

1. Protonema in the life cycle of *Funaria* is
 - A) Diploid
 - B) Haploid
 - C) Dihaploid
 - D) Merodiploid
2. Spore dispersal in moss is made possible by
 - A) Columella
 - B) Operculum
 - C) Peristome teeth
 - D) None of these
3. Cryopreservation of germplasm is carried out using liquid nitrogen at the temperature -----
 - A) -196°C
 - B) -80°C
 - C) 0°C
 - D) -20°C
4. Endosperm in gymnosperms is
 - A) Pre fertilization product and haploid
 - B) Post fertilization product and diploid
 - C) Pre fertilization product and triploid
 - D) Post fertilization product and triploid
5. Lichens living on rocks are called
 - A) Saxicolous
 - B) Corticolous
 - C) Terricolous
 - D) Halicolous
6. When two ecosystems overlap each other, the area is called
 - A) Habitat
 - B) Niche
 - C) Ecotone
 - D) Ecotype
7. Recently (2013) Government of India notified one biosphere reserve. Choose the correct one from the following:
 - A) Valley of Flowers
 - B) Nanda Devi
 - C) Nicobar Islands
 - D) Seshachalam
8. The modern synthetic theory of evolution is the consortium of the work by a number of scientists namely T. Dobzhansky, R.A. Fisher, J.B.S. Haldane, Swall Wright, Ernst Mayr, and G.L. Stebbins. Name the two theories in Science that are combined to form the synthetic theory of evolution?
 - A) Darwin's Theory of Natural Selection and Lamarck's Theory of Use and Disuse
 - B) Mendel's Theory of Heredity and Heckel's Theory of Ontogeny Repeats Phylogeny
 - C) Darwin's Theory of Natural Selection and Mendel's Theory of Heredity
 - D) Lamarck's Theory of Use and Disuse and Heckel's Theory of Ontogeny Repeats Phylogeny

9. DNA supercoiling is the over- or under-winding of a DNA strand, and is an expression of the strain on that strand. This helical winding of DNA molecules is removed by the activity of an enzyme
- A) DNA polymerase B) DNA primase
 C) DNA helicase D) DNA topoisomerase

10. Match the List I with II

List I	List II
A.Population	i. Large naturally occurring community of flora & fauna occupying a major habitat
B.Biocoenoosis	ii. Assemblage of all the individuals belonging to different species occurring in the same geographical area
C.Ecosystem	iii. Group of similar individuals belonging to the same species found in an area
D.Biome	iv. Interaction between the living organisms and their physical environmental components
	v. Classification of species assemblage based on the type of environment

- A) A- v, B- ii, C- iii, D- i B) A- iv, B- i, C- ii, D- iii
 C) A- iii, B- ii, C- iv, D-i D) A- ii, B- iii, C- iv, D- i
11. Okazaki fragments are short, discontinually newly produced DNA fragments that are formed on the lagging template strand during replication of DNA. These DNA fragments are sealed by which one of the following enzyme?
- A) RNA primase
 B) DNA ligase
 C) Single strand binding proteins
 D) DNA polymerase
12. Coding region of an mRNA is 336 nucleotides long, including the initiator and termination codons. Predict the number of amino acids in the protein translated from this m RNA?
- A) 109 B) 110 C) 111 D) 112
13. The protective covering of radicle in monocot seeds is called
- A) Coleoptile B) Coleorrhiza
 C) Scutellum D) Aleurone layer

14. Match the List I (interaction) with List II (character) using the codes given below the Lists:

List – I	List – II
I) Incomplete dominance	1) Human skin colour
II) Codominance	2) Purple colour in maize due to anthocyanin
III) Polygenes	3) Human being belonging to AB blood group
IV) Complementary genes	4) Pink colour in 4 O' clock plant

Code:

- | | I | II | III | IV |
|----|---|----|-----|----|
| A) | 4 | 3 | 1 | 2 |
| B) | 3 | 4 | 2 | 1 |
| C) | 4 | 3 | 2 | 1 |
| D) | 3 | 4 | 1 | 2 |
15. A Ti plasmid is:
- A vector that can transfer recombinant genes into plant genomes
 - A vector that can be used to produce recombinant proteins in yeast
 - A vector specific to cereals like wheat and rice
 - All of the above
16. Which among the following is a naturally occurring hormone?
- Zeatin
 - 2,4-D
 - Benzyl adenine
 - Indole-3-butyric acid
17. Observe the following statements related with various biological process and their structural components. Which one of the following is NOT a correct statement?
- Manganese forms the structural core of chlorophyll
 - Iron is a structural component of porphyrin rings
 - Boron plays major role in translocation of sugars
 - Molybdenum regulates nitrogen fixation
18. The scientists who proposed the system of classification called as Neo-Adansonian system are
- Engler & Prantl
 - Bentham & Hooker
 - Sokal & Sneath
 - Camp & Gilly
19. Sporophyte of *Riccia* is protected by
- Indusium
 - Calyptra
 - Endothecium
 - Amphithecium

20. Meiosis is a specialized type of cell division which reduces the chromosome number by half. This process occurs in all sexually reproducing eukaryotes (both single-celled and multicellular) including animals, plants, and fungi. Which of the following statements about meiosis is NOT true?
- A) Kinetochores of sister chromatids attach to opposite poles in Meiosis I
 - B) Kinetochores of sister chromatids attach to opposite poles in Meiosis II
 - C) Chiasma is formed in Prophase I
 - D) Homologous chromosomes are segregated in Meiosis I
21. The site for coupled oxidation-reduction reactions in the chloroplast is the
- A) Outer chloroplast membrane
 - B) Inner chloroplast membrane
 - C) Thylakoid space
 - D) Stromal space
22. Which one of the following pairs is mismatched?
- A) Tundra: permafrost
 - B) Coniferous: evergreen trees
 - C) Prairie: deciduous forest
 - D) Savanna: Acacia
23. Auxin namely IAA, is present in all parts of a plant, although in minute quantities. The structure of this hormone is related to which one of the following amino acids?
- A) Glutamic acid
 - B) Aspartic acid
 - C) Threonine
 - D) Tryptophan
24. Stomatal movement in leaves of well-watered plants grown in natural environment is significantly controlled by Light. Which one of the following wavelengths of light is responsible for such regulation?
- A) Red light
 - B) Blue light
 - C) Green light
 - D) Far-red light
25. Pharmacogenomics deals with
- A) Interaction of two molecules
 - B) Protein sequencing
 - C) Genetic Variations and responses to drugs
 - D) All of the above
26. Commensalism is a class of relationships between two organisms. An example of the species interaction called commensalism is
- A) Nitrogen-fixing bacteria in association with legume plant roots.
 - B) A microbe in living human gut.
 - C) Female mosquito deriving nourishment from human blood
 - D) Orchid plant growing on the trunk of mango tree

36. Which among the following lack sexual reproduction?
A) Ascomycetes B) Basidiomycetes
C) Deuteromycetes D) Oomycetes
37. The function of enzyme ligase is to
A) Covalently join two ends of a double stranded DNA
B) Covalently join the ends of two single DNA strands
C) Connects RNA strands to DNA
D) All the above
38. Resurrection plant is a species of
A) Usnea B) Selaginella
C) Cycas D) Sargassum
39. Secondary metabolite biosynthetic pathway result in the synthesis of many significant phytochemicals in the plants. Identify the pathway/s that produce terpenes?
A) Mevalonic acid and MEP pathways
B) Malonic acid and MEP pathways
C) Shikimic acid and Malonic acid pathway
D) Shikimic acid and Mevalonic acid pathways
40. Large number of cloning vectors are available. Identify the cloning vector capable of an insert size upto 3000 KB?
A) Phage B) Cosmid
C) BAC D) YAC
41. According to Chargaff's rules
A) In double-stranded DNA, the amount of G equals the amount of C.
B) All DNA molecules contain the same proportions of A, C, G and T
C) Single stranded RNA molecules contain same amount of A and U
D) In double-stranded DNA, the amount of T equals the amount of C
42. Occurrence of Himalayan floral element in Western Ghats of India is best explained by which hypothesis?
A) Continental Drift Theory
B) Deccan Trap Hypothesis
C) Himalayan Glaciations Theory
D) Coromandel Coast Hypothesis
43. How do the bacteria save its DNA from the restriction enzymes it produces?
A) Bacterial DNA has no restriction sites
B) Modification enzymes inactivates the restriction sites
C) DNA is protected by methylation
D) Restriction enzymes are not produced inside the cell

44. The taxonomic designation called Tautonym used for referring to
 A) Same name for both the genus and species
 B) Same name for species and subspecies
 C) Trinomial nomenclature
 D) The name of the author for the species
45. Inulin is an organic compound, a polysaccharide consisting of repeated units of:
 A) Glucose and galactose B) Galactose
 C) Glucose D) Fructose
46. Transpiration in plants are regulated by a pigment known as
 A) Crypto chromes B) Carotenoids
 C) Cytochromes D) Phytochrome
47. Mass scale production of vitamin B2 is carried using the fungus -----
 A) *Penicillium chrysogenum* B) *Aspergillus niger*
 C) *Ashbya gossypi* D) *Trichoderma harzianum*
48. Engler and Prantl system is one of the phylogenetic classifications. They classified -----
 A) All tracheophytes
 B) All plants
 C) All seed plants
 D) Thallophytes, bryophytes and Pteridophytes
49. The class of fungi to which the common mushroom, puffballs and truffles belongs to:
 A) Ascomycetes B) Basidiomycetes
 C) Oomycetes D) Deuteromycetes
50. Identify the correct sequences of the trend in the evolution of thallus in algae?
 A) Unicellular – Heterotrichous-Colonial - Filamentous
 B) Unicellular -Filamentous -Heterotrichous -Colonial
 C) Unicellular -Colonial -Filamentous -Heterotrichous
 D) Unicellular -Filamentous -Colonial – Heterotrichous
51. Name the algal group that contain the predominating pigment fucoxanthin, laminarin as reserve food is
 A) *Rhodophyceae* B) *Chryophyceae*
 C) *Phaeophyceae* D) *Cyanophyceae*
52. A frame shift mutation is
 A) A point mutation in which a single base pair is inserted or deleted
 B) When one base is replaced by another
 C) When a segment of DNA is inverted but remains in the same overall location
 D) A mutation that inactivates the gene completely

53. Groups of genes with similar function that arose by multiple rounds of duplication are called
 A) Genomes
 B) Gene families
 C) Operons
 D) Quasi genes
54. The effect of increasing humidity on rate of transpiration would be-----
 A) Rate of transpiration will decrease
 B) Rate of transpiration will increase
 C) Initially low then it will be high
 D) It will be unaffected
55. Corymb is a racemose inflorescence and is a characteristic feature of the Family---
 A) Mimosoideae
 B) Papilionoideae
 C) Caesalpinioideae
 D) Apiaceae
56. Identify the type of stain which on ionization gives positively charged molecules
 A) Acidic Stain
 B) Basic Stain
 C) Anionic Stain
 D) Basic Mordant
57. In a hybridization experiment due to Duplicate dominant gene interaction, the following phenotypic ratio was observed 15:1. How many genes control the trait for the observed phenotypic ratio?
 A) One
 B) Two
 C) Three
 D) Polygene
58. Polyploid developed from two different species is known as
 A) Triploid
 B) Autopolyploid
 C) Allopolyploid
 D) Monoploid
59. The Unique chemotaxonomic character of the family Caryophyllaceae is the presence of
 A) Betalain
 B) Glycosides
 C) Terpenes
 D) Alkaloids
60. To determine the variation in style length of carpel of Hibiscus plant from five different places which would be the best statistical test?
 A) Chi-square
 B) Student t-test
 C) F-test
 D) Regression analysis
61. The Mendelian law of Independent assortment is due to the arrangement of chromosome during
 A) Anaphase-I
 B) Anaphase-II
 C) S-Phase
 D) Cytokinesis
62. Triticale is a product of
 A) Inter specific cross
 B) Inter generic cross
 C) Intra specific cross
 D) Intra generic cross

63. Multiple effects of a single gene is known as
A) Polyploidy B) Heterosis
C) Pleiotropy D) None of these
64. Climbers with tendrils are borne in the axil of the leaf, radially symmetrical, bisexual flowers, one-chambered ovary composed of three to five carpels with numerous ovules, stamens are present below the ovary, born in androgynophore, seeds with fleshy aril and fruits are capsules or berries. Name the family that possess these features
A) Passifloraceae B) Vitaceae
C) Cucurbitaceae D) Oleaceae
65. The 1987 Montreal Protocol was signed for which of the following reasons?
A) To ban nuclear testing in tropical oceans
B) To stop the global trade in products made from endangered tigers
C) To begin converting from fossil fuel use to more renewable energy sources to reduce the anthropogenic greenhouse effect
D) To phase out the use of CFC's, found to be causing depletion of the ozone layer
66. The antibody known to be responsible for allergic reaction is:
A) IgG B) IgA
C) IgM D) IgE
67. Which of the following molecule acts as connecting link between EMP pathway and Kreb's cycle?
A) Pyruvic acid B) Acetyl CoA
C) Phosphophenol Pyruvate D) Ribulose bis phosphate
68. Most stable kind of RNA is
A) mRNA B) tRNA
C) rRNA D) snRNA
69. Antisense technology
A) Selectively blocks gene expression
B) Helps in gene expression
C) Always keeps genes inactivated
D) Always keeps genes expressed
70. A structure which arises from the funicle and surrounds the ovule more or less completely in post fertilization stage is called
A) Aril B) Caruncle
C) Sarcotesta D) Operculum
71. The family that display Pseudo Embryo Sac is
A) Podostemaceae B) Polygonaceae
C) Piperaceae D) Portulacaceae

72. Choosing the best and most uniform of organisms for subsequent generations of a self-pollinated crop
 A) Mass Selection B) Pedigree analysis
 C) Germ line selection D) Pure line selection
73. A ----- is a genotype formed when haploid cells undergo chromosome doubling?
 A) Doubled Haploid B) Selective Haploid
 C) Artificial Aneuploid D) Diplo-haploid
74. Vital stains are used for
 A) Staining of dead tissue outside the body
 B) Staining of a living cell inside the body
 C) Staining of a fixed cell outside the body
 D) Staining of a dead tissue inside the body
75. An Hfr strain of *E. coli* contains:
 A) A vector of yeast or bacterial origin which is used to make many copies of a particular DNA sequence
 B) A bacterial chromosome with a human gene inserted
 C) A bacterial chromosome with the F factor inserted
 D) A human chromosome with a transposable element inserted
76. Red rust of coffee is caused by ----- while red rust of tea by -----
 A) *Ustilago* & *Puccinia*
 B) *Albugo* & *Puccinia*
 C) *Cephaleuros* & *Albugo*
 D) *Hemileia* & *Cephaleuros*
77. The organelle of the endomembrane system associated with the sorting of lipids and proteins for various cellular functions are
 A) Rough endoplasmic reticulum
 B) Lysosomes
 C) Vesicles
 D) Golgi complex
78. Wood is classified into hardwood or softwood through its physical structure and make up. Which among the following is/are example/s for hardwood?
 i. Mahogany ii. Oak iii. Teak iv. Walnut
 A) i & ii B) i, ii & iii
 C) i & iii D) i, ii, iii & iv
79. Vascular connection between leaf and stem that is maintained by leaf traces, which are associated with parenchymatous interruptions in the stem vascular cylinder. Nodal anatomy where a leaf is associated with one leaf gap is known as
 A) Unilacunar node B) Trilacunar node
 C) Multilacunar node D) Polyaxial node

80. Select the correct option from the following. One is an example of a colonial and other as heterotrichous green alga.
- A) *Ulva* & *Coleochaete* B) *Chlamydomonas* & *Ulothrix*
 C) *Volvox* & *Coleochaete* D) *Sargassum* & *Pandorina*
81. The amount of living matter present in a population at any time in the given ecosystem is known as
- A) Net productivity B) Gross primary productivity
 C) Standing crop D) Standing state
82. Anthracosis is a serious lung disease associated with inhaling -----
- A) Cotton dust B) Pollen C) Coal D) Fibers
83. Mitochondrial DNA is advantageous for evolutionary studies because:
- A) It is inherited only through the female parent and thus evolves in a way that allows trees of relationship to be easily constructed
 B) It is inserted into the X chromosome
 C) It first appeared in humans and is not found in other animals
 D) It evolves more slowly than the genes in the nucleus
84. Algae have diverse roles. Which among the following are the economically important products of the red algae?
- A) Agar used to make capsules for drugs and vitamins as well as a solidifying agent for bacterial media.
 B) Calcium carbonate
 C) Nitrogen fixation
 D) Both A & B
85. The sporocarp of ascomycetes have high diversity in their characters. Name the fruiting body in *Xylaria*
- A) *Cleistothecium* B) *Perithecium*
 C) *Apothecium* D) *Gymnothecium*
86. The stele in *Marsilea* rhizome is an example for
- A) Amphiploic Siphonostele B) Meristele
 C) Amphixylic Siphonotele D) Dictyostele
87. Irish famine occurred in 1845 is associated with -----
- A) *Phytophthora* B) *Albugo*
 C) *Chondrus crispus* D) *Penicillium*
88. Which statement given below is true about lichens?
- A) Algal component always enheathed by fungal mycelium
 B) Both components occur side by side
 C) Algae and fungal cells are intermixed
 D) Fungal mycelium envelop algal cells

89. Which among the following is an example for fossil bryophyte?
 A) *Pogonatum* B) *Naiadita*
 C) *Lejeunea* D) Both B & C
90. Apomixis is defined as the replacement of the normal sexual reproduction by asexual reproduction, without fertilization. The process is discovered by
 A) Hans Winkler B) Smith
 C) Bower D) Farlow
91. Canada balsam is a resinous essential oil, viscous, sticky, colourless or yellowish liquid that turns to a transparent yellowish mass when the essential oils have been allowed to evaporate and is obtained from
 A) *Pinus* B) *Abies*
 C) *Cedrus* D) *Taxus*
92. The tendency of ecotone to contain a greater number of species and higher population density is known as
 A) Niche B) Ecotype
 C) Edge effect D) Carrying capacity
93. Black rust of wheat is caused by
 A) *Pucciniagraminis* B) *Pucciniarecondita*
 C) *Pucciniastriformis* D) *Pucciniaglummarum*
94. Enzymes responsible for alcoholic fermentation
 A) Ketolase B) Zymase
 C) Peroxidase D) Oxidase
95. Read the features and identify the family- evergreen plants, coriaceous leaves, stamens frequently in whorls, with a pair of glands at the base of the filaments, Anthers with two or four pollen sacs, opening by valves, usually from the base upwards, in the two outer whorls usually introrse. Ovary unilocular, usually superior, sometimes surrounded by the receptacle to completely enclose in it, with a single, pendulous ovule.
 A) Solanaceae B) Dipterocarpaceae
 C) Lauraceae D) Myrstickaceae
96. The principle light-trapping pigment molecule in plants, Algae, and Cyanobacteria is
 A) Chlorophyll a B) Chlorophyll b
 C) Porphyrin D) Rhodapsin
97. Which of the following microscopic techniques relies on the specimen interfering with the wavelength of light to produce a high contrast image without the need for dyes or any damage to the sample?
 A) Conventional bright field light microscopy
 B) Phase contrast microscopy
 C) Electron microscopy
 D) Fluorescence microscopy

98. The total amount of water present in the soil is
A) Holard
B) Capillary water
C) Chesard
D) Echard
99. Which is a true statement about ribosomes?
A) Ribosomes contain DNA and protein.
B) Ribosomes are active in carbohydrate synthesis.
C) Ribosomes are present both in prokaryotes and eukaryotes.
D) Ribosomes are only found associated with the endoplasmic reticulum in prokaryotic cells.
100. Name the Scientists who constructed the prototype electron microscope in 1931
A) Ernst Ruska & Max Knoll
B) Eli Franklin Burton, Cecil Hall, James Hillier, and Albert Prebus
C) Dennis Gabor, & Leo Szilárd
D) Ernst Lubcke of Siemens & Halske
101. Hybridoma technique was first demonstrated by
A) Kohler and Milstein
B) Robert Koch
C) 'D' Herelle
D) Land Steiner
102. Complete reduction of archegonium is observed in the gymnosperm -----
A) *Gnetum* B) *Cycas* C) *Ginkgo* D) *Pinus*
103. Assuming Hardy-Weinberg equilibrium, the genotype frequency of heterozygotes, if the frequencies of the two alleles at the gene being studied are 0.6 and 0.4, will be:
A) 0.80 B) 0.64 C) 0.48 D) 0.32
104. Recently, the major reason for worldwide loss of species from the natural habitats is?
A) Habitat destruction
B) Intraspecific competition
C) Random mating
D) Viral outbreaks
105. A homeotic mutation is one which:
A) Is present in only one form in an individual
B) Substitutes one body part for another in development
C) Results in development of a tumor
D) Is wild type at one temperature and abnormal at another
106. Eusporangiate ferns are those where the sporangia arise from group of epidermal cells. Identify the eusporangiate fern from the choices given below
A) *Dicranopteris* B) *Matonia*
C) *Equisetum* D) *Osmunda*
107. Which one of the following bacterium is commonly employed for production of transgenic plants?
A) *Escherichia coli* B) *Bacillus thuringiensis*
C) *Staphylococcus aureus* D) *Agrobacterium tumefaciens*

108. Identify the abnormal base pairings noticed in “wobble” codon-anticodon binding?
 A) Adenosine-uracil B) Guanine-uracil
 C) Cytosine-inosine D) Guanine-thymine
109. Which of the following is TRUE about G-protein signaling?
 I. During activation of G-protein, subunit of the G-protein dissociates from the activated G-protein to activate adenyl cyclase
 II. During activation of G-protein, the active α subunit is terminated by the hydrolysis of the bound GTP caused by GTPase
 III. Testosterone can bind to the cell membrane receptor to activate G- protein
 IV. The ratio of G-protein coupled receptor to G-protein is 1:1
 A) I only B) II only
 C) III only D) II and IV only
110. Which type of Genetic Analysis method can detect the presence of a gene but is not useful for single base pair changes?
 A) Genetic Sequencing B) Western Blot Analysis
 C) Southern Blot Analysis D) Cytogenics
111. Name the mitotic stage that is unique and is characterized by the shortening of kinetochore microtubules?
 A) Metaphase B) Anaphase
 C) Prophase D) Telophase
112. Name the triplet codons which is a chain termination codon?
 A) UGU B) AAU C) UUG D) UAG
113. The terminology employed to denote species is restricted to a specific area is known as
 A) Sibling species B) Allopatric species
 C) Sympatric species D) Endemic species
114. Which one of the following immunoglobulins is found as pentamer?
 A) IgG B) IgM
 C) IgA D) IgE
115. The sum total of an organism's interaction with the biotic and abiotic resources of its environment is called its
 A) Habitat B) Logistic growth
 C) Ecological niche D) Microclimax
116. Which of these ecosystems accounts for the largest amount of Earth's primary productivity?
 A) Open ocean B) Savanna
 C) Tundra D) Salt marsh

117. Hemophilia is a sex-linked recessive trait in humans. If a father and the son are hemophilic, but the mother is normal, her genotype must be:
A) X^hX^h B) $X^H X^h$
C) $X^H X^H$ D) $X^h Y$
118. Hairy root cultures for secondary metabolite production are induced by transforming plant cells with
A) *Agrobacterium tumefaciens*
B) *Bacillus thuringiensis*
C) *Agrobacterium rhizogenes*
D) *E.coli* plasmids
119. Elicitors are molecules that induce secondary metabolite production. Identify the non plant derived elicitor from the given options
A) Chitin B) Pectin
C) Pectic acid D) Cellulose
120. Following are few statements for regeneration of plants from explants/tissues.
(1) Cytokinin is required for shoot development.
(2) Auxin is required for shoot development.
(3) Auxin to cytokinin ratio is very important.
(4) Jasmonic acid is required for both root and shoot development.
Which of the following combinations of above statements is true?
A) (1) and (3) B) (2) and (4)
C) (1) and (4) D) (2) and (3)
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