

A

17203

120 MINUTES

1. Consider List I (chemical compound) and List II (function) and match them

List I

- a. Chloramphenicol
- b. Reserpine
- c. Rotenone
- d. Ascorbic acid

List II

- 1. Alternative electron donor to PS II
- 2. Mitochondrial inhibitor
- 3. Inhibits chloroplastic protein
- 4. Antihypertensive drug

Choose the correct answer code:

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

2. During the course of prolonged starvation and fasting, glucose is synthesized from one of the following metabolic process.

- A) Glycogenesis
- B) Glycolysis
- C) Gluconeogenesis
- D) Fermentation

3. In aroids a foul smell emanates at the time of the emergence of the inflorescence, which basically is due to alternative oxidation pathway. Arrange the various steps of the respective process and related events in appropriate order.

- 1. Volatilisation of indoles and sulphur compounds
- 2. Temperature generation
- 3. Oxygen is converted to water
- 4. Movement of electrons from Ubiquinone to alternate oxidase

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

4. Following are a few statements related to the mitochondrial electron transport in plants. Pick out the correct statements.

- 1. NAD(P)H dehydrogenase complex facing intermembrane space facilitate oxidation of NAD(P)H
- 2. NAD(P)H dehydrogenase is sensitive to rotenone
- 3. Alternate oxidase supports cyanide resistant respiratory pathway
- 4. Terminal oxidase is sensitive to potassium cyanide

- A) 1,2,3 only are correct
- B) 2,3,4 only are correct
- C) 1,3,4 only are correct
- D) All are correct

5. In the water oxidizing clock which metal element functions as the pivotal component?

- A) Mg^{2+}
- B) Mn^{2+}
- C) Cu
- D) Fe

6. What is meant by lichenometry?
 A) Study regarding the age of lichens.
 B) Study of the age of exposed rock surfaces based on the size of lichen thalli.
 C) Study regarding the calculation of the period in which lichens evolved.
 D) Study regarding the succession of various forms of lichens
7. The pH indicator in the litmus test is a dye extracted from the lichen.
 A) *Umbilicaria esculenta* B) *Parmelia saxatilis*
 C) *Roccella tinctoria* D) *Xanthoria parietina*
8. State whether these statements are true or false.
 1. The acrocarpous mosses are generally those upright mosses with terminal sporangia.
 2. Pleurocarpous mosses produce their sporangia on short, specialized lateral branches or buds and typically are prostrate.
 3. Cladocarpous are those mosses that bear sporophytes terminally on short, lateral branches.
 A) 1 and 2 only are correct B) 2 and 3 only are correct
 C) 1 and 3 only are correct D) All are correct
9. Observe the following definitions and choose the correct ones?
 1. Virion is a complete virus particle, consisting of RNA/DNA surrounded by a protein shell and consisting the infective form of a virus.
 2. Viroids consist solely of short strands of circular, single-stranded RNA without protein coats.
 3. A retrovirus is an infectious agent composed entirely of protein material, called PrP.
 A) 1 and 2 only are correct B) 2 and 3 only are correct
 C) 1 and 3 only are correct D) All are correct
10. Match the resin and the source plant.
 p. Dammar gum l. *Ferula gummosa*,
 q. Frankincense m. *Boswellia sacra*,
 r. Galbanum n. Members of Dipterocarpaceae
 s. Hashish o. *Cannabis indica*,
 A) p-l, q-n, r-m, s-o B) p-l, q-o, r-n, s-m
 C) p-n, q-m, r-l, s-o D) p-n, q-l, r-m, s-o
11. Give the types of electron source for transmission electron microscope, operating on different physical principles.
 A) Thermionic emission B) Schottky emission
 C) Field emission D) All of the above

