

**Civil Service Examination: Botany question paper 2009**

1. Which one of the following terms describes the increase in the performance of a cross when two different inbred lines are crossed?  
 (a) Heterozygotic  
 (b) Heterosis  
 (c) Heterogametic  
 (d) Homogametic
2. Hardy-Weinberg equilibrium refers to:  
 (a) Stable mutation as a factor for speciation and evolution  
 (b) Population genetics based on Mendelian laws to interpret evolutionary process  
 (c) Microgeographic races as key contributors to divergent evolutionary tendencies  
 (d) Random distribution of species in time and space
3. Meselson and Stahl used an isotope to demonstrate semi-conservative nature of DNA duplication. Which isotope did they use?  
 (a)  $^{14}\text{C}$   
 (b)  $^3\text{H}$   
 (c)  $^{32}\text{P}$   
 (d)  $^{15}\text{N}$
4. Among the following, which group has recently originated?  
 (a) Gnetales  
 (b) Cycadales  
 (c) Bennettitales  
 (d) Coniferales
5. What is the correct sequence in which the following plants appeared on the earth?  
 1. Rhynia  
 2. Williamsonia  
 3. Lyginodendro  
 4. Magnolia  
 Select the correct answer using the code given below:  
 (a) 1, 2, 3, 4  
 (b) 1, 3, 2, 4  
 (c) 2, 1, 3, 4  
 (d) 1, 3, 4, 2
6. Bicollateral vascular bundles occur in which of the following families?  
 (a) Cruciferae  
 (b) Gramineae  
 (c) Solanaceae  
 (d) Castaceae
7. Phelloids differ from phellem cells in:  
 (a) Lacking the suberin lamellae  
 (b) Lacking the lignin deposition  
 (c) having a different origin  
 (d) Being the product of cambial activity
8. The phellogen produces:  
 (a) Phelloderm towards its outer and secondary xylem towards its inner side  
 (b) Phelloderm towards its outer and phellem towards its inner side  
 (c) Phellem towards its outer and phelloderm towards its inner side  
 (d) Phellem towards its outer and secondary xylem towards its inner side
9. When two whorls of stamens are inserted in such a way that the members of the outer whorl are opposite the sepals and inner whorl opposite the petals, the condition is known as:  
 (a) Diplostemonous  
 (b) Diadelphous  
 (c) Didynamous  
 (d) Obdiplostemonous
10. Family Labiatae can be easily identified with the help of:  
 (a) Spurred corolla and quadrangular stem  
 (b) Verticillaster inflorescence and many stamens  
 (c) Gynbasis style and four ovules  
 (d) Two stigmas and regular corolla
11. Withania somnifera belongs to the family:  
 (a) Malvaceae  
 (b) Magnoliaceae  
 (c) Solanaceae  
 (d) Sterculiaceae
12. Which one of the following pairs is correctly matched?  
 (a) Solanaceae : Adelpous condition  
 (b) Malvaceae : syngenesious condition  
 (c) Brassicaceae : Didynamous condition  
 (d) Acanthaceae : Retinaculum
13. Consider the following pairs:  
 1. Chlorine : Involved in  $\text{O}_2$  evolution during photosynthesis  
 2. Iron : Constituent of cytochromes  
 3. Sulphur : Constituent of Coenzyme A  
 Which of the pairs given above are correctly matched?  
 (a) 1 and 2 only  
 (b) 2 and 3 only  
 (c) 1 and 3 only  
 (d) 1, 2 and 3
14. What is the edible part in Jack fruit?  
 (a) thalamus  
 (b) Ovary (ripened)  
 (c) Perianth and seeds  
 (d) Fleshy aril

