A

21703 **120 MINUTES**

1. Inflorescences are distinguished by branching. Identify the characteristic inflorescence in Solanum species:
   A) Amentum B) Drepanium
   C) Bostryx D) Rhipidium

2. Carbohydrates are localized by histochemical method using Periodic acid Schiff's (PAS) Stain. The major ingredient in Schiff reagent is:
   A) Basic fuchsin B) Congo red
   C) Methylene-blue & eosin D) Azure B

3. The first genetic maps were developed using the genes as markers because:
   A) The gene location on the chromosome could be easily viewed by the banding patterns like in the polytene chromosomes
   B) The phenotype governed by the gene could be visually observable and its pattern of inheritance followed.
   C) Genes spanned larger regions than the present day available DNA markers like SNPs
   D) The genes specifying a given phenotype could be easily cloned.

4. The two most unique climatic factors influencing the biomes distribution around the world:
   A) Latitude & temperature
   B) Altitude & temperature
   C) Temperature & precipitation
   D) Humidity & temperature

5. The size of an isolated genome is 5.6×10^6 Kb and the mean value of cloned fragment size is 40Kb. How many minimum numbers of clones are needed to represent a particular sequence?
   A) 1.4×10^5 B) 2.8×10^5 C) 1.4×10^6 D) 2.8×10^6

6. Plant tissue culture technique that is commonly employed to analyze the plant metabolic processes or to produce valuable secondary metabolites or recombinant proteins, often with plant genetic engineering
   A) Hairy root culture B) Somatic embryogenesis
   C) Somatic hybridization D) Protoplast culture

7. Identify the correctly matched pairs
   1. High yielding chickpea mutant varieties : Pusa-408, Pusa-413
   2. Allotetraploid : Raphanobrassica
   3. Allopolyploidy : Triticale

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

8. Which among the following statements are connected with Plant Breeders' Rights?
   1. Rights granted to the breeder of a new variety of plant that give the breeder exclusive control over the propagating material (including seed, cuttings, divisions, tissue culture) and harvested material (cut flowers, fruit, foliage) of a new variety for a number of years
   2. PBR under the Agreement on Trade-Related Aspects of Intellectual Property Rights, a component of the World Trade Organization
   3. UPOV (the Convention of the International Union for the Protection of New Varieties of Plants) international treaty that guarantees to plant breeders in member nations national treatment and a right of priority.

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

9. Observe the following bioinformatics tools and select the correct statement/s that properly explain the tool
   1. Clustal Omega: Globally used in molecular graphics program for visualizing 3-D structures of proteins, nucleic acids and small molecules.
   2. RasMol : Fast and scalable program used for multiple sequence alignment. It uses seeded guide trees and a new HMM engine that focuses on two profiles to generate these alignments. The program requires three or more sequences in order to calculate the multiple sequence alignment, for two sequences use pair wise sequence alignment tools.
   3. BLAST: An algorithm for comparing biological sequence information, such as the amino-acid sequences of protein or nucleotide sequences

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

10. The causative organism of False Smut of Paddy.
    A) Ustilaginoidea virens B) Cephaleuros parasiticus
    C) Hemileia vastatrix D) Uromyces coronatus

11. Secondary databases contain information derived from primary data such as sequences, active site residue of proteins and so on. Which of the following is an example for secondary database?
    A) OMIM B) EMBL
    C) SWISSPROT D) All the above

12. During C2 photo respiratory pathway, which of the following metabolite is transported from chloroplast to peroxisome?
    A) Glycerate B) Glyoxylate C) Glycine D) Glycolate

13. Which one of the following properties of aquaporins given below is / are correct?
    1. Aquaporins are water channels in membrane.
    2. Some aquaporins also transport uncharged molecules like NH3.
    3. The activity of aquaporins is regulated by phosphorylation.
    4. The activity of aquaporin is regulated by calcium concentration.

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

14. Nitrogen fixation is a process of converting molecular nitrogen into ammonia. Nitrogenase is the key enzymes in the process. The production and activity of nitrogenase is highly regulated. Which among the following features is/are correct with the enzyme?

1. Nitrogen fixation requires energy equivalent to about 150 calories per mole of nitrogen gas
2. Nitrogenase encoding gene is under a constitutive promoter.
3. Nitrogenase is highly labile to oxygen.
4. Endogenous availability of the cofactor of nitrogenase enzyme is very low.