12. Match the dye with the respective action.
- | | |
|--------------------|---|
| p) Acridine orange | l. is an intense dye used to stain glycogen |
| q) Carmine | m. is a nucleic acid selective fluorescent cationic dye |
| r) Coomassie blue | n. stains cell walls purple |
| s) Crystal violet, | o. non-specifically stains proteins |
-
- | | |
|-----------------------|-----------------------|
| A) p-m, q-l, r-o, s-n | B) p-n, q-o, r-l, s-m |
| C) p-o, q-n, r-m, s-l | D) p-l, q-o, r-n, s-m |
-
13. Which of these sentences stands true for an abzyme?
1. A single molecule of an antibody-enzyme, capable of catalyzing the destruction of thousands of target molecules
 2. The efficiency of abzyme technology could permit treatments with smaller doses of medicines at lower costs than are possible today.
 3. An abzyme is used to lower the activation energy of a reaction allowing for the transition state to be possible and the product to be formed.
 4. An abzyme is typically artificially made and is made by having the immune system make antibodies that bind to a molecule that resembles the transition state of the catalytic process that the researchers want to emulate.
- | | |
|-------------------------------|-------------------------------|
| A) 1,2 and 3 only are correct | B) 2,3 and 4 only are correct |
| C) 1,3 and 4 only are correct | D) All are correct |
-
14. Name the post-translational modifications which calmodulin can undergo.
- | | |
|--------------------|---------------------|
| A) Phosphorylation | B) Acetylation |
| C) Methylation | D) All of the above |
-
15. Identify the plant hormone known as anti senescence hormone.
- | | | | |
|--------|----------------|--------------|--------|
| A) IAA | B) Gibberellin | C) Cytokinin | D) ABA |
|--------|----------------|--------------|--------|
-
16. Suggest an appropriate statistical application if the following assumptions are true.
1. K is the number of times an event occurs in an interval and K can take values 0, 1, 2, 3, etc.
 2. The occurrence of one event does not affect the probability that a second event will occur. That is, events occur independently.
 3. The rate at which events occur is constant. The rate cannot be higher in some intervals and lower in other intervals.
- | | |
|--------------------------|-------------------------|
| A) Binomial distribution | B) Poisson distribution |
| C) Normal distribution | D) F distribution |

17. Which is the technique utilised to estimate the methylation of DNA?
 A) Ion-mobility spectrometry
 B) Mass spectrometry
 C) Neutron triple-axis spectrometry
 D) Optical spectrometry
18. What was the earlier name of International Union for Conservation of Nature and Natural Resources (IUCN)?
 A) International Union for Nature and Natural Resources (IUCN)
 B) International Union for Conservation of Nature
 C) International Union for Protection of Nature
 D) International Union for Nature Protection
19. Gamma diversity (γ -diversity) is the total species diversity in a landscape. Who introduced this terminology?
 A) Shannon B) Simpson C) Odum D) Whittaker
20. Identify the correct statements related to Biomagnification.
 1. Non biodegradable
 2. Food chain energetics
 3. Persistent organic pollutant
 A) 1 and 2 only are correct B) 2 and 3 only are correct
 C) 1 and 3 only are correct D) All are correct
21. Jacobsen Syndrome is due to:
 A) Deletion B) Duplication
 C) Translocation D) Inversion
22. Pick out the biological function(s) of RNA silencing.
 A) Immunity against viruses or transposons
 B) Down-regulation of genes
 C) Up-regulation of genes
 D) All of the above
23. To determine the variation in body size of a single species of insect collected from six different places, suggest an appropriate statistical test.
 A) Chi square B) Student t test
 C) F test D) Regression analysis
24. Polygenic traits in crops can be identified by:
 A) QTL mapping B) Cluster analysis
 C) Tandem analysis D) Gene mapping

25. The bending of plants towards unilateral light is due to:
 A) Polar transport of auxin
 B) Auxin degradation in light
 C) Auxin synthesis in shaded area
 D) Lateral distribution of auxin towards shaded area
26. Among the following, which is not an assumption of Hardy Weinberg rule?
 A) No mutation
 B) Random mating
 C) No natural selection
 D) Small population size
27. Below are three mechanism of exon shuffling of which one is proven to be important in gene evolution of rice and other grass species, identify the same.
 A) by the usage of helitrons
 B) by Long-terminal repeat (LTR) retrotransposons
 C) by illegitimate recombination
 D) by the long interspersed element (LINE) -1 mediated 3' transduction
28. Ph chromosome, which is associated with chronic myelogenous leukemia is as a result of:
 A) A translocation between chromosome 22 and chromosome 8.
 B) A translocation between chromosome 21 and chromosome 9.
 C) A translocation between chromosome 22 and chromosome 9.
 D) A translocation between chromosome 21 and chromosome 8.
29. The DNA segments may be mapped by locating the restriction sites through restriction enzymes, called restriction mapping. When this is extended to complete chromosome, it is called:
 A) Chromosome sketching
 B) Chromosome walking
 C) Chromosome reading
 D) Chromosome framing
30. Acrosome of spermatozoon contains:
 A) Protease
 B) Hyaluronidase
 C) Acid phosphatase
 D) All of the above
31. Match the test with its appropriate purpose.
 p. Immunodiffusion test
 q. Immuno-electrophoresis
 r. Radial immuno diffusion
 l. to measure antigen or antibody concentration
 m. to separate several antigens
 n. to detect antigen or antibody in samples
 A) p-l, q-m, r-n
 B) p-m, q-n, r-l
 C) p-n, q-m, r-l
 D) p-l, q-n, r-m

