

# CIVIL SERVICES (PRE) EXAMINATION, 2007

## Cell Biology

1. With reference to anthocyanins, consider the following statements
1. Anthocyanins impart red colour to flower petals.
  2. They are soluble in water.
  3. They are located in vacuoles.
- Which of the statements given above are correct?
- a. 1 and 2 only
  - b. 2 and 3 only
  - c. 1 and 3 only

### 1. Plasmids

2. Consider the following statements
1. B-chromosomes are indispensable and their inheritance is non-Mendelian.
  2. B-chromosomes may increase in number due to a drive involving non-disjunction during pollen mitosis.
  3. When B-chromosomes are present in high numbers, they suppress vigour and fertility.
  4. B-chromosomes do not show homology with the basic A-chromosomes.

Which of the statements given above are correct?

- a. 1, 2 and 3
- b. 2, 3 and 4
- c. 1, 3 and 4
- d. 1, 2 and 4

3. A proteinaceous tubular structure that extends through a plasmodesmata and is attached to endoplasmic reticulum on either side is known as

- a. microtubule
- b. microfilament
- c. microvilli
- d. microsome

4. Inter-cellular communications in plant tissues is mediated by

- a. desmosomes
- b. plasmodesmata
- c. tonofilaments
- d. tight junctions

## Genetics, Molecular Biology

## Biotechnology and Tissue Culture

5. In the synthesis of which one of the following is nucleolus involved?

### 1. Ribosomal RNA

- a. Messenger RNA
- b. Transfer RNA
- c. DNA

6. The phenomenon whereby mutations caused by UV rays are reversed by exposing cells to visible light of 422-492 nm wavelength is known as

### 1. Photoactivation

- a. ionization
- b. tautomeric shift
- c. transversion

7. The region of Ti plasmid essential for the transfer of T-DNA in a host is

- a. *ori* region
- b. *vir* region
- c. *onc* region
- d. *chc* locus

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

### List I (Concept)

- A. Chromosome theory of Linkage
- B. Chromosome theory of Linkage
- C. One gene- one enzyme concept
- D. Chemiosmotic theory Active transport

### List II (Scientist)

1. Morgan and
2. Beadle and Tatum
3. Morgan and Castle
4. Hoagland and Davis Jacob and Monod Mitchell

Codes:

### 1. A-B-C-D-E

- a. A-4, B-2, C-5, D-3
- b. A-2, B-1, C-3, D-5
- c. A-4, B-2, C-3, D-5

9. The following are the DNA molecules with base composition. Which one of them requires high melting temperature for denaturation?

- a. %A-28, %T-28, %G-22, %C-22
- b. %A-30, %T-30, %G-20, %C-20
- c. %A-35, %T-35, %G-15, %C-15
- d. %A-30, %T-30, %G-20, %C-20

10. The genes C, M, P and S are linked. Crossover map distances as determined by two-point crosses are: P-C = 7, S-M = 10, C-M = 8, S-C = 2 and P-S = 5. The relative positions of these four linked loci are

10. ~~SCPM~~
- SCPM
  - PCSM
  - SCMP
11. With reference to cosmids, which one of the following statements is not correct ?
- ~~Cosmids can be used to clone DNA inserts of sizes than 45 kb.~~
  - Cosmids can be packaged into  $\lambda$  particles that infect host cells.
  - Selection for recombinant DNA is based on the procedure applicable to the plasmid making up the cosmid.
  - Cosmids are amplified and maintained in the same manner as the contributing plasmid.
12. Consider the following
- 5-aminouracil
  - 2,3,5-triphenyltetrazolium chloride
  - Hydroxyurea
  - Fluorescein diacetate
- Which of the above is are the inhibitor-inhibitors of DNA synthesis ?
- 1 only
  - 1 and 2
  - ~~1 and 3~~
  - 3 and 4
13. Nucleic acid sequences, which either originate partly or fully or propagate through reverse transcription are called
- Plasmids
  - ~~retroelements~~
  - insertion sequences
  - transposons
14. What is the name of the technique used to obtain a heterokaryon
- Inter-specific hybridization
  - Intergeneric hybridization
  - ~~Inter-specific hybridization~~
  - Interspecific hybridization
15. Which one of the following is caused by the chemical, 5-bromouracil, which is a base-analog?
- ~~Transitions~~
  - Frame-shift mutations
  - Transversions
  - Translocations
16. Match List I with List II and select the correct answer using the code given below the lists
- List-I (Discoveries)
- PCR Technology
  - DNA Fingerprinting
  - Hybridoma Technology
  - Jumping genes
- List-II (Scientists)
- G. Kohler and C. Milstein
  - B. McClintock
  - K. Mullis
  - Alec Jeffreys
- Codes:
- A-2, B-1, C-4, D-3
  - A-2, B-4, C-1, D-3
  - A-3, B-1, C-4, D-2
  - ~~A-3, B-4, C-1, D-2~~
17. In *Agrobacterium tumefaciens*, disarmed plasmids differ from wild-type plasmids by not having the
- vir region of Ti plasmid
  - indoles of the vir operons
  - ~~vir gene~~
  - requirement for acetosyringone
18. Who of the following first used the term 'mutation' to describe heritable phenotypic changes ?
- L.I. Stadler
  - C. Auerbach
  - H.J. Muller
  - ~~H. de Vries~~
19. In *E. coli*, which of the following codons are recognized by the release factor RF1 ?
- UAG and UGA
  - UAA and UGG
  - ~~UAG and UAA~~
  - UAG and UUA
20. The Okazaki fragments occur as fragments in
- leading strand of the duplex DNA
  - ~~lagging strand of the duplex DNA~~
  - circular DNA of viruses
  - rolling circle type of replication of viral DNA
21. Which one of the following statements correctly applies to the genetic code ?
- ~~Triplet, degenerate, universal, comma-less, non-overlapping~~
  - Degenerate, non-universal, triplet, comma-less, non-overlapping
  - Nearly universal, non-degenerate, triplet, comma-less, overlapping
  - Triplet, with comma, degenerate, nearly universal, overlapping

22. The double-stranded DNA, having one of the strands with which of the following sequences can be called as palindromic?

- a. GCGATCGC  
 b. CCTGGACGC  
 c. GOATCCTGG  
 d. AAGTACGGT

23. Datura cell cultures possess the ability to convert hydroquinone into arbutin through the process of

- a. Phosphorylation  
 b. oxidation  
 c. glycosylation  
 d. hydrolysis

24. For the commercial production of virus-free plants through tissue culture, explants are derived from

- a. old leaves  
 b. nodal segments  
 c. endosperm  
 d. apical meristems

25. Degeneracy of genetic code implies that

- a. the codons degenerate after the synthesis of polypeptide chain  
 b. more than one codon can code for one amino acid  
 c. some codons degenerate as they are not involved in coding for any amino acid  
 d. one codon can code for more than one amino acid

26. With reference to protein synthesis, consider the following enzymes.

1. Activation of amino acid  
 2. Polypeptide formation  
 3. Formation of amino acid tRNA complex  
 4. Binding of amino acid tRNA complex with mRNA  
 What is the correct sequence of the above events in protein synthesis?  
 a. 1-3-2-4  
 b. -1-4-2  
 c. 3-1-2-4

## Plant Physiology and Biochemistry

27. The carrier-mediated cotransport in which a solute is actively transported across a membrane against the gradient of electrochemical potential by coupling the uphill transport of one solute to the downhill transport of another is an example of

22

23

24

25

26

28.

- a. symport transport  
 b. primary active transport  
 c. facilitated diffusion  
 d. antiport transport

With reference to photosynthesis, consider the following statements

1. Ten photons are required to reduce one molecule of  $\text{CO}_2$  to the level of a carbohydrate ( $\text{C}_3\text{H}_6\text{O}$ )  
 2. If one mole of glucose ( $6 \times 10^6 \text{C}_3\text{H}_6\text{O}$ ) is oxidized to  $\text{CO}_2$  and  $\text{H}_2\text{O}$ ,  $20 \times 10^6$  energy is released  
 Which of the statements given above are correct?

- a. 1 only  
 b. 2 only  
 c. Both 1 and 2  
 d. Neither 1 or 2

29.

Nicotinamide adenine dinucleotide (NAD) is a co-factor to accept electrons in some oxidation-reduction reactions in cells. Specifically, which component of NAD accepts electrons?

- a. Adenine  
 b. Nicotinamide  
 c. Ribose  
 d. Pyrophosphate bridge

30.

In Krebs' cycle, GTP is formed in a reaction between

- a. isocitrate and  $\alpha$ -ketoglutarate  
 b. succinate and fumarate  
 c. malate and oxaloacetate  
 d. malate and isocitrate

31.

If there is more than one enzyme that can act on the same substrate and convert it to the same product, such enzymes are referred to as

- a. allosteric enzymes  
 b. apoenzymes  
 c. coenzymes  
 d. holoenzymes

32.

Which one of the following pairs is not correctly matched?

- a. Dry seed - Low respiratory activity  
 b. Seed imbibition - Hydrolysis of proteins  
 c. Substrates  
 d. Cytosol - Persistent nucleolus

33.

Vernalization, followed by correct photoperiod and optimum temperature will make the photoreceptor

- a. annuals flower earlier  
**b. biennials flower**  
 c. annuals remain vegetative  
 d. biennials remain vegetative
34. Which one of the following statements is not correct ?  
 a. All fatty acids have a carboxyl group at one end  
**b. Like carbohydrates, fatty acids have more oxygen than hydrogen**  
 c. Saturated fatty acids are solids at room temperature  
 d. Glycerol is a component of phospholipids
35. Consider the following plants  
 1. Cucurbits  
 2. Grapes  
 3. Lilies  
 4. Mints  
 Which of the above plants exhibit the Crassulacean Acid Metabolism ?  
 a. 1 and 2 only  
**b. 2, 3 and 4 only**  
 c. 1 and 4 only  
 d. 1, 2, 3 and 4
36. Consider the following  
 1. Auxins  
 2. Maleic hydrazide  
 3. Tartaric acid  
 Which of the above selectively induce male sterility ?  
**a. 1 and 2 only**  
 b. 2 and 3 only  
 c. 1 and 3 only  
 d. 1, 2 and 3 only
37. Structurally, which one of the following is the most similar amino acid ?  
 a. Alanine  
 b. Cysteine  
**c. Glutamine**  
 d. Lysine
38. In xerophyllum, the stomata remain open during the night and close during daytime. Which one of the following hypothesis explains best the mechanism of stomatal movement at night ?  
**a. Absorption of  $\text{CO}_2$  and its conversion to organic acids results in the increased uptake of potassium ions and water**  
 b.  $\text{CO}_2$  is used up and increased pH results in the accumulation of sugars  
 c. Low  $\text{CO}_2$  concentration accumulates organic acids resulting in the increased concentration of cell sap  
 d.  $\text{CO}_2$  accumulation and reduction of \* pH cause stimulation of enzymes- resulting in the accumulation of sugar.
39. Using heavy isotope of oxygen ( $\text{O}^{18}$ ) who of the following provided the direct proof that oxygen evolved in photosynthesis comes from water and not from  $\text{CO}_2$  ?  
 a. Robert Hill  
**b. Ruben and Kamen**  
 c. Emerson and Lewis  
 d. Arnon
40. Match List I with List II and select the correct answer using the code given below the lists  
 List I (Concepts)  
 A. Richmond-Lan effect  
 B. Emerson effect  
 C. Pasteur effect  
 D. Warburg effect  
 List II (Phenomenon)  
 1. Reversal of red drop  
 2. Inhibition of glycolysis by  $\text{O}_2$   
 3. Inhibition of photosynthesis by  $\text{O}_2$   
 4. Retardation of senescence in detached leaves  
 Codes :  
 a. A-3, B-1, C-2, D-4  
 b. A-4, B-2, C-1, D-3  
 c. A-3, B-2, C-1, D-4  
**d. A-4, B-3, C-2, D-1**
41. Which one of the following is the correct sequence of electron transport in Mitochondria ?  
**a.  $\text{NADH} \rightarrow \text{F}_0\text{F}_1 \rightarrow \text{Cytc}_1 \rightarrow \text{Cyt}_b \rightarrow \text{Cyt}_{c_2} \rightarrow \text{Cytc} \rightarrow \text{Cytc}_1 \rightarrow \text{Cytc}_2 \rightarrow \text{O}_2$**   
 b.  $\text{NADH} \rightarrow \text{Cyt}_a \rightarrow \text{Cyt}_{a_1} \rightarrow \text{F}_0\text{F}_1 \rightarrow \text{Cyt}_b \rightarrow \text{Cyt}_{c_1} \rightarrow \text{Cyt}_c \rightarrow \text{O}_2$   
 c.  $\text{NADH} \rightarrow \text{F}_0\text{F}_1 \rightarrow \text{Cyt}_b \rightarrow \text{Cyt}_a \rightarrow \text{Cyt}_{a_1} \rightarrow \text{Cyt}_c \rightarrow \text{Cytc}_1 \rightarrow \text{O}_2$   
 d.  $\text{NADH} \rightarrow \text{Cyt}_b \rightarrow \text{Cyt}_{c_1} \rightarrow \text{Cyt}_c \rightarrow \text{F}_0\text{F}_1 \rightarrow \text{Cyt}_a \rightarrow \text{Cyt}_{a_1} \rightarrow \text{O}_2$
42. Consider the following statements  
 1. Cytokinins synthesized in roots are transported shoots where axillary buds are stimulated.  
 2. Cytokinins present in a healthy stem cause some of the new cells to differentiate as phloem.  
 Which of the statements given above is are correct ?

- a. I only  
 b. Both 1 and 2  
 c. Both 1 and 2  
 d. Neither 1 nor 2

### Taxonomy and Economic Botany

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

#### List-I (Authors)

- A. Hutchinson  
 B. Bentham and Plants  
 C. Engler and Prantl Plants  
 D. Takhtajan

#### List-II (Books)

1. Die Naturlichen Pflanzenfamilien  
 2. The Families of Flowering Plants  
 3. The Origin of Angiospermous Plants  
 4. Genera Plantarum

Codes:

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

44. Among the following fruits, which one is richest in tartaric acid ?

- a. *Vitis vinifera*  
 b. *Citrus sinensis*  
 c. *Tamarix indica*  
 d. *Citrullus vulgaris*

45. Which one of the following plants is used as a substitute of rubber plant (*Hevea brasiliensis*) for production of rubber?

- a. *Argemone mexicana*  
 b. *Cleome gynandra*  
 c. *Calotropis procera*  
 d. *Parthenium hysterioides*

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

#### List-I (Medicinal Plants)

- A. *Crotalaria calisaya*  
 B. *Digitalis purpurea*  
 C. *Papaver somniferum*  
 D. *Strychnos nux-vomica*

#### List-II (Parts used)

1. Seeds  
 2. Unripe capsules  
 3. Bark  
 4. Leaves

Codes:

- a. A-3, B-4, C-2, D-1  
 b. A-3, B-2, C-4, D-1

- c. A-1, B-4, C-2, D-3  
 d. A-1, B-2, C-4, D-3

47. The coconut water is a part of  
 a. Nucleus  
 b. pericarp  
 c. embryo

#### List-I (Angiosperms)

48. Consider the following plants

1. Date palm  
 2. Maize  
 3. Mulberry

Which of the above plants is/are dioecious ?

- a. 1 only  
 b. 1 and 3  
 c. 2 and 3  
 d. 3 only

49. Which one of the following plants is an important source of beverage and exhibits cauliflory ?

- a. *Coffea arabica*  
 b. *Artemisia caryophyllus*  
 c. *Camellia sinensis*  
 d. *Artocarpus heterophyllus*

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

#### List I (Common trade name)

- A. Ashwagandha  
 B. Safflower  
 C. Licorice  
 D. Neem

#### List II (Botanical name)

1. *Glycyrrhiza glabra*  
 2. *Azadirachta indica*  
 3. *Withania somnifera*  
 4. *Carthamus tinctorius*

Codes :

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

51. Which one of the following plant products is derived from stigma ?

- a. Clove  
 b. Saffron  
 c. Camphor  
 d. Marijuana

52. In which one of the following is alkaloid morphine found ?

- a. *Hyoscyamus niger*  
 b. *Ephedra gerardiana*

- c. *Atropa belladonna*  
~~d. *Paspalum conjugatum*~~
53. Consider the following statements
- The finished tea leaves contain less caffeine than the roasted coffee beans on percentage basis.
  - The cocoa beans contain theobromine
- Which of the statements given above is are correct ?
- 1 only
  - 2 only
  - Both 1 and 2
  - Neither 1 nor 2
54. Which one of the following families has sepals, petals, stamens and carpels in the ratio of 2 : 2 : 3 : 1 ?
- ~~Labiatae~~
  - Asteraceae
  - Solanaceae
  - Liliaceae
55. Which one of the following is considered suitable for energy plantation ?
- Leucaena leucocephala*
  - ~~*Artocarpus lacucha*~~
  - Casurina equisetifolia*
  - Cinnamomum camphora*
56. Consider the following statements
- In Bentham and Hooker's classification, gymnosperms are placed between dicots and monocots.
  - In Engler and Prantl's classification, monocots are regarded to be more advanced than dicots.
- Which of the statements given above is are correct ?
- 1 only
  - 2 only
  - Both 1 and 2
  - Neither 1 nor 2
57. Consider the following characteristics
- Verticillaster inflorescence
  - Gynobasic style
  - Free-central placentation
- Which of the above are present in the family Labiatae ?
- ~~1 and 2 only~~
  - 2 and 3 only
  - 1 and 3 only
  - 1, 2 and 3 only
58. Spurred corolla is one of the main characteristics of :
- Ocimum*
  - Capparis*
  - ~~*Delphinium*~~
  - Bignonia*
- Cryptogams, Phanerogams, Palaeobotany and Evolution**
59. To indicate the origin of life from simple gases, S. Miller in his experiments used the one of the following mixture of gases for amino acid synthesis ?
- ~~Methane, ammonia, hydrogen and water vapour~~
  - Methane, ammonia, nitrogen and water vapour
  - Methane, nitrogen, hydrogen and carbon dioxide
  - Ammonia, carbon dioxide, nitrogen and water vapour
60. Which one of the following characters is a primitive one for gymnosperms ?
- Sunken stomata
  - ~~Naked seeds~~
  - Non-motile gametes
  - Polyembryony
61. Consider the following statements
- The thylakoids of blue-green algae are arranged singly and not aggregated into grana.
  - In blue-green algae, the thylakoids are not only the sites for photosynthesis but also for respiration.
- Which of the statements given above is are correct ?
- 1 only
  - 2 only
  - Both 1 and 2
  - Neither 1 nor 2
62. Match List-I with List-II and select the correct answer using the code given below the lists
- List I (Structure)**
- Pseudocelater
  - Elater
  - Elaterophore from apex of capsule
  - Elaterophore from base of Capsule
- List II (Plant)**
- Riccardia
  - Marchantia

3. Pellia  
4. anthoceros

Codes:

- a. A-4, B-1, C-2, D-3  
b. A-3, B-2, C-1, D-4  
~~A-4, B-2, C-1, D-3~~  
d. A-3, B-1, C-2, D-4

63. What is apophysis ?

- ~~Basal part of the moss capsule~~  
b. Lower part of the seta in moss  
c. Basal part of fern sporangium  
d. Nutritive tissue of a fern sporangium

64. The fern in which the sporangium develops from a single superficial cell of the sporophyll is known as

- ~~Leptosporangiate~~  
b. eusporangiate  
c. anisporangiate  
d. mesosporangiate

65. In which one of the following classes of algae the motile flagellated structures are absent?

- a. Chlorophyceae  
~~Rhynophyceae~~  
c. Xanthophyceae  
d. Phaeophyceae

66. In which geological period did the 'Flowering Plants' come into existence ?

- a. Permian  
~~Cretaceous~~  
c. Devonian  
d. Carboniferous

67. In lower vascular plants, ~~rhizoids~~ occurs at the time of

- a. formation of gametes  
~~formation~~  
c. division of zygote  
d. germination of spores

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

List I

- A. Azolla  
B. Casuarina  
C. Cajanus cajan  
D. Gunnera

List II

1. Rhizobium  
2. Nostoc  
3. Frankia  
4. Anabaena

Codes :

~~A-1, B-3, C-1, D-4~~

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

69. Lichens reproduce by which one of the following ?

- a. Gonidia  
b. Conidia  
c. Oidia  
~~Sporidia~~

## Plant Pathology and Microbiology

70. Microbial conversion of Sorbitol to Sorbose (used as antioxidant in food manufacture) is brought about by

- ~~Acetobacter suboxydans~~  
b. Bacillus cereus  
c. Saccharomyces lipolytica  
d. Clostridium cellulyticum

71. In the context of biological control of disease, which one of the following is an antagonist ?

- a. Pythium aphanidermatum  
b. Fusarium moniliforme  
~~Trichostema viride~~  
d. Helminthosporium maydis

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

List-I (Bacteria)

- A. Pyrococcus furiosus  
B. Rhodospirillum  
C. Pseudomonas aeruginosa  
D. Bacillus thuringiensis

List-II (Characteristic)

1. Production of bacterial pesticide  
2. Production of thermostable enzyme  
3. Free living nitrogen fixer  
4. Biodegradation of oil spills  
5. Photosynthetic bacteria

Code :

- a. A-2, B-5, C-1, D-4  
~~A-2, B-3, C-4, D-1~~  
c. A-3, B-2, C-4, D-1  
d. A-3, B-2, C-1, D-4

73. The ability of the Gram positive bacterial cell to retain Gram's stain after washing with suitable organic solvent is due to the presence of high amount of

- a. Phospholipid  
~~peptidoglycan~~  
c. lipopolysaccharide  
d. phosphoglyceride

74. A component of cell wall in most of the prokaryotes which has been dubbed as 'signature molecule' to distinguish species of bacteria from species of Archaea is

- Hemicellulose
- chitin
- lignocellulose
- peptidoglycane**

75. Bacteria and blue-green algae are similar due to the

- presence of mitochondria
- chemosynthetic mode of nutrition
- presence of flagella
- presence of nucleoid**

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

List I (Disease)

- Karnal Bunt
- White Rust
- Grassy Shoot
- Tikka

List II (Plant)

- Groundnut
- Sugarcane
- Wheat
- Mustard

Codes:

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

77. Burgundy mixture contains

- copper sulphate, sodium carbonate and water**
- copper sulphate, calcium hydroxide and water
- sodium chloride, calcium hydroxide and water
- sodium chloride, copper sulphate and potassium chloride

### Ecology and Biodiversity

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

List I (Scientist)

- Brown and Wilson
- Clupman
- Raunkiaer
- Whittaker

List II (Associated with)

- Biotic potential
- Character displacement

3. Life forms

4. Vegetational continuum

Codes :

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

79. Consider the following

- Western Ghats
- Eastern Ghats
- Eastern Himalayas
- Central Himalayas

Which of the above in India, is/are identified as 'hot-spots' of biodiversity?

- 1 only
- 2 and 3

**Code:**

- 2 and 4

80. If the individuals of organisms in any ecosystem are distributed equally among the different species, the diversity would be

- Maximum
- minimum
- intermediate
- zero

Among the following states, Which one has the largest area under its National Parks ?

- Arunachal Pradesh
- Madhya Pradesh**
- Karnataka
- Rajasthan

82. With reference to community ecology, which one of the following describes a cluster of different species of vines climbing into the canopy of a tropical forest ?

- Ecological equivalents
- guilds**
- Edge species
- Ecotypes

83. In the context of an ecosystem, how is 'Net Primary Productivity' defined ?

- Rate of storage of organic matter in plant tissues in excess of the respiratory utilization by the plants during the measurement period**
- Total rate of photosynthesis including the organic matter used up in respiration during the measurement period
- Rate of storage of organic matter not used by consumers during the measurement period



- d. Rate of energy storage by the consumers alongwith food materials utilized in their respiration during the measurement period
84. Match List I with List II and select the correct answer using the code given below the lists

## List I (Hydrophyte)

- A. Azolla  
B. Ceratophyllum  
C. Hydrilla  
D. Trapa

## List II (Description)

1. Completely submerged and rooted in soil.  
2. Rooted in soil but with leaves floating on the water surface.  
3. Completely submerged but not rooted in soil.  
4. Free floating on the water surface with no contact with soil.

## Codes :

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

85. An agreeable and well defined system of categorization of threatened taxa was proposed by

- a. WWF  
b. CBD  
c. UNEP  
d. IUCN

86. Genetic races of a species, with heritable variations that differentiated due to interplay with environmental conditions are called

- a. ecads  
b. ecotypes  
c. syntypes  
d. ecoclines

87. Which one of the following types of ecosystems has probably an inverted pyramid of biomass ?

- a. Grassland ecosystem  
b. Forest ecosystem  
c. Freshwater ecosystem  
d. Mangrove ecosystem

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

## List I (Plant)

- A. *Avicennia alba*  
B. *Prosopis spicigera*  
C. *Betula utilis*  
D. *Dipterocarpus indicus*

## List II (Natural Vegetation)

1. Wet evergreen forest  
2. Thorn scrub forest  
3. Temperate forest  
4. Mangrove forest

## Codes :

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

89. Consider the following statement

1. The presence of grassland is a characteristic feature of the regions with high rainfall during summer and low rainfall during winter  
2. The presence of sclerophyllous forests is a characteristic feature of the regions with heavy rainfall during winter and low rainfall during summer.

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

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

## List I (Wetland)

- A. Harike  
B. Kolleru  
C. Loktak  
D. Pichola

## List II (State)

1. Andhra Pradesh  
2. Manipur  
3. Punjab  
4. Rajasthan

## Codes:

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

91. Which one of the following compositions of soil best describes the leam soils ?

- a. 85% sand + 15% clay or silt  
b. 70% sand + 30% clay or silt  
c. 50% sand + 50% clay or silt  
d. 10% sand + 90% silt

**Embryology, Seed Development and seed Germination: Plant Breeding**

92. Consider the following statements
- The country of origin of *Gossypium arboreum* is Mexico.
  - Gossypium barbadense* is considered to have originated from Nile valley and Egypt.
- Which of the statements given above is/are correct ?
- 1 only
  - 2 only
  - Both 1 and 2
  - Neither 1 nor 2
93. In angiosperms, germinable adventive embryos develop from
- endosperm
  - micelles
  - antipodal cells and/or synergids
  - synergids
94. Consider the following plants
- Avicennia*
  - Aegiceras*
  - Sonneratia*
- Which of the above plant/plants exhibit vivipary?
- 1 only
  - 1 and 2
  - 2 and 3
  - 1, 2 and 3
95. The loss of hybrid vigour in successive generations is due to
- inbreeding
  - cross-breeding
  - induced mutation
  - self-incompatibility
96. Consider the following statements
- Calcium plays an important role in pollen germination.
  - Pectinase and cellulase occur in pollen grains.
- Which of the statements given above is/are correct ?
- 1 only
  - 2 only
  - Both 1 and 2
  - Neither 1 nor 2
97. In sporophytic self-incompatibility, rejection of the male gametophyte occurs at the level of
- ovary
  - stigma surface
  - transmitting tract of the stigma
  - stylar canal
98. In which one of the following families does the seed contain endosperm?
- Polypodiaceae
  - Trapaecae
  - Podostemataceae
  - Orchidaceae
99. When the pollen grains from the anther of a flower are transferred to the stigma of another flower on the same plant, what is it called?
- Xenogamy
  - Autogamy
  - Geitonogamy
  - Cherkogamy
100. Consider the following
- protandry
  - homogamy
  - heterostyly
  - herkogamy
- Which of the above conditions favour cross fertilisation?
- 1 and 4 only
  - 2 and 3 only
  - 1, 3 and 4 only
  - 1, 2, 3 and 4
101. Match List I with List II and select the correct answer using the code given below the lists
- List I (Mode of propagation)
- Leaf cutting
  - Underground stem cutting
  - Runner
  - Bulb
- List II (Name of plant)
- Strawberry
  - Bryophyllum
  - Ginger
  - Sugarbeet
  - Onion
- Codes:
- A-2, B-3, C-5, D-1
  - A-4, B-2, C-5, D-1
  - A-2, B-3, C-1, D-5
  - A-4, B-2, C-1, D-5
102. Apomictic seed production
- bypasses meiosis and fertilization
  - involves fertilization of reduced egg
  - involves fertilization of unreduced egg
  - involves parthenogenetic development of reduced egg
103. Bisporic type of embryo sac development occurs in

- a. Polygonum  
b. Fritillaria  
c. Chrysanthemum  
104. Epigeal germination occurs in  
a. gram  
b. pea  
c. maize
105. Which one of the following is the most common type of ovule in angiosperms?  
a. Campylotropous  
b. Hemianatropous  
c. Orthotropous
106. Match List I with List II and select the correct answer using the code given below the lists  
List-I (Plant)  
A. Rice  
B. Onion  
C. Tobacco  
D. Wheat  
List-II (Diploid chromosome number)  
1. 16  
2. 24  
3. 42  
4. 48  
a. A-2, B-4, C-1, D-3  
b. A-2, B-1, C-4, D-3  
c. A-3, B-4, C-1, D-2  
d. A-3, B-1, C-4, D-2

### Anatomy and Morphogenesis

107. In which one of the following woods are all the vessels uniform through out the season?  
a. Ring porous  
b. Diffuse porous  
c. Reticulate  
d. Conspicuous
108. Interfascicular meristem is derived from  
a. lateral meristem  
b. intercalary meristem  
c. interfascicular cambium  
d. protoderm
109. The cells which are rich in starch grains and help in geotropic response are called  
a. aleurone cells  
b. starch cells  
c. file cells  
d. albuminous cells

110. At the close of the growing season, the sieve plate is covered by a deposit of a colourless shining substance that consists of which one of the following?  
a. Cellulose  
b. Calcium  
c. Pectin  
d. Lignin

111. Which one of the following is most suitable for the detection of multiserial rays in the wood?  
a. Radial longitudinal section  
b. Transverse section  
c. Tangential section  
d. Oblique section

112. Consider the following statements  
1. Xylem vessels are semi-permeable  
2. Sieve tubes transport only solutes  
3. Xylem vessels do not have a turgor pressure  
4. Sieve tubes are dead when mature but perform functions

Which of the statements given above are correct?

- a. 1 and 2  
b. 2 and 3  
c. 1 and 3  
d. 2 and 4

### Assertion and Reason

Directions : The following eight (8) items consist of two statements, one labelled as the 'Assertion (A)' and the other as 'Reason (R)'. You are to examine these two statements carefully and select the answers to these items using the codes given below

Codes:

- a. Both A and R are individually true and R is the correct explanation of A  
b. Both A and R are individually true but R is not the correct explanation of A  
c. A is true but R is false  
d. A is false but R is true

113. Assertion (A) : The algae are primarily aquatic in nature.

Reason (R) : Water is always required to facilitate the reproduction in algae.

114. Assertion (A) : Auxin plays a regulatory role in floral bud formation.

Reason (R) : Auxin promotes florigen synthesis.

115. Assertion (A): The phenotypic effects of polysomy are much more severe than that of the polyploidy.

Reason (R): Polysomy disturbs the genomic balance which produces abnormal phenotypes, while polyploidy does not affect the genomic balance

Answer

116. Assertion (A): In cyanobacteria, Photosynthetic