Which one of the above statements is/are correct?

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

15. Analyze the statements related to Polyclonal antibodies and select the true ones:

1. Polyclonal antibodies (pAbs) are mixture of heterogeneous which are usually produced by different B cell clones in the body. They can recognize and bind to many different epitopes of a single antigen
2. Antibodies are produced *ex vivo* using tissue-culture techniques
3. Inexpensive and relatively quick to produce (+/- 3 months) and Antibody affinity results in quicker binding to the target antigen

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

16. Observe the RNA silencing steps and arrange them sequentially to explain the event

1. RNA with inverted repeats hairpin/panhandle constructs
2. ds RNA
3. mi RNAs / si RNAs
4. RNA-induced silencing complex
5. Destruction of target mRNA

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

17. Which among the following is/are Chromatin remodeling factors?

1. Histone chaperones 2. Histone modifying enzymes
3. ATP-dependent chromatin remodeling complexes

A) 1 & 3 only B) 2 only C) 2 & 3 only D) All the above

18. Translated proteins are transferred to ------ where they are modified and packaged for distribution.

A) Golgi apparatus B) Ribosomes
C) Endoplasmic reticulum D) Nucleus

19. What may be the possible reason in Prokaryotic cells can have more than one functional start codon per mRNA?

A) No introns in Prokaryotic cells.
B) In prokaryotes, tRNA molecules are made by RNA polymerase II
C) Two separated sequences like the -10 box and the -35 box promoters are seen in Prokaryotes.
D) Prokaryotic ribosomes bind to Shine-Dalgarno sequences.

20. Which of the following is **not** employed for degrading RNA from RNA: DNA hybrid in replication?
A) RNase A - rNTP facilitator
B) RNase H - dissolves RNA in eukaryotes
C) Polymerase I - hydrolyses RNA in the 5' – 3' direction
D) Exonuclease - dNTP is digested

21. Observe the statements connected with DNA Repair mechanism and chose the correct ones
1. DNA polymerase involved in Base excision repair mechanism is DNA polymerase β
2. Chloroplast genome lack DNA repair mechanism
3. Recombinational repair event is often due to many thymidine dimer formation and associated large gaps in a strand
4. DNA glycosylase facilitates the base excision repair and function in eliminating the

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

22. In an experiment, you synthesized a fluorescent probe against a gene that has been deleted. You expose the DNA to the probe and try to visualize it under fluorescent microscope. What will you see?
A) Many regions in the DNA that emit fluorescence
B) Most parts of the chromosome emits fluorescence
C) Fluorescence will be correspond to the gene of your interest
D) Nothing is visible under fluorescence microscope

23. Glutamic acid in protein A was replaced by glutamine molecule to synthesize the new protein B. Which tool can resolve these two types of proteins?
A) Pulse field electrophoresis B) Isoelectric focusing
C) Gel filtration D) SDS-PAGE

24. Which of the following cycle/pathways will be affected by a cell containing a nonfunctional copy of the protein- the guardian of the genome p53?
1. Apoptotic pathways 2. DNA repair pathways
3. Ability to arrest the cell cycle

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

25. Select the correctly matched pair/s:
1. Microtubules - long, hollow cylinders, made up of tubulin protein units
2. Microfilaments – double stranded helical polymers, made up of actin proteins
3. Intermediate filaments - composed of a variety of proteins that are expressed in different types of cells

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

26. Analyze the statements given below with cell cycle regulators that cause key events, such as DNA replication or chromosome separation and choose the correct ones.

1. Cyclin-dependent kinases that phosphorylate specific target proteins. The attached phosphate group acts like a switch, making the target protein more or less active.
2. Maturation-promoting factor complexes add phosphate tags to several different proteins in the nuclear envelope, resulting in its breakdown, and also activate targets that promote chromosome condensation and other M phase events
3. Maturation-promoting factor also triggers its own destruction by activating the anaphase-promoting complex/cyclosome (APC/C), a protein complex that causes M cyclins to be destroyed starting in anaphase.

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

27. Analyze the statements connected with Transduction and chose the correct ones
1. It does not require physical contact between the cell donating the DNA and the cell receiving the DNA, and it is DNAase resistant.
2. It happens only through lytic cycle.
3. It is important as it explains the mode by which antibiotic drugs become ineffective due to the transfer of antibiotic-resistance genes between bacteria.