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15. Which one of the following genera shows vessels in xylem?  
 (a) Cycas  
 (b) Pinus  
 (c) Gnetum  
 (d) Marsilea
16. Which one of the following is devoid of nucleus?  
 (a) Mature sieve element  
 (b) Guard cell of stomata  
 (c) Collenchyma cell  
 (d) Companion cell
17. Consider the following statements:  
 1. There is no sexual reproduction in blue-green algae.  
 2. There are no marine species of blue-green algae.  
 Which of the statements given above is/are correct?  
 (a) 1 only  
 (b) 2 only  
 (c) Both 1 and 2  
 (d) Neither 1 nor 2
18. Lodicules represent the reduced perianth in:  
 (a) Sedges  
 (b) Grasses  
 (c) Rushes  
 (d) Composites
19. Distant hybridization studies indicate that the nearest relative of wheat, among the following, is:  
 (a) Sorghum  
 (b) Oat  
 (c) Rye  
 (d) Rice
20. Consider the following statements:  
 1. Chloroplasts synthesize some of the proteins that are essential for photosynthesis.  
 2. Mitochondria proliferate through the division by fission of pre-existing mitochondria.  
 Which of the statements given above is/are correct?  
 (a) 1 only  
 (b) 2 only  
 (c) Both 1 and 2  
 (d) Neither 1 nor 2
21. Fungi without sexual or perfect stages are classified as:  
 (a) Phycomycetes  
 (b) Dermatophytes  
 (c) Deuteromycetes  
 (d) Ascomycetes
22. Consider the following statements:  
 1. Auxin has a role in delaying the onset of leaf abscission.  
 2. IAA is synthesized primarily in the roots.  
 Which of the statements given above is/are correct?  
 (a) 1 only  
 (b) 2 only  
 (c) Both 1 and 2  
 (d) Neither 1 nor 2
23. Match List I with List II and select the correct answer using the code given below the lists:
- | <b>List I</b>           |  | <b>List II</b>  |  |
|-------------------------|--|-----------------|--|
| Characters              |  | Families        |  |
| A. Cruciform Corolla    |  | 1. Malvaceae    |  |
| B. Syngenesious stamens |  | 2. Brassicaceae |  |
| C. Spikelet             |  | 3. Poaceae      |  |
| D. Epicalyx             |  | 4. Apiaceae     |  |
- Code:**
- |     | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> |
|-----|----------|----------|----------|----------|
| (a) | 2        | 4        | 5        | 1        |
| (b) | 2        | 3        | 4        | 1        |
| (c) | 1        | 4        | 5        | 2        |
| (d) | 1        | 3        | 4        | 2        |
24. In which one of the following are heterocysts seen?  
 (a) Nostoc  
 (b) Chara  
 (c) Polysiphonia  
 (d) Spirogyra
25. Which one of the following is a rootless fossil plant?  
 (a) lepidodendron  
 (b) Lyginopteris  
 (c) Rhynia  
 (d) Williamsonia
26. In the sporophyte of Bryales, archesporium originates from:  
 (a) Endothecium  
 (b) Endothelium  
 (c) Amphithecium  
 (d) Perithecium
27. Consider the following:  
 1. Selaginella  
 2. Isoetes  
 3. Marsilea  
 4. Azolla  
 Which of the above are heterosporous pteridophytes?  
 (a) 1, 2 and 3 only  
 (b) 2, 3 and 4 only  
 (c) 1 and 4 only  
 (d) 1, 2, 3 and 4