32. Compare the ovule with the appropriate characteristic feature.
- | | | |
|-------------------|----|--|
| p) Campilotropous | l. | Ovule is curved, micropyle is directed towards the surface of origin, chalaza is situated at right angles to the funicle |
| q) Amphitropous | m. | Nucellus and integuments lie more or less at right angles to the funiculus (eg. Ranunculus) |
| r) Hemitropous | n. | Ovule curvature is more prominent and embryo sac is horse shoe shaped |
| s) Circinotropous | o. | Funicle is very long and form a complete circle around the ovule |
- A) p-l, q-m, r-n, s-o B) p-m, q-n, r-o, s-l
 C) p-l, q-n, r-m, s-o D) p-l, q-o, r-m, s-n
33. Compare the amoeboid tapetum with the appropriate characteristic feature.
- | | | |
|--------------------|----|--|
| p) Sagittaria type | l. | Tapetum breaks the wall when microspore mother cells undergo meiosis. |
| q) Butomus type | m. | Formation of periplasmodium occurs when tetrads are formed. |
| r) Sparganium type | n. | Fusion of protoplasts begins at tetrad stage, tapetal cells are multinucleate. |
| s) Triglochin type | o. | Tapetal cells loose their wall when the microspore tetrads are formed. |
- A) p-l, q-m, r-n, s-o B) p-m, q-n, r-o, s-l
 C) p-l, q-n, r-m, s-o D) p-o, q-m, r-n, s-l
34. The viral system used to deliver a therapeutic gene to a specified cell type in gene therapy.
- | | |
|-------------------------|---------------------|
| A) Retrovirus | B) Adenovirus |
| C) Herpes simplex virus | D) All of the above |
35. What are arbuscules?
- A) The spore producing structures
 B) Site of nutrient exchange between the fungus and the host
 C) Propagating structures
 D) Structures formed for defensive purpose
36. What is fuelgen reaction?
- A) DNA-leucobasic fuchsin reacts to form red product
 B) Sugar-leucobasic fuchsin reacts to form red product
 C) Lipid-leucobasic fuchsin reacts to form red product
 D) Protein-leucobasic fuchsin reacts to form red product
37. Heavy charged particle, more toxic than other forms of radiation, not penetrating: These are the properties of which type of radiation?
- | | |
|----------|---------------------|
| A) Alpha | B) Beta |
| C) Gamma | D) All of the above |

38. Which one forms the basis for scintillation counting of radioactivity?
 A) Methods based upon gas ionization
 B) Methods based upon excitation
 C) Methods based upon exposure of photographic emulsions
 D) Methods based upon photo energy
39. Determination of secondary structure of proteins that cannot be crystallised is achieved through.
 A) X ray crystallography B) NMR
 C) Circular dichroism D) Mass spectrometry
40. Which is the predominant auxin biosynthesis pathway in various pathogenic bacteria, such as *Pseudomonas savastanoi* and *Agrobacterium*?
 A) IPA Pathway B) TAM pathway
 C) IAN pathway D) IAM pathway
41. Pick out a non antioxidant in plants from the following:
 A) Vit C B) Alpha tocopherol
 C) Carotenoids D) Cysteine
42. Pick out a process not associated with enzyme purification.
 A) Ammonium sulphate precipitation
 B) Gel filtration chromatography
 C) Western blotting
 D) Dialysis
43. The evolution of genes and the proteins mainly occur due to:
 A) Point mutation B) Chromosomal aberrations
 C) Gene recombinations D) Gene duplication and divergence
44. The CSIR Institute, Centre for Medicinal and Aromatic Plants, is located at
 A) Kanpur B) Lucknow C) Chandigarh D) Kolkata
45. Nitrogen fixation in woody trees is accomplished through the microorganism.
 A) Rhizobium B) Azotobacter
 C) Frankia D) Azospirillum
46. Of the different subunits of G protein, this is responsible for activation of Adenylate cyclase?
 A) Alpha subunit B) Beta subunit
 C) Gamma subunit D) Delta subunit

47. Observe the table showing DNA composition from 3 different species. Which species contains stable DNA?
- | Organism | A:T | C:G |
|----------|-----|-----|
| (a) | 25 | 75 |
| (b) | 50 | 50 |
| (c) | 75 | 25 |
- A) Organism (b) B) Not predictable using this data
C) Organism (a) D) Organism (c)
48. Species selected for making conservation-related decisions, typically because protecting these species indirectly protects the many other species that make up the ecological community of its habitat.
- A) Indicator species B) Keystone species
C) Flagship species D) Umbrella species
49. A biome characterized by coniferous trees consisting mostly of pines, spruces and larches is referred as:
- A) Pine forests B) Temperate forests
C) Temperate deciduous forests D) Boreal forests
50. The chemical having bactericidal activity as a result of increasing the permeability of the bacterial cell membrane, allowing inorganic monovalent cations (e.g. Na⁺) to travel through unrestricted and thereby destroying the ion gradient between the cytoplasm and the extracellular environment.
- A) Valinomycin B) Actinomycin
C) Gramicidin A D) Nicin
51. Which of these viruses is used as a pesticide for crops infested by insects susceptible to contraction?
- A) Cauliflower mosaic virus B) Cucumber mosaic virus
C) Rice tungro virus D) Nuclear polyhedrosis virus
52. An evolutionary substitution of one base for another in an exon of a gene coding for a protein, such that the produced amino acid sequence is not modified is referred as:
- A) Point mutation B) Gene duplication
C) Synonymous mutations D) Non-synonymous mutations
53. Sigma factor in RNA polymerase affects RNA synthesis by
- A) Affecting elongation only
B) Affecting initiation only
C) Affecting both initiation and elongation
D) Affecting termination only
54. The sequence (AGGAGG), which is a ribosomal binding site in bacterial and archaeal messenger RNA, generally located around 8 bases upstream of the start codon AUG.
- A) Pribnow box B) Hogness box
C) Homeo box D) Shine-Dalgarno box

55. An approximately 120 nucleotide-long ribosomal RNA molecule with a mass of 40 kDa and is a structural and functional component of the large subunit of the ribosome in bacteria and eukaryotes.
 A) miRNA B) rRNA C) 5S RNA D) tRNA
56. Which of the pair is not correctly matched?
 A) Alternate oxidase – Cyanide resistant respiratory pathway
 B) Ascorbate peroxidase-Detoxify Hydrogen peroxide
 C) Catalase-Detoxify Hydrogen peroxide
 D) Guaiacol peroxidase- Detoxify guaiacol
57. The gene whose phenotype is masked by the expression of an allele at a separate locus, in an epistasis event.
 A) Jumping gene B) Epistatic gene
 C) Supplementary gene D) Hypostatic gene
58. An ecogeographical rule which states that within a broadly distributed taxonomic clade, populations and species of larger size are found in colder environments, and species of smaller size are found in warmer regions.
 A) Allen's rule B) Cope's rule
 C) Bergman's rule D) Dollo's Law
59. A secondary messenger molecule which is soluble and diffuses through the cell.
 A) 1,2 diacyl glycerol (DAG) B) 3'-5' Cyclic AMP
 C) Inositol 1,4,5 triphosphate D) Cyclins
60. A type of natural phenol, and a phytoalexin produced naturally by several plants in response to injury or when the plant is under attack by pathogens such as bacteria or fungi and also produce statistically significant reductions in systolic blood pressure.
 A) Taxol B) Cinristine C) Resveratol D) Bardystanin
61. Among the pteridophytes, which have multiciliate antherozoids?
 A) Marsilea and Equisetum B) Lycopodium and Selaginella
 C) Equisetum and Psilotum D) Selaginella and Equisetum
62. Pick out the correct definition for phytotron.
 A) An enclosed chamber used to study the plant responses to elevated carbondioxide conditions.
 B) An enclosed chamber used to study the plant responses to elevated ultraviolet radiations.
 C) An enclosed chamber with controlled environmental conditions used for studying interactions between plants and the environment.
 D) An enclosed chamber with controlled environmental conditions used for growing plants.

63. Match the following:
- | | |
|---|-----------------------------------|
| p) Used as a fining to extract impurities | l. Inhibitor of ethylene |
| q) SHAM | m. Polyvinylpyrrolidone |
| r) AgNO ₃ | n. Inhibitor of alternate oxidase |
| s) 1-N-Naphthylphthalamic acid (NPA) | o. Auxin inhibitor |
- | | |
|-----------------------|-----------------------|
| A) p-n, q-o, r-m, s-l | B) p-m, q-n, r-o, s-l |
| C) p-m, q-n, r-l, s-o | D) p-m, q-l, r-n, s-o |
64. The structure of DNA important for the critical biological processes of DNA recombination and repair mutations that occur in the cell.
- | | |
|----------------|------------------|
| A) G-quadrets | B) Triplex DNA |
| C) Hairpin DNA | D) Cruciform DNA |
65. Identify the enzyme which plays a critical role in regulating the total rate of DNA synthesis so that DNA to cell mass is maintained at a constant ratio during cell division and DNA repair.
- | | |
|------------------------|-----------------------------|
| A) Adenosine deaminase | B) Ribonucleotide reductase |
| C) DNA polymerase | D) DNA helicase |
66. Match the following with appropriate combination.
- | | |
|----------------------|----------------------|
| p) Protein structure | l. Southern Blot |
| q) DNA transfer | m. Frederick Sanger |
| r) DNA sequencing | n. Ramachandran plot |
| s) RNA transfer | o. Northern Blot |
- | | |
|-----------------------|-----------------------|
| A) p-n, q-l, r-m, s-o | B) p-m, q-n, r-o, s-l |
| C) p-m, q-n, r-l, s-o | D) p-m, q-l, r-n, s-o |
67. Phagotrophs are:
- Organisms that feed on dead organic matter
 - Organisms that absorb dissolved organic matter
 - Organisms that ingest other organisms or particulate organic matter
 - Organisms that synthesise food from inorganic substances
68. Choose the correct match
- | | |
|--------------------------|-----------------------------------|
| p) Model organism | l. <i>Ustilago maydis</i> |
| q) Smut disease in maize | m. <i>Neurospora crassa</i> |
| r) Ergot fungus | n. <i>Cryptococcus neoformans</i> |
| s) Encapsulated yeast | o. <i>Claviceps purpurea</i> |
- | | |
|-----------------------|-----------------------|
| A) p-n, q-l, r-m, s-o | B) p-m, q-n, r-o, s-l |
| C) p-m, q-n, r-l, s-o | D) p-m, q-l, r-o, s-n |

69. Pick out the correct statement.
- Antheridiophores and archegoniophores are present in pteridophytes
 - Origin of seed habit can be traced in pteridophytes
 - Pteridophyte gametophyte has a protonemal and leafy stage.
 - In gymnosperms female gametophyte is free-living
70. What feature makes sexual reproduction in *Spirogyra* more advanced?
- Morphologically distinct sex organs
 - Similar size of motile sex organs
 - Different size of motile sex organs
 - Physiologically differentiated sex organs
71. Process in which organisms diversify rapidly from an ancestral species into a multitude of new forms is referred to as:
- Adaptive radiation
 - Natural selection
 - Convergent evolution
 - Non-random evolution
72. The major tribes of the Waynad tribal population include:
- Koragars and Maradis
 - Paniyars and Kurichiar
 - Mudugar and Kurumbar
 - Malayar, Uralis
73. The key element(s) for the optical design of phase contrast microscope are:
- isolate the surround and diffracted rays emerging from the specimen so that they occupy different locations in the diffraction plane at the back aperture of the objective lens
 - advance the phase and reduce the amplitude of the surround light, in order to maximize differences in amplitude between the object and background in the image plane.
- Which of these statements is/are correct?
- 1 is correct
 - 2 is correct
 - Both 1 and 2 are correct
 - Both 1 and 2 are incorrect
74. Widely used computer programs used in bioinformatics for multiple sequence alignment with command line interface.
- BLAST
 - TargetP
 - CLUSTALW
 - Primer Express
75. Which of the following terms best describes the character shared by a set of species but not present in their common ancestor?
- Cladogenesis
 - Paedomorphosis
 - Allometric growth
 - Homoplasy
76. Which of the following is **NOT** a greenhouse gas?
- Hydrofluoro carbons
 - Nitrogen oxides
 - Sulphur hexafluoride
 - Sulphur dioxide