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

28. Identify the family that shows the characters such as fleshy leaves, hairy or scarious stipulate, unilocular ovary with 2 to many campylotropous ovules on a basal central placenta with 2-5 styled condition

A) Brassicaceae B) Portulaceaceae
C) Amaranthaceae D) Polygalaceae

29. Flowers are unisexual, hypogynous, androecium 4-5, filaments incurved in bud, anthers explosive, gynoecium 1, ovary unilocular, superior, style 1 and seed endospermic. The family which shows these characters is

A) Arecaceae B) Euphorbiaceae
C) Urticaceae D) Poaceae

30. Systematic essential steps are noticed in the preparation of paraffin sections before staining has begun. Select the correct sequence for paraffin embedded sections preparation

A) Fixation -Clearing – Dehydration –Infiltration – Embedding -Sectioning
B) Fixation – Dehydration-Infiltration –Clearing – Embedding -Sectioning
C) Fixation – Dehydration –Clearing –Infiltration – Embedding -Sectioning
D) Fixation – Dehydration –Clearing- Embedding –Infiltration –Sectioning

31. Select the mismatched pairs (thallus nature: species)
1. Coenobium – Pandorina
2. Unicellular, motile – Chlorella
3. Filamentous, unbranched – Oedogonium
4. Heterotrichous – Ulothrix

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

32. Anomalous secondary growth is characterized by the formation of successive rings of cambium. This is noticed in the species
A) Boerhaavia B) Bignonia C) Tinospora D) Mirabilis

33. Pollen allergy, a common syndrome includes the symptoms such as:
1. Nasal congestion 2. Sinus pressure with facial pain 3. Running nose
4. Itchy, watery eyes 5. Decreased sense of taste or smell
A) 1, 2, 3, 4, 5 B) 1, 3, 4 & 5 only
C) 1, 2, 3 & 5 only D) 1, 2, 3 & 4 only

34. Which among the following pairs of fungi are correctly matched?
1. Earthstars = Astraeus 2. Poroid Fungi = Polyporus
3. Artist's Bracket = Ganoderma

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

35. Select the mismatch (plant vs family) from the given pairs:
A) Shorea robusta – Dipterocarpaceae
B) Lactuca sativa – Fabaceae
C) Hemidesmus indicus – Asclepiadaceae
D) Mentha arvensis - Lamiaceae

36. Identify the correct combination of Carnoy's solution, the common fixative in microtechnique:
A) 60% ethanol, 30% chloroform and 10% glacial acetic acid
B) 50% ethanol, 40% chloroform and 10% glacial acetic acid
C) 60% ethanol, 20% chloroform and 20% glacial acetic acid
D) 40% ethanol, 30% chloroform and 30% glacial acetic acid

37. Megaspore mother cell divides mitotically thrice to form 8 nuclei. The embryosac is unreduced and have same number of chromosomes and genetic material is known as
A) Apospory B) Diplospory
C) Adventive embryony D) Parthenogenesis

38. Lichens are eaten by many different cultures across the world especially during famine periods; others as a staple food or even a delicacy. Identify the food lichens:
A) Bryoria B) Umbilicaria
C) Cladina D) All the above

39. Observe the statements with Equisetum and chose the correct ones:
1. Homosporous pteridophyte
2. Gametophyte is homothallic
3. Antherozoid is spirally coiled with the lower part is expanded with tuft of flagella attached to the anterior end
4. Archegonium was embedded without neck cells, neck canal cells, and the venter consists of ventral canal cell and an egg

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

40. Who is known as the father of Ethnobotany?
A) Schultes B) Colines C) Jones D) Harshberger

41. Spot out the binomial of cowpea:
A) Lathyruss sativus B) Vigna unguiculata
C) Pisum sativum D) Lablab purpureus

42. Arborescent Lycopods like Lepidodendrales was evolved during:
A) Devonian of Paleaozoic B) Carboniferous of Paleaozoic
C) Jurassic of Mesozoic D) Triassic of Mesozoic

43. The ethnic plant species *Ficus benghalensis* is used by the native people for curing the ailment
A) Hepatitis B) Jaundice C) Mensis pain D) All of these

44. Observe the statements with Ginkgoales and select the correct ones:
1. Luxuriance and worldwide distribution during Permian period of Mesozoic age
2. Wood is pycnoxylic
3. Dichotomous venation is usually present in the leaves
4. Spermatozoids are motile and contain spiral bands of flagella

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

45. Identify the species with the following features - Stem usually had large pith, narrow vascular cylinder with thick cortex and a number of gum canals, small amount of secondary growth, scalariform thickenings; pitted thickenings rather rare, leaf traces were direct and no girdles.
A) Lyginopteris B) Cordaites
C) Williamsonia D) Cycadeoidea

46. Specimen designated from the original material as the nomenclatural type, in conformity with Art. 9.9 and 9.10, if no holotype was indicated at the time of publication, or if it is missing, or if it is found to belong to more than one taxon is known as:
A) Lectotype B) Paratype C) Neotype D) Epitype

47. Sort out the pollutants released from Automobile exhaust?
A) Carbon compounds, sulphur compounds, Hydro carbons
B) Nitrogen compounds, sulphur compounds, Hydro carbons
C) Nitrogen compounds, carbon compounds, Hydro carbons
D) Nitrogen compounds, sulphur compounds, particulate matter

48. Consider the following statements related to Ecological niche and select the correct ones
1. A niche is specific functional role of an organism
2. No two species can occupy the same niche at the same time
3. Two species can occupy the same niche at the same time in different habitats

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

49. Glycogen and cellulose are polysaccharides made up of
A) Both shows helical structures but with varied degree of helicity
B) Helical and β-sheet structure, respectively
C) Both shows β-sheet structures
D) β-sheet and Helical structure respectively

50. Analyze the statements connected with Succession and select the correct ones:
1. Increased productivity.
2. The shift of nutrients from the reservoirs.
3. Increased diversity of organisms with an increase in the niche development
4. A gradual decline in the complexity of food webs.

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

51. The pollutant gas which slows down our reflexes and make us confused and sleepy?
A) Carbon dioxide B) Carbon monoxide
C) Nitrogen dioxide D) Ozone

52. Large ecosystem having distinct types of vegetation and wildlife is known as:
A) Biogeographic region B) Biome
C) Biogeographic provinces D) Biosphere reserve

53. Identify the forest types in Kerala.
1. Tropical Moist Deciduous 2. Tropical Dry Deciduous
3. Tropical Wet Evergreen 4. Mountain Sub Tropical

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

54. Solar fuel is a synthetic fuel produced from solar energy i.e., the light is converted to chemical energy via reducing protons to hydrogen, or carbon dioxide to organic compounds is an example for:
A) First -generation biofuels B) Second-generation biofuels
C) Third-generation biofuels D) Fourth-generation biofuels

55. Monoclimax Theory of Clements describes the origin of dynamic ecology. Identify the major assumptions of the theory from the given statements:

1. All successions of a region lead through time to the same adult organism (the climax) regardless of earlier site differences.
2. Climatic factors determine the dominant species that can be present in a region, and completion results in selection of one or more species as the final dominants.
3. Although climax is permanent because of its harmony with a stable habitat, the equilibrium is dynamic and not static.

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

56. Which among the following is/are examples of co-evolution?
1. Mutualism 2. Host-parasite 3. Predator-prey relationships between species
4. Competition within or between species

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

57. Which among the following statements substantiates the hypotheses about the origin of life?
1. Oparin-Haldane hypothesis suggests that life arose gradually from inorganic molecules, with building blocks like amino acids forming first and then combining to make complex polymers
2. Miller-Urey experiment provided the first evidence that organic molecules needed for life could be formed from inorganic components
3. RNA world hypothesis, which suggests that the first life was self-replicating RNA

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

58. Identify the correctly matched pair of Green House Gases (GHG) vs Global warming potential from the given table

GHG	GWP (100-year)
1. Carbon dioxide	1
2. Methane	310
3. Nitrous oxide	21

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

59. Identify the molecule which has the highest diffusion coefficient in plasma membrane?
A) Glycophorin B) F0-F1 ATPase
C) Insulin receptor D) ABC transporters

60. Analyze the statements given below with Fast protein liquid chromatography (FPLC) and chose the correct ones.
1. A form of liquid chromatography that is often used to analyze or purify mixtures of proteins
2. Separation is based on ionic charge difference
3. The buffer flow rate is controlled by a positive-displacement pump and is normally kept constant, while the composition of the buffer can be varied by drawing fluids in different proportions from two or more external reservoirs.
4. The stationary phase is a resin composed of beads, usually of cross-linked agarose, packed into a cylindrical glass or plastic column.

