Methane

77. Water vascular system is seen in:
A) Mollusca B) Porifera C) Cnidaria D) Echinodermata

78. Assertion (A) : Shark is a poikilothermic animal.
Reason (R) : It is not capable of regulating its body temperature according to the temperature of the environment.

A) Both A and R are true and R is not correct explanation of A
B) A and R are true and R is the correct explanation of A
C) A is true but R is false
D) Both A and R are false

79. Pulse is usually detected at :
A) Carotid artery B) Radial artery
C) Branchial artery D) Femoral artery

80. Isinglass is obtained from:
A) Mollusca B) Fish
C) Sponges D) Silkworm cocoon

81. Select the correct order of steps in PCR:
A) Denaturation, Annealing, Extension
B) Annealing, Denaturation, Extension
C) Extension, Denaturation, Annealing
D) Annealing, Extension, Denaturation

82. Assertion (A): Wings of birds and bat are known as analogous structures
Reason (R) : Analogous structures are result of divergent evolution and developed due to adaptation to different needs.

A) Both A and R are true and R is the correct explanation of A
B) Both A and R are true and R is not correct explanation of A
C) A is true but R is false
D) A is false, R is true

83. Anaphylaxis is:
A) Hypervitaminosis
B) Hypersensitivity reaction
C) Neuro degenerating disorder
D) Both A & C

84. Pseudocoelom is characteristic of :
A) Aschelminthes B) Platyhelminthes
C) Arthropods D) Chordates

85. Biston betularia is associated with :
A) GM crops B) Natural Selection
C) Zoonotic diseases D) Cell free cloning

86. Intrinsic factor is secreted by:
A) Mast cells B) Parietal cells C) Chief cells D) Pancreatic acini

87. Caspase is associated with:
A) Apoptosis B) Gene cloning C) ELISA D) Both B & C

88. Specialized proteins which allow individual polypeptide chains to fold into stable configuration :
A) Plasmins B) G- proteins C) Chaperons D) Cathepsins

89. Inheritance of yellow coat colour in mice is an example of :
A) Multiple allelism B) Lethal genes
C) Codominance D) Incomplete dominance

90. Bacterial conjugation was discovered by:
A) Beadle and Tatum B) Griffith
C) Lederberg and Tatum D) Robert Koch

91. In electron microscope, the source of illumination is:
A) Mercury lamp B) Xenon arc lamp
C) Laser beam D) Tungsten metal

92. The sum of the observations in a data set containing 12 observations is 144 and the standard deviation of the data set is4. If 4 is added to every observation in the data set then, what will be the coefficient of variation of the resulting data set?
A) 25 % B) 20 % C) 30 % D) 40 %

93. Light gathering capacity of an objective lens in microscope is
A) Angular aperture B) Numerical aperture
C) Resolving power D) Cohler illumination

94. Match the following List I with List II :

List I	List II
a. Diffuse placenta	1. Cow
b. Cotyledonary placenta	2. Primates
c. Zonary placenta	3. Horse
d. Meta discoidal placenta	4. Cat

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

95. Caecilians belong to:
A) Anura B) Squamata C) Caudata D) Gymnophiona

96. Reptiles flourished and attained maximum development during the era
A) Triassic B) Carboniferous
C) Mesozoic D) None of these

97. The causative organism of Lyme disease is a:
A) Fungus B) Bacteria C) Tick D) Helminth

98. The process not involved in gastrulation:
A) Invagination B) Ingression C) Notogenesis D) Delamination

99. Cells not associated with Porifera :
A) Choanocytes B) Amoebocytes C) Porocytes D) Plasmatocytes

100. Planula is the larval form of :
A) Obelia B) Sea urchin C) Fasciola D) None of these

101. Whales comes under the Order:
A) Cetacea B) Sirenia C) Lagomorpha D) Rodentia

102. Ketosis is associated with:
A) Diabetes insipidus B) Diabetes mellitus
C) Gastritis D) Pancreatitis

103. Glycoprotein laminin is involved in:
A) Immune response B) Blood coagulation
C) Tumour formation D) Cell recognition and adhesion

104. In eukaryotes, beta oxidation takes place in:
A) Cytoplasm B) Mitochondria
C) Endoplasmic reticulum D) Both A & B

105. Most of the sex-linked genes are found on:
A) Y chromosome B) X chromosome
C) Nucleolus D) None of the above

106. Glyceraldehyde is an example of:
A) Pentose sugar B) Tetrose sugar
C) Hexose sugar D) Triose sugar

107. Diagrammatic representation of Karyotype is :
A) Idiogram B) Polygram
C) Phylogenetic tree D) None of the above

108. The concept of 'Scala Naturae' was proposed by :
A) Aristotle B) Linnaeus C) Meyer D) Pythagoras

109. The hormone involved in regulation of biological rhythm is :
A) Cortisol B) Melanin C) Melatonin D) Epinephrin

110. The microscope employs for observing live, unstained specimens :
A) Fluorescent microscope B) Transmission electron microscope
C) Phase contrast microscope D) Scanning electron microscope

111. Which among the following are **wrong** about reptiles?
1. Skull is dicondylic 2. Abdominal ribs are not true ribs
3. Truncus arteriosus is present

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

112. Which among the following is an example for alien species of fish?
A) *Etroplus maculatus* B) *Cyprinus carpio*
C) *Rastrelliger* D) All of the above

113. Paralogous sequences arise due to:
A) Insertion B) Deletion C) Speciation D) Gene duplication

114. Select the post translational modification:
A) Capping B) Tailing
C) Protein folding D) Both A& C

115. Mutation in fibrillin gene causes ----- syndrome.
A) Noonan B) Patau's C) Williams D) Marfan's

116. Match the following List I with List II:

List I	List II
a. Typhoid	1. Bacteria
b. Kala-azar	2. Virus
c. Candidiasis	3. Protozoa
d. Herpes simplex	4. Fungus

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

117. Major portions of junk DNA consists of:
A) Pseudogenes B) Heterochromatin
C) Highly repetitive DNA D) Transposons

118. Methylation of DNA results in:
A) Inactivation of genes B) Activation of genes
C) Folding of proteins D) No effect on genes

119. The specific control of transcription involves which motif ?:
A) Zinc finger B) Leucine Zipper
C) Heix-turn-heix D) All the above

120. The arm in tRNA which is capped with a sequence of CCA:
A) The acceptor arm B) The D arm
C) The anticodon arm D) The variable arm