77. Identify the incorrect definitions.
- 1) Synandrous- Stamen fused at anthers and free at filaments
 - 2) Syngenesious - Androecium with united anthers
 - 3) Polyadelphous- Anthers united into three or more groups
 - 4) Obdiplostemonous– Stamen in two whorls, the outer alternating with the petals
- A) 1 and 3 only are incorrect B) 2 and 3 only are incorrect
 C) 3 and 4 only are incorrect D) 1 and 4 only are incorrect
78. Genus of Silurian-Devonian vascular land plant with branching axes on which kidney-shaped sporangia are arranged in lateral positions.
- A) *Cooksonia* B) *Zosterophyllum*
 C) *Rhynia* D) *Williamsonia*
79. Complex molecular machine that unwinds double stranded DNA into two single strands.
- A) Metasome B) Helicosome
 C) Replisome D) Spliceosome
80. Process by which organic material becomes a fossil through the replacement of the original material and the filling of the original pore spaces with minerals.
- A) Compression B) Petrifications
 C) Casts D) Mineralisations
81. Pick out the incorrect match.
- | | | |
|------------------------|---|-------------------------------|
| 1) Leaf spot of Mango | - | <i>Xanthomonas campestris</i> |
| 2) Red rust of tea | - | <i>Cephaleuros virescens</i> |
| 3) False smut of Paddy | - | <i>Hemileia vastatrix</i> |
| 4) Coffee rust | - | <i>Ustilaginoidea virens</i> |
- A) 1 and 2 B) 3 and 4 C) 1 and 3 D) 2 and 3
82. Complex of proteins is found in the outer mitochondrial membrane. It allows movement of proteins through this barrier and into the inter membrane space of the mitochondrion.
- A) F₀& F₁ Complexes B) TOM Complexes
 C) GERL Complexes D) Toc & Tic Complexes
83. Outgrowths of the thallus surface, and are corticated, usually with a columnar structure, and consisting of both fungal hyphae (the mycobiont) and algal cells (the photobiont).
- A) Cephalodia B) Isidia C) Soredia D) Soralia
84. Sri Chitra Tirunal Institute for Medical Sciences is funded by which one of the following?
- A) Dept. of Science and Technology
 B) Dept. of Biotechnology
 C) Council for Scientific and Industrial Research
 D) Govt. of Kerala

85. Name the journal published by Indian Academy of Sciences, Bangalore.
 A) Indian Journal of Sciences B) Journal of Biosciences
 C) Indian Biological Sciences D) Current Advances in Sciences
86. Genomically encoded non-coding RNAs that help regulate gene expression, particularly during development.
 A) miRNAs B) siRNAs C) dsRNAs D) ssRNAs
87. Distribution of plant species covering tropical regions of all continents is referred to as:
 A) Circumtropical B) Pantropical
 C) Neotropical D) Palaeotropical
88. When did the Convention on International Trade in Endangered Species of Wild Fauna and Flora come into force?
 A) 1 July 1972 B) 1 July 1971
 C) 1 July 1975 D) 1 July 1974
89. The compound which acts as a phosphorus store, as an energy house, as a source of cations and as a source of myoinositol.
 A) Ptyalin B) Phytin C) Phytol D) Phytoline
90. Study of pollen contained in honey and, in particular, the pollen's source.
 A) Melissopalynology B) Cercinopalynology
 C) Cretinopalynology D) Meopalynology
91. The function of NodA, NodB and NodC are given below, arrange them in the order of their sequential functions:
 1. *N*-acyltransferase that catalyzes the addition of a fatty acyl chain.
 2. Chitin-oligosaccharide synthase that links *N*-acetyl-D-glucosamine monomers.
 3. Chitin-oligosaccharide deacetylase that removes the acetyl group from the terminal non-reducing sugar.
 A) 1, 2, 3 B) 2,3,1 C) 1,3,2 D) 3,2,1
92. From the following, pick out the non photochemical quenching of light energy.
 A) Chlorophyll remits the absorbed energy in the form of fluorescence
 B) Chlorophyll transfers energy to another chlorophyll molecule
 C) Chlorophyll remits the absorbed energy in the form of heat
 D) Energy utilised for photochemistry
93. Below are listed a few statements related to phytochrome. Establish whether these statements are true or false.
 1. Phytochrome is encoded by a multigene family: PHYA through PHYE.
 2. phyA: Type I
 3. phyB,C,D,E: Type 2
 4. phyA & phyB have similar roles
 A) 1, 2, 3 are true and 4 is false B) 2, 3, 4 are true and 1 is false
 C) 1, 3, 4 are true and 2 is false D) 1, 2, 4 are true and 3 is false

94. Below are listed different physiological roles of Pentose Phosphate Pathway (PPP). Find out whether these statements are true or false.
1. In nongreen plastids, such as amyloplasts, and in chloroplasts functioning in the dark, PPP supply NADPH for biosynthetic reactions such as lipid biosynthesis and nitrogen assimilation.
 2. PPP produces ribose-5-phosphate, a precursor of the ribose and deoxyribose needed in the synthesis of RNA and DNA, respectively.
 3. An intermediate of PPP, the four-carbon erythrose-4-phosphate, combines with PEP in the initial reaction that produces plant phenolic compounds, including the aromatic amino acids and the precursors of lignin, flavonoids, and phytoalexins
 4. During the early stages of greening, before leaf tissues become fully photoautotrophic, the PPP is thought to be involved in generating Calvin cycle intermediates.
- A) 1, 2 are true and 3, 4 are false B) 1, 2 are false and 3,4 are true
 C) All are true D) All are false
95. Which is the Na^+ transporting proteins located on the tonoplast?
 A) SOS 1 B) AtNHX C) NSCC D) AtHKT1
96. Compare the algae/algal product with the most appropriate economic importance associated with it.
- | | |
|-------------------------|-------------------------------------|
| p) Coralline algae | l. Ice cream/Salad cream |
| q) Cyanophycean members | m. Cosmetics |
| r) Carragenin | n. binding agent on surface of soil |
| s) Algin | o. liming the soil |
- A) p-n, q-l, r-m, s-o B) p-m, q-n, r-o, s-l
 C) p-m, q-n, r-l, s-o D) p-o, q-n, r-m, s-l
97. Identify the correct and incorrect statements regarding the Characteristics of somatic hybridization and cybridization.
1. Somatic cell fusion appears to be the only means through which two different parental genomes can be recombined among plants that cannot reproduce sexually (asexual or sterile).
 2. Protoplasts of sexually sterile (haploid, triploid, and aneuploid) plants can be fused to produce fertile diploids and polyploids.
 3. Somatic cell fusion does not overcome sexual incompatibility barriers. In some cases somatic hybrids between two incompatible plants have also found application in industry or agriculture.
 4. Somatic cell fusion is useful in the study of cytoplasmic genes and their activities and this information can be applied in plant breeding experiments.
- A) 1,2 and 3 correct, 4 incorrect B) 2,3 and 4 correct, 1 incorrect
 C) 3,4 and 1 correct, 2 incorrect D) 1,2 and 4 correct, 3 incorrect

98. The most important part of an osmometer is:
- A) Humidifier B) Osmosensor
C) Thermocouple hygrometer D) Flame ionization detector
99. Pick out the correct statement regarding aquaglyceroporins.
- A) aquaglyceroporins transports water molecules alone across the membrane.
B) aquaglyceroporins along with water, transport glycerol, across the membrane, depending on the size of the pore
C) aquaglyceroporins along with water, transport other small uncharged solutes, such as glycerol, CO₂, ammonia and urea across the membrane, depending on the size of the pore
D) aquaglyceroporins along with water, transport other small charged and uncharged solutes, across the membrane, depending on the size of the pore
100. Give the correct sequence for the different steps followed in Western Blotting.
- 1) Tissue preparation
2) Gel electrophoresis
3) Blocking non specific binding
4) Transfer of proteins from the gel to nitrocellulose paper
5) Incubation with antibodies
6) Detection and imaging
- A) 1, 2, 3, 4, 5, 6 B) 1, 3, 2, 5, 4, 6
C) 1, 2, 4, 3, 5, 6 D) 1, 2, 3, 5, 4, 6
101. Cellulosic ethanol is:
- A) First generation biofuel B) Second generation biofuel
C) Third generation biofuel D) Fourth generation biofuel
102. Identify the farming approach established by Masanobu Fukuoka (1913–2008), a Japanese farmer and philosopher, introduced in his 1975 book *The One-Straw Revolution*. It is also referred to as "the Fukuoka Method".
- A) Mixed farming B) Natural farming
C) Ecofarming D) Organic farming
103. The part of a bioreactor used to break the vortex formation in the vessel, which is usually highly undesirable as it changes the center of gravity of the system and consumes additional power.
- A) Agitator B) Baffle C) Sparger D) Jacket
104. Identify a DNA marker which is most powerful tool in population genetics, for DNA profiling in kinship analysis and in forensic identification, genetic linkage analysis/marker assisted selection to locate a gene or a mutation responsible for a given trait or disease.
- A) Random amplification of polymorphic DNA
B) Variable number tandem repeat
C) Simple sequence repeat
D) Single nucleotide polymorphism

105. What is meant by Plant breeders' rights?
- Rights granted to the breeder for a new variety of plant that give the breeder exclusive control over the propagating material (including seed, cuttings, divisions, tissue culture) of a new variety for a number of years.
 - Rights granted to the breeder for a new variety of plant that give the breeder exclusive control over the propagating material (including seed, cuttings, divisions, tissue culture) of a new variety for ever.
 - 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.
 - 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 ever.
106. Starch is synthesized in the:
- ER
 - Chloroplast
 - Cytosol
 - Mitochondria
107. Match the correct inhibitor with the following processes.
- | | |
|----------------------|-----------------------|
| a) Respiration | p) Atrazine |
| b) Photosynthesis | q) KCN |
| c) Protein synthesis | r) α -amanitin |
| d) Transcription | s) Rifamycin |
-
- | | |
|-----------------------|-----------------------|
| A) a-s, b-q, c-r, d-p | B) a-q, b-p, c-s, d-r |
| C) a-p, b-s, c-r, d-q | D) a-r, b-q, c-s, d-p |
108. Which is the largest and most diverse class of voltage-gated channels?
- Sodium (Na^+) channels
 - Calcium (Ca^{2+}) channels
 - Potassium (K^+) channels
 - Chloride (Cl^-) channels
109. Pick out the apomixis in which the megaspore mother cell undergoes the usual meiotic divisions and a haploid embryo sac is formed. The new embryo may then arise either from the egg or from some other cell of the gametophyte.
- Nonrecurrent apomixes
 - Recurrent apomixis,
 - Sporophytic apomixis
 - Vegetative apomixes
110. Carotenoids molecules containing oxygen, such as lutein and zeaxanthin, are known as xanthophylls. The unoxygenated (oxygen free) carotenoids such as α -carotene, β -carotene, and lycopene, are known as carotenes.
Of these, which carotenoid is more associated with high light tolerance of plants?
- Lutein
 - Zeaxanthin
 - α -carotene
 - β -carotene

111. The primitive mode of energy generating metabolic reaction is:
 A) Photosynthesis B) Reduction of nitrate
 C) Reduction of sulphate D) Oxidation of nitrate
112. Analyse the following fatty acids. Which among them are essential fatty acids as well as PUFA category?
 1. Oleic acid 2. Linoleic acid 3. Arachidonic acid
 A) 1, 2 & 3 B) 1 & 2 only C) 1 & 3 only D) 2 & 3 only
113. Which of the statements are correct regarding International Code for nomenclature of algae, fungi and plants (Melbourne Code 2012)?
 i. Latin diagnosis is mandatory for names of taxa published after 1 January 2012.
 ii. Online publication of names in Portable Document Format (PDF with an International Standard Serial Number (ISSN) or International Standard Book Number (ISBN) is permitted.
 iii. Names of taxa published on or after 1 January 2012 without designating types are considered valid.
 iv. Morphotaxon concept in the nomenclature of fossils is permitted.
 A) i alone is correct B) ii alone is correct
 C) i & iv only are correct D) i & ii only are correct
114. α - taxonomy deals with:
 A) Classical taxonomy B) Chemo taxonomy
 C) Phylogeny D) Experimental taxonomy
115. Specific epithet exactly repeats the generic name called:
 A) Tautonym B) Homonym
 C) Synonym D) Autonym
116. Bisexual, tri or tetramerous flowers with perianth in two whorls of three or four each, stamens many (10-20), stout, arranged spirally, ovary superior, apocarpus and aggregate fruits is characteristic feature of -----
 A) Apocynaceae B) Asclepiadaceae
 C) Anacardiaceae D) Annonaceae
117. Match column I with Column II and select the correct option.

Column I	Column II
a. Didynamous Stamens	i. Annonaceae
b. Pepo	ii. Lamiaceae
c. Basal Placentation	iii. Cucurbitaceae
d. Ruminant Endosperm	iv. Asteraceae

 A) a-(iii), b-(iv), c-(ii), d-(i) B) a-(ii), b-(i), c-(iii), d-(iv)
 C) a-(iv), b-(i), c-(iii), d-(ii) D) a-(ii), b-(iii), c-(iv), d-(i)

118. The foundation of International Code of Botanical Nomenclature is found in, a book written by Carolus Linnaeus.
- A) *Historia Naturalis* B) *Systema Naturae*
C) *Species Plantarum* D) *Philosophia Botanica*
119. Which statements are correct regarding Numerical Taxonomy?
- i). It is otherwise called Phenetics
ii). All characters are equally weighed
iii). The taxonomic unit is called Cladon
iv). Michael Adanson is called as the Father of Numerical Taxonomy
- A) All are correct B) i, ii & iv only are correct
C) ii & iii only are correct D) ii & iv only are correct
120. Which among the following are not related to Cladistics?
- A) Principle of parsimony
B) Ranking based on the age of common ancestor
C) Recognizes only monophyletic groups
D) Recognizes both monophyletic and paraphyletic groups
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