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

61. In a competitive inhibition of enzyme catalyzed reaction
A) V_{max} is increased and K_m is decreased
B) V_{max} is increased and K_m is increased
C) V_{max} is normal and K_m is decreased
D) V_{max} is normal and K_m is increased

62. Analyze the statements in connection with ethylene vs abscission and select the correct ones.

1. Ethylene accelerates the rate of abscission by inducing the synthesis of wall hydrolases in the abscission zone.

2. IAA moving acropetally from the leaf blade is thought to retard abscission by maintaining the abscission zone in an ethylene-insensitive state.

3. It also inhibits the expression of genes encoding abscission-specific cellulases and polygalact uranases.

4. As leaves age, the auxin concentration drops, and the ethylene-induced abscission syndrome commences. Abscisic acid and jasmonates also reported to induce abscission

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

63. Analyze the features with Marchantia and select the correct statements from the given options:

1. Sex organs are born on the stalked antheridiophore and archegoniophore.

2. The upper epidermis consists of air pores, which open in the air chamber present in the photosynthetic zone. The upper epidermis lack chloroplasts.

3. Beneath the air chamber and photosynthetic zone lies the storage zone. It lacks chloroplasts and is made up of parenchymatous cells. They store protein, starch, oil and mucilage.

4. The smooth walled rhizoids and scales are extended from the lower epidermis.

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

64. Flow cytometry is employed in research connected with:
A) Cell counting & sorting
B) Determining cell characteristics and function
C) Detecting microorganisms
D) All the above

65. Separation of isomers is carried effectively using:
A) Counter-current chromatography
B) Chiral chromatography
C) Paper chromatography
D) Thin layer chromatography

66. Passive transport is the simplest method of transport. Consider the statements in connection with passive transport and select the correct ONES

1. Based on the thermodynamics of the system, particles will move from an area of high concentration to an area of low concentration in order to increase the entropy of the cell.
2. Particle movement will occur spontaneously as the free energy (Gibbs free energy; ΔG) of the system is negative
3. If $\Delta G<0$, then particle movement is considered to be spontaneous; whereas, $\Delta G>0$ particle movement requires the input of energy to move in the desired direction. The properties of the membrane must also be considered when determining the rate of flow of the substrate. Darcy's Law can be used to determine flow rate.

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

67. ----- is referred to as Puff ball fungus:
A) Claviceps B) Ustilago C) Morchella D) Lycoperdon

68. Laminarin is present in:
A) Cryptophyta B) Bacillariophyta
C) Rhodophyta D) Phaeophyta

69. Match List I with List II:

List I	**List II**
a. Fungi	1. Volutin
b. Bacteria	2. Floridin starch
c. Diatoms	3. Diaminopimelic acid
d. Red algae	4. Chitin

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

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

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

71. An extreme xerophytic gymnosperm with a single pair of opposite leaves:
A) Wielandiella B) Pentaxylon C) Ginkgo D) Welwitschia

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

73. A host for a pathogen to tide out unfavourable condition:
A) Collateral host B) Subsidiary host
C) Alternate host D) Principal host

74. Viral diseases in plants can be controlled by:
A) Isolation B) Roguing
C) Field sanitation D) All of these

75. A member of Sphaerocarpales
A) Riella B) Targionia C) Cyathodium D) Reboulia

76. Choose the Correct statements
1. Minimal media is without nutrients
2. Minimal media is without organic compounds other than a carbon source
3. Minimal media has all inorganic ions
4. Minimal media has no inorganic ions

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

77. Find the correct sequence
1. Entry of phage DNA
2. Control of synthetic machinery
3. Adsorption of phage particle to bacterial cell
4. Assembly of phage particles from DNA and protein
5. Penetration of tail through bacterial cell wall
6. Lysis of bacterial cell

A) 5, 6, 1, 3, 2, 4 B) 3, 5, 1, 2, 4, 6
C) 6, 3, 2, 1, 5, 4 D) 1, 3, 4, 2, 6, 5

78. An example of anabolic pathway:
A) Splitting of sucrose into glucose and fructose
B) Synthesis of proteins from amino acids
C) Breakdown of protein
D) Break down of DNA

79. Match List I with List II

List I	List II
a. Luxury genes	1. Express until the presence of an inhibiting stimulus
b. Constitutive genes	2. Lacks introns
c. Repressible gene	3. Expressed in different cells and tissues
d. Processed genes	4. Active in all types of cells

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

80. Monosaccharides are classified based on number of carbon atoms. Galactose is an example for:
A) Triose B) Tetrose C) Pentose D) Hexose

81. Ion exchange resin used in ion exchange chromatography
A) CM sephadex B) Polyacrylamide
C) Silica D) Starch

82. Starch is a:
A) Heteropolysaccharide B) Mixture of amylose and amylopectin
C) Polymer of amylose D) Monosaccharide

83. Factors affecting migration of macromolecules in electrophoresis:
A) Size and shape of molecule, voltage, current, buffer
B) Voltage and size of molecule
C) Size and shape of molecule, voltage, current
D) Size and shape of molecule

84. In DNA, glycosidic bond links:
A) Phosphate molecule to first carbon of deoxyribose
B) Nitorgenous base to first carbon atom of deoxyribose sugar
C) Nitrogenous base to fifth carbon atom of deoxyribose sugar
D) Phosphate molecule to third carbon of deoxyribose

85. A family in the series Bicarpellatae as per Bentham and Hookers Classification
A) Apiaceae B) Combretaceae
C) Asteraceae D) Oleaceae

86. A duplicate of Holotype:
A) Neotype B) Paratype C) Lectotype D) Isotype

87. A method by which cell uses membranes to couple the energy released by the oxidation of cofactors to yield ATP:
A) Glycolysis B) Redox potential
C) Chemiosmotic coupling D) Photophosphorylation

88. ------ is most commonly used for identification of individuals by DNA fingerprinting:
A) Satellite DNA B) VNTR
C) Heterogenous RNA D) Microsatellite DNA

89. A family with syngenesious anther:
A) Amaranthaceae B) Cucurbitaceae
C) Acanthaceae D) Asteraceae

90. The correct sequence of polypeptide formation
1. Amino acetylation of tRNA
2. Formation of initiation complex
3. Activation of amino acids
4. Binding of AA tRNA at site A of larger subunit of ribosomes
5. Termination of polypeptide chain
6. Translocation from A site to P site
7. Formation of peptide bond

A) 4, 1, 2, 7, 6, 3, 5 B) 3, 1, 2, 4, 7, 6, 5
C) 2, 3, 1, 4, 7, 6, 5 D) 1, 2, 4, 6, 7, 3, 5

91. Choose the correct statements:
1. Typical Inflorescence in Asteraceae is Head
2. Gamopetalous corolla is found in Caryophyllaceae
3. Androecium is didynamus in Lamiaceae
4. Syncarpous gynoecium is present in Anonaceae

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

92. Choose the correct statements:
1. TEM uses low voltage electron beam to create a clear image
2. TEM uses high voltage electron beam to create a clear image
3. Electron gun is commonly fitted with tungsten filament cathode as electron source
4. Electron beam is emitted by elelctromagnetic lenses

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

93. The function of Cryoprotectant is:
A) Cause osmotic stress
B) Protect biological tissue from damage after ice formation
C) Cool the cells faster to avoid crystal formation
D) Cool the cells to a point in which liquid within the cell will be viscous

94. Value of one ocular micrometer division:
A) $\frac{\text{Number of divisions on the stage micrometer}}{\text{Number of divisions on the ocular micrometer}} \times 100$
B) $\frac{\text{Number of divisions on the stage micrometer}}{\text{Number of divisions on the ocular micrometer}} \times 10$
C) $\frac{\text{Number of divisions on the ocular micrometer}}{\text{Number of divisions on the stage micrometer}} \times 100$
D) $\frac{\text{Number of divisions on the ocular micrometer}}{\text{Number of divisions on the stage micrometer}} \times 10$

95. Hypanthodium is present in:
A) Euphorbia B) Hyptis C) Ficus D) Colocasia

96. Nyctanthes arbo- tristis belongs to the family:
A) Apocynaceae B) Nyctanginaceae
C) Cruciferae D) Oleaceae

97. Chromosomes with kinetochore diffused along the entire length of chromosome:
A) Polycentric chromosome B) Dicentric chromosome
C) Holokinetic chromosome D) Isochromosome

98. Choose the correct statements:
1. Mutations are helpful to elucidate functions of gene
2. Mutants enable one to learn about metabolic regulation
3. Mutations cannot be induced for biochemical blocks
4. In vitro biochemical activity can be correlated with in vivo functions using mutations

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

99. Choose the correct statement
A) Nucleoplasm is Feulgen positive
B) Nucleoplasm in bacterial cell is located in the side of cell
C) Slimy capsule of bacterial cell is secreted gas vesicle
D) In bacteria nuclear region is surrounded by nuclear membrane

100. Man made colourless, odourless, easily liquefiable chemical with great potential for global warming:
A) Methane B) Nitrous oxide
C) Chlorofluorocarbons D) CO_2

101. Choose the correct statements
1. Golgi complex is involved in storage of synthetic proteins
2. B oxidation of fatty acids occur in mitochondria
3. Lysosomes act as tore house of hydrolysing enzymes
4. Vacuoles act as osmoregulatory structures in the cell

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

102. General morphology of a set of chromosomes at somatic metaphase of an individual
A) Centromere
B) Karyotype
C) Super numerary chromosmes
D) Euchromatin

103. Continuous process by which living organisms have come to their present forms and functions:
A) Organic evolution B) Inorganic evolution
C) Progressive evolution D) Retrogressive evolution

104. Non coding sequence upstream is organized into promoter region with a set of seven nucleotides in the middle
A) Antisense region B) ORI
C) Initiator site D) Pribnow box

105. A chemical mutagen used for breeding:
A) EMS B) UV
C) Methylene blue D) Cobalt

106. Integral membrane proteins that form water selective channels across the membrane:
A) Aquaporins B) Ion channel
C) Plasmodesmata D) Hydraulic pore

107. A vitamin which is growth promoting, anti infective, soluble in fats and if present in excess stored in liver:
A) Vitamin A B) Vitamin B C) Vitamin C D) Vitamin K

108. If terminal bud of a plant is removed, what will be the fate of the plant?
A) Plant will stops growing
B) Plant will die
C) Shoot will die
D) lateral buds will grow and cause profuse branching

109. Importance of pentose phosphate pathway:
A) Alternate route for carbohydrate production, produce ribose sugars
B) Produce ribose sugars, alternate route for carbohydrate degradation, Provides erythorose 4 phosphate, and many number of tetroses and pentoses
C) Enhanced Co2 fixation and ribulose production
D) Alternate route to carbohydrate oxidation in the absence of oxygen

110. A grazing food chain:
A) Autotroph → herbivore → primary carnivore → secondary carnivore
B) Autotroph → herbivore → decomposers
C) Herbivore → primary carnivore → secondary carnivore
D) Autotroph → carnivore → decomposers

111. Kaziranga wild life sanctuary is mainly for:
A) Sloth bear B) Elephant C) Wild boar D) Rhinoceros

112. Percentage of net production efficiency of an ecosystem:
A) $\frac{\text{Gross primary productivity}}{\text{Incidet total solar radiation}}$ x 100
B) $\frac{\text{Net primary productivity}}{\text{Gross primary productivity}}$ x 100
C) $\frac{\text{Food energy assimilated}}{\text{Food energy ingested}}$ x 100
D) $\frac{\text{Gross primary productivity}}{\text{Net primary productivity}}$ x 100

113. Basis of speciation:
A) Mutation
B) Genetic variation
C) Species diversity
D) Environmental stress

114. A biome with tree less plain, with long winters and little daylight
A) Savannah B) Tundra C) Taiga D) Chapparal

115. A free floating plant on the surface of water:
A) *Ceratophyllum*
B) *Typha*
C) *Nymphaea*
D) *Wolffia*

116. Raw sewage converted to biologically inactive and aesthetically inoffensive state, sludge is formed after:
A) Primary treatment
B) Secondary treatment
C) Tertiary treatment
D) Chlorination

117. A method for production of virus free plants from infected plants
A) Anther culture B) Pollen culture
C) Meristem culture D) Oovule culture

118. Biodegradable natural polymer:
A) Polyurethane B) Polystyrene C) Polyethylene D) Polylactide

119. Golden rice is a genetically modified rice variety for biosynthesis of
A) Vitamin A B) Vitamin B C) Biotin D) Beta karotene

120. A bibliographic database:
A) MEDLINE B) ExPASY C) SRS D) TrEMBL