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28. Match List I with List II and select the correct answer using the code given below the lists:
- | List I                        |  | List II             |  |
|-------------------------------|--|---------------------|--|
| N <sub>2</sub> fixing genera) |  | (Group they belong) |  |
| A. Clostridium                | 1. Aerobic bacteria                      |                     |  |
| B. Rhodospirillum             | 2. Facultative bacteria                  |                     |  |
| C. Azotobacter                | 3. Non-photosynthetic anaerobic bacteria |                     |  |
| D. Klebsiella                 | 4. Photosynthetic anaerobic bacteria     |                     |  |
- Code:**
- |     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 2 | 4 | 1 | 3 |
| (b) | 2 | 1 | 4 | 3 |
| (c) | 3 | 4 | 1 | 2 |
| (d) | 3 | 1 | 4 | 2 |
29. Which one of the following chemical is used for converting iron into absorbable form by plants?
- Dinitrophenol
  - Diphenyl carbazole
  - Ethylene-diamine-tetra-acetic acid
  - paraaminobenzoic acid
30. Which one of the following is the correct sequence of the three cell organelles involved in photorespiration?
- Chloroplast → mitochondrion → Peroxisome
  - Peroxisome → Chloroplast → Mitochondrion
  - Chloroplast → Peroxisome → Mitochondrion
  - Mitochondrion → Peroxisome → Chloroplast
31. Consider the following statements:
- Transposons are responsible for mutation and chromosome breakage.
  - In bacteria, some transposons carry genes for antibiotic resistance.
- Which of the statements given above is/are correct?
- 1 only
  - 2 only
  - Both 1 and 2
  - Neither 1 nor 2
32. The process of photorespiration in plants leads to:
- Release of enhanced levels of CO<sub>2</sub>
  - Removal of waste metabolites
  - Lowering of the efficiency of photosynthetic carbon fixation
  - Enhanced plant yield
33. With reference to photosynthesis in higher plants, which one of the following statements is correct?
- The C<sub>3</sub> pathway requires 24 ATP molecules for the synthesis of one molecule of glucose.
  - The C<sub>4</sub> Pathway requires 30 ATP molecules for the synthesis of one molecule of glucose.
  - In C<sub>4</sub> Pathway, Phosphoenol pyruvate is generated in the bundle sheath cells and transported to mesophyll cells.
  - In C<sub>3</sub> Pathway, six molecules of phosphoglyceraldehyde and two molecules of ATP are required to regenerate RuBP.
34. Under water stress, the leaves of plants are found to contain higher concentration of:
- Gibberellic acid
  - Cytokinins
  - Auxins
  - Abscisic acid
35. With reference to C<sub>4</sub> Pathway of photosynthesis, which one of the following statements is not correct?
- Atmospheric CO<sub>2</sub> is accepted by a 3-carbon compound
  - The first product formed after atmospheric CO<sub>2</sub> assimilation is malic acid.
  - Malic acid is transported from mesophyll cells to bundle sheath cells.
  - The Calvin cycle takes place in bundle sheath cells.
36. Which one of the following statement is not correct?
- The gamete bearing phase of moss plant is haploid.
  - Bryophytes have a multi-cellular sporophytic generation.
  - All the ferns have underground and horizontally growing stems called rhizomes.
  - Ferns form the largest living group of primitive vascular plants.
37. Which one of the following mineral elements plays an important role in photosynthetic oxygen evolution?
- Magnesium
  - Manganese
  - Molybdenum
  - Boron

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38. Consider the following statements:
1.  $\beta$ -oxidation of fatty acids involves the reduction of  $\frac{1}{2}$  O<sub>2</sub> to H<sub>2</sub>O and formation of 1 NADH and 1 FADH<sub>2</sub> for each acetyl CoA produced.
  2. In plant seed storage tissue, the enzymes associated with  $\beta$ -oxidation are localized in mitochondria
- Which of the statements given above is/are correct?
- (a) 1 only (b) 2 only  
(c) Both 1 and 2 (d) Neither 1 nor 2
39. Phosphorus is absorbed primarily in the form of ortho-phosphates, but in which form does it occur in soil?
- (a) Monovalent only  
(b) Divalent only  
(c) Trivalent  
(d) Both monovalent and divalent
40. Phosphorus as <sup>32</sup>P is one of the radioactive isotopes commonly used in biological studies. Its half-life is:
- (a) 14.3 days (b) 87.5 days  
(c) 8.07 days (d) 3.2 days
41. A competitive inhibitor of ethylene-mediated physiological responses is:
- (a) Carbon monoxide  
(b) Carbon dioxide  
(c) Acetylene  
(d) Nitrogen
42. Production of human protein in bacteria by genetic engineering is possible because:
- (a) A human chromosome can replicate in bacterial cell  
(b) The mechanism of gene regulation is identical in humans and bacteria  
(c) Bacterial cell can carry out the RNA splicing reactions  
(d) The genetic code is universal
43. Which one of the following bacteria has found extensive use in genetic engineering work in plants?
- (a) *Agrobacterium tumefaciens*  
(b) *Clostridium septicum*  
(c) *Xanthomonas citri*  
(d) *Bacillus coagulans*
44. Which of the following codons do not specify amino acids and are known as non-sense codons?
- (a) CUU, GUC, GUA  
(b) UAA, UAG, UGA  
(c) GCU, GCC, GCA  
(d) GGU, GGC, GGA
45. Which one of the following techniques is employed to detect the proteins of a particular specificity?
- (a) Western blotting  
(b) Southern blotting  
(c) Northern blotting  
(d) Slot blotting
46. Consider the following statements: Linkage is a phenomenon in which
1. linked gene does not show independent segregation.
  2. the intensity of linkage between two genes is directly proportional to the distance between them.
  3. the effect of linkage is more clearly noticeable in back-cross generation.
  4. the frequency of recombination between two linked genes cannot exceed 50%
- Which of the statements given above is/are correct?
- (a) 1 only (b) 1 and 4  
(c) 1, 2 and 3 (d) 2, 3 and 4
47. With reference to the relative proportion of parental and recombinant phenotypes in the test-cross progeny involving two recessive genes 'r' (round) and 'y' (yellow) controlling the seed shape and seed colour respectively, the observed per cent recombinants is 10, then the map distance between 'r' and 'y' is:
- (a) 10 map units (b) 20 map units  
(c) 30 map units (d) 5 map units
48. Who for the first time experimentally demonstrated that only DNA of the bacteriophage enters the host cell and not the phage protein?
- (a) Beadle and Tatum  
(b) Jacob and Monod  
(c) Luria and Delbruck  
(d) Hershey and Chase
49. The diploid chromosome number of the garden pea is  $2n = 14$ . How many different trisomics could be formed in this plant?
- (a) 7 (b) 14  
(c) 21 (d) 42
50. The prophase of meiosis is distinct from that of mitosis. The main difference lies in:
- (a) Formation of bivalents by the homologous chromosomes.  
(b) Presence of long, non-condensed chromosomes.  
(c) Each chromosome though apparently looks like a single thread, is actually made up of two threads.  
(d) The chromosome is rich in DNA

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51. The centromere or primary constriction of the chromosome contains rings of proteins that are intimately associated with a spindle fibre. These rings are called:  
(a) Centrioles  
(b) Secondary constrictions  
(c) Asters  
(d) Kinetochores
52. The mechanism in which the rate of the solute movement increases by interaction of transmembrane proteins is termed as:  
(a) Endocytosis  
(b) Simple diffusion  
(c) Facilitated diffusion  
(d) Active transport
53. A diploid plant species of  $2n = 16$  chromosomes was hybridized with one having  $2n = 12$  chromosomes. Surprisingly, the breeder found the hybrid to be an allotetraploid (amphidiploid). How many chromosomes can he expect in it?  
(a) 24  
(b) 28  
(c) 32  
(d) 56
54. Freshly broken chromosomal ends are sticky and tend to fuse. However, the ends of intact chromosomes are stable and do not fuse in spite of presence of DNA ligase in the nucleus. Which of the following could explain the stability of chromosomal ends?  
(a) Presence of centromeric sequences  
(b) Presence of repeated sequences  
(c) Presence of specific membrane around the chromosomes  
(d) Presence of telomeric sequences
55. Semiconservative replication of eukaryotic genetic material was first demonstrated by Taylor et al using root tip cells of  
(a) *Pisum sativum*  
(b) *Vigna acontifolia*  
(c) *Arabidopsis thaliana*  
(d) *Vicia faba*
56. Which one of the following sub-cellular structures is enclosed by a half unit membrane?  
(a) Vacuole  
(b) Vesicle  
(c) Oleosome  
(d) Chloroplast
57. Consider the following statements:  
1. Aleurone tissue forms the outermost layer of endosperm in maize.  
2. Aleurone tissue helps in the nutrition of embryo during germination.
- Which of the statements given above is/are correct?  
(a) 1 only  
(b) 2 only  
(c) Both 1 and 2  
(d) neither 1 nor 2
58. Which one of the following tissues is not a nutritive tissue?  
(a) Tapetum  
(b) Endosperm  
(c) Endothelium  
(d) Endothecium
59. The protein in the pollen wall that causes allergy is contributed by:  
(a) Exine  
(b) Pollen cytoplasm  
(c) Tapetum  
(d) Intine
60. Fluorescein diacetate is used to test pollen viability based on the activity of which one of the following enzymes?  
(a) Catalase  
(b) Amylase  
(c) Esterase  
(d) Callase
61. Russell et al demonstrated the occurrence of dimorphic sperms in the pollen of:  
(a) *Amaryllis*  
(b) *Clivia*  
(c) *Plumbago*  
(d) *Orchis*
62. Which one of the following features is not associated with grasses?  
(a) Aleurone tissue  
(b) Scutellum  
(c) Cellular endosperm  
(d) 3-celled pollen
63. In all, a minimum of how many meiotic divisions are required to form 100 sexual seeds?  
(a) 25  
(b) 50  
(c) 100  
(d) 125
64. In which one of the following plants is pollination said to be entomophilus?  
(a) *Zostera marina*  
(b) *Sterlitzia reginae*  
(c) *Aristolochia fimbriata*  
(d) *Kigelia africana*

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65. Match List I with List II and select the correct answer using the code given below the lists:

List I	List II
Embryological Features	Plant

- |   |                 |
|---|-----------------|
| A. Longitudinal Division of Zygote                            | 1. Cyperus      |
| B. Only one of the four microspores in a tetrad is functional | 2. Dendrophthoe |
| C. Plant regeneration from in vitro fertilized egg            | 3. Zea          |

Code:

- |     | A | B | C |
|-----|---|---|---|
| (a) | 1 | 2 | 3 |
| (b) | 3 | 1 | 2 |
| (c) | 1 | 3 | 2 |
| (d) | 2 | 1 | 3 |

66. The adventive embryo initials in Citrus differentiate:

- (a) Before pollination
- (b) After pollination
- (c) After fertilization
- (d) After the division of zygote

67. What is unique about the embryogenesis in Paeonia?

- (a) Intrasegmental growth
- (b) Long dormancy of zygote
- (c) Free nuclear divisions in the zygote
- (d) Oblique division of the zygote

68. In the endospermous seeds the growth of the embryo starts:

- (a) Concurrently with the endosperm
- (b) Before the endosperm starts growing
- (c) After the endosperm has started growing
- (d) After the endosperm is fully developed

69. Which one of the following structures arises from the funiculus during post fertilization development of the ovule?

- (a) Caruncle
- (b) Aril
- (c) Operculum
- (d) Perisperm

70. In sporophytic self incompatibility,  $S_1S_2$  plants would be compatible with the plants carrying:

- (a)  $S_1S_2$
- (b)  $S_3S_4$
- (c)  $S_2S_3$
- (d)  $S_1S_4$

71. Which one of the following types of inflorescence is found in Banana?

- (a) Catkin
- (b) Corymb
- (c) Spadix
- (d) Spike

72. Match List I with List II and select the correct answer using the code given below the lists:

List I	List II
Plant	Part used for vegetative propagation

- |           |               |
|-----------|---------------|
| A. Agave  | 1. Flower bud |
| B. Ginger | 2. Rhizome    |
| C. Mint   | 3. Runner     |

Code:

- |     | A | B | C |
|-----|---|---|---|
| (a) | 1 | 2 | 3 |
| (b) | 3 | 2 | 1 |
| (c) | 1 | 3 | 2 |
| (d) | 2 | 1 | 3 |

73. In angiosperms, normally after fertilization:

- (a) the zygote divides before the division of the primary endosperm.
- (b) the primary endosperm nucleus divides before the division of the zygote
- (c) both the zygote and the primary endosperm nucleus divide simultaneously.
- (d) both the zygote and the primary endosperm nucleus undergo a resting period and then divide simultaneously.

74. In nature, the orchid seeds germinate only in association with:

- (a) Myxomycetes
- (b) Mycorrhiza
- (c) Blue green algae
- (d) Actinomycetes

75. Restriction enzymes are used in genetic engineering because:

- (a) They can join different DNA fragments.
- (b) They can cleave DNA at a specific target site.
- (c) They are nucleases that cut DNA at variable sites.
- (d) They are proteolytic enzymes which can degrade harmful enzymes.

76. Which one of the following statements regarding the photoperiodism in plants is not correct?

- (a) In plants, the phytochrome is involved in measuring the length of day.
- (b) Phytochrome contains protein and sulphur.
- (c) Xanthium strumarium is a long day plant and it flowers if nights are shorter than 8.4 hours.
- (d) In plants, the sites of perception for night length are young leaves.

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77. Isotopes have:
- Same atomic number but different atomic weights
  - Same atomic number and same atomic weights.
  - Different atomic numbers but same atomic weight
  - Different atomic numbers and different atomic weights.
78. The hydrostatic pressure developed within a plant cell through osmosis and/or imbibition when exerted on its wall is:
- Wall pressure
  - Osmotic pressure
  - Suction pressure
  - Turgor pressure
79. Which one of the following enzymes is associated with the conversion of nitrate to nitrite in the cytosol?
- Nitrate reductase
  - Nitrite reductase
  - Glutamine synthase
  - Glutamate synthase
80. Which one of the following classes of pigments is not found within the chloroplast/chromatophore in photosynthetic eukaryote?
- |                 |                   |
|-----------------|-------------------|
| (a) Carotenoid  | (b) Anthocyanin   |
| (c) Phycocyanin | (d) Phycoerythrin |
81. With reference to the development of genetics, consider the following events:
- Proposal of Operon model.
  - Discovery of the first RNA polymerase
  - Establishment of the complete genetic code.
- What is the correct chronological sequence of the above?
- |               |               |
|---------------|---------------|
| (a) 1 – 2 – 3 | (b) 2 – 1 – 3 |
| (c) 1 – 3 – 2 | (d) 3 – 1 – 2 |
82. The photoperiod required to induce flowering is referred to as:
- Short-day length
  - Long-day length
  - Critical day length
  - Intervening light period
83. Which one of the following bacteria is associated with the seed gall nematode (*Anguina* sp.) responsible for "Ear Cockle of wheat"?
- Clavibacter tritici*
  - Erwinia cartovora*
  - Clavibacter michiganense*
  - Ralstonia solanacearum*
84. Match List I with List II and select the correct answer using the code given below the lists:
- | List I                  |  | List II                           |  |
|-------------------------|--|-----------------------------------|--|
| Name of the disease     |  | Name of Pathogen                  |  |
| A. Stem rot of paddy    |  | 1. <i>Erwinia carotovora</i>      |  |
| B. Wilt of cotton       |  | 2. <i>Colletotrichum falcatum</i> |  |
| C. Red rot of sugarcane |  | 3. <i>Fusarium oxysporum</i>      |  |
| D. Soft rot of potato   |  | 4. <i>Sclerotium oryzae</i>       |  |
- Code:
- |     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 3 | 4 | 1 | 2 |
| (b) | 4 | 3 | 2 | 1 |
| (c) | 3 | 4 | 2 | 1 |
| (d) | 4 | 3 | 1 | 2 |
85. Heterospory and origin of seed habit was noticed for the first time in:
- Isoetes
  - Lycopodium
  - Selaginella
  - Marsilea
86. Which one of the following bryophytes has stomata present in the sporophyte?
- Riccia*
  - Dumortiera*
  - Marchantia*
  - Anthoceros*
87. Reserpine, an active alkaloid is obtained from:
- Atrope belladonna*
  - Catharanthus roseus*
  - Digitalis purpurea*
  - Rauwolfia serpentina*
88. The development of somatic embryos was first observed in carrot suspension cultures by:
- Steward et al (1958)
  - Reinert (1958)
  - Braun (1959)
  - Guha and Maheshwari (1964)
89. Deo-geo-woo-gen is the name of a variety of:
- Rice
  - Wheat
  - Maize
  - china grass
90. "Vanillin", a popular flavouring agent for ice creams, is obtained from:
- Leaf
  - Latex
  - Bark
  - Fruit

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91. In protoplast fusion which one of the following compounds is used?  
(a) Sorbitol  
(b) Polyethylene glycol  
(c) Dinitrophenol  
(d) Mannitol
92. Which one of the following plants is a source of chuckle gum, the basis of chewing gum industry?  
(a) *Hevea brasiliensis*  
(b) *Acacia senegal*  
(c) *Areca catechu*  
(d) *Achras zopota*
93. Which one of the following pairs of tree species is a representative of tropical wet evergreen forests in India?  
(a) *Dipterocarpus grandiflorus* and *Hopea odorata*  
(b) *Cupressus torulosa* and *Picea morinda*  
(c) *Betula utilis* and *Dipterocarpus grandiflorus*  
(d) *Boswellia serrata* and *Anogeissus Latifolia*
94. *Welwitschia mirabilis*, one of the most peculiar gymnospermous plants, is found only in:  
(a) South West Africa  
(b) Western Australia  
(c) Rajmahal hills of India  
(d) West Indies
95. Which type of relationship is shown by Lianas?  
(a) Protocooperation  
(b) Mutualism  
(c) Commensalism  
(d) Amensalism
96. A particular plant has various adaptations namely, (i) presence of soft spongy stem (ii) presence of air cavities in the leaf (iii) heavy reduction of vascular tissues and (iv) absence of cuticle in the epidermis. To which group does the plant belong?  
(a) Epiphyte  
(b) Hydrophyte  
(c) Xerophyte  
(d) Halophyte
97. Plants which grow on the forest floor in tropical rain forests have:  
(a) Leaves with thick cuticle  
(b) Succulent small leaves  
(c) Large light green leaves  
(d) Large, dark green leaves
98. Which one of the following groups of gases contribute to the greenhouse effect?  
(a)  $\text{NH}_3$ ,  $\text{O}_3$ ,  $\text{H}_2\text{S}$   
(b)  $\text{NO}_2$ ,  $\text{CO}$ ,  $\text{SO}_2$   
(c)  $\text{CH}_4$ ,  $\text{N}_2\text{O}$ ,  $\text{SO}_2$   
(d)  $\text{O}_3$ ,  $\text{CH}_4$  and  $\text{CO}$
99. What is the correct order in which the following four plant species occur on the Himalayas starting from the base of foothill to the alpine zone upwards?  
1. *Pinus roxburghii*  
2. *Juniperus macropoda*  
3. *Pinus wallichiana*  
4. *Shorea robusta*  
Select the correct answer using the code given below:  
(a) 4, 1, 2, 3  
(b) 4, 1, 3, 2  
(c) 2, 4, 3, 1  
(d) 1, 4, 2, 3
100. Consider the following:  
1. Coral reefs  
2. Flood plains  
3. Mangrove areas  
As per Ramsar Convention, which of the above is/are covered under the definition of wetlands?  
(a) 1 and 2 only  
(b) 2 and 3 only  
(c) 3 only  
(d) 1, 2 and 3
101. Which one of the following does not belong to in situ conservation?  
(a) Biosphere Reserve  
(b) Botanical Garden  
(c) National Park  
(d) Wildlife Sanctuary
102. With reference to environmental pollution, consider the following statements:  
1. Acid rains are caused by  $\text{H}_2\text{SO}_4$  only.  
2. While  $\text{SO}_2$  is highly injurious to plants,  $\text{NO}_2$  is not injurious to plants.  
Which of the statements given above is/are correct?  
(a) 1 only (b) 2 only  
(c) Both 1 and 2 (d) Neither 1 nor 2
103. Consider the following statements:  
1. There are no xerophytic epiphytes.  
2. There are no epiphytic orchids.  
Which of the statements given above is/are correct?  
(a) 1 only (b) 2 only  
(c) Both 1 and 2 (d) Neither 1 nor 2

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104. Consider the following statements:  
 1. Lignin contains long-chain fatty acids.  
 2. Cutin is a carbohydrate polymer.  
 Which of the statements given above is/are correct?  
 (a) 1 only  
 (b) 2 only  
 (c) Both 1 and 2  
 (d) Neither 1 nor 2
105. Consider the following statements:  
 1. Members of Agaricales infect roots to form ectotrophic mycorrhiza.  
 2. Mycorrhizal roots take up nutrients better than uninfected roots.  
 Which of the statements given above is/are correct?  
 (a) 1 only  
 (b) 2 only  
 (c) Both 1 and 2  
 (d) Neither 1 nor 2
106. Consider the following pairs:
- | Plant                            | Area of natural occurrences |
|----------------------------------|-----------------------------|
| 1. <i>Betula utilis</i>          | : Western Himalayas         |
| 2. <i>Dendrocalamus strictus</i> | : Temperate zone            |
| 3. <i>Diospyros melanoxylon</i>  | : Temperate zone            |
- Which of the pairs given above is/are correctly matched?  
 (a) 1 only  
 (b) 1 and 2 only  
 (c) 2 and 3 only  
 (d) 1, 2 and 3
107. Match List I with List II and select the correct answer using the code given below the lists:
- | List I                         | List II                            |
|--------------------------------|------------------------------------|
| Plant                          | Oil extracted                      |
| A. <i>Cymbopogon flexuosus</i> | 1. Citronella oil                  |
| B. <i>Cymbopogon nardus</i>    | 2. Palma rosa and ginger grass oil |
| C. <i>Cymbopogon martini</i>   | 3. East Indian Lemon grass oil     |
- Code:**
- |     | A | B | C |
|-----|---|---|---|
| (a) | 3 | 1 | 2 |
| (b) | 2 | 1 | 3 |
| (c) | 3 | 2 | 1 |
| (d) | 1 | 3 | 2 |
108. Consider the following statements:  
 1. Rust diseases are caused by the fungi of order Uredinales.  
 2. Smut diseases are caused by the fungi of order Ustilaginales.
- Which of the statements given above is/are correct?  
 (a) 1 only  
 (b) 2 only  
 (c) Both 1 and 2  
 (d) Neither 1 nor 2
109. Consider the following statements:  
 1. *Agrobacterium tumefaciens* is a soil bacterium.  
 2. *Agrobacterium tumefaciens* can infect the plant at the junction between root and stem (crown) only  
 Which of the statements given above is/are correct?  
 (a) 1 only  
 (b) 2 only  
 (c) Both 1 and 2  
 (d) Neither 1 nor 2
110. Consider the following statements:  
 1. Early blight of potato is caused by *Erwinia amylovora*.  
 2. Late blight of potato is caused by *Phytophthora infestans*.  
 Which of the statements given above is/are correct?  
 (a) 1 only  
 (b) 2 only  
 (c) Both 1 and 2  
 (d) Neither 1 nor 2
111. From which one of the following flowers is the insecticides 'pyrethrum' derived?  
 (a) *Chrysanthemum*  
 (b) *Iberis*  
 (c) *Nelumbo*  
 (d) *Rosa*
112. With reference to eukaryotes, consider the following statements:  
 1. The size of ribosomes present in the cytoplasm of all species of eukaryotes is same.  
 2. The size of ribosomes present in chloroplasts and mitochondria is smaller as compared to those found in cytoplasm.  
 Which of the statements given above is/are correct?  
 (a) 1 only  
 (b) 2 only  
 (c) Both 1 and 2  
 (d) Neither 1 nor 2
113. Who postulated the chromosome basis of linkage?  
 (a) Bateson  
 (b) Bridges  
 (c) Griffith  
 (d) Morgan

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114. The mutagen Proflavin is a/an:  
 (a) Acridine dye  
 (b) Alkalyating agent  
 (c) Base analog  
 (d) Hydroxylating agent
115. The term "Genetic load" refers to:  
 (a) Sum total of unfavourable genes in cross fertilized species.  
 (b) reduction in vigour and fertility in plant species.  
 (c) Increased vigour and size of inter-specific hybrids.  
 (d) Increased homozygosity in the plant progeny.
116. Consider the following statements:  
 1. One DNA cistron specifies one polypeptide chain in protein synthesis.  
 2. In Operon model, the operator need not always be located contiguous to the structural gene or genes whose expression it regulates.  
 Which of the statements given above is/are correct?  
 (a) 1 only (b) 2 only  
 (c) Both 1 and 2 (d) Neither 1 nor 2
117. Which one of the following terms is used to explain the acquisition of new genes by a cell due to the uptake of naked DNA?  
 (a) Transduction  
 (b) Transfection  
 (c) Transformation  
 (d) Conjugation
118. Consider the following statements:  
 1. In dicot stem, cuticle is present.  
 2. In monocot stem, endodermis and pericycle are indistinct.  
 Which of the statements given above is/are correct?  
 (a) 1 only (b) 2 only  
 (c) Both 1 and 2 (d) Neither 1 nor 2
119. Match List I with List II and select the correct answer using the code given below the lists:
- | <b>List I</b> |                 | <b>List II</b>                   |  |
|---------------|-----------------|----------------------------------|--|
| Plant         |                 | Tendrils are the modification of |  |
| A. Gloriosa   | 1. Leaf tip     |                                  |  |
| B. Nepenthes  | 2. Midrib       |                                  |  |
| C. Smilax     | 3. Stipule      |                                  |  |
| D. Vitis      | 4. Terminal bud |                                  |  |
- Code:**
- |     | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> |
|-----|----------|----------|----------|----------|
| (a) | 4        | 3        | 2        | 1        |
| (b) | 4        | 2        | 3        | 1        |
| (c) | 1        | 3        | 2        | 4        |
| (d) | 1        | 2        | 3        | 4        |

120. Match List I with List II and select the correct answer using the code given below the lists:

<b>List I</b>		<b>List II</b>	
Fruit		Plant	
A. Acne	1. Calotropis		
B. Cypsela	2. Nelumbium		
C. Follicle	3. Mustard		
D. Siliqua	4. Tridax		

**Code:**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
(a)	2	1	4	3
(b)	2	4	1	3
(c)	3	1	4	2
(d)	3	4	1	2

**End of question paper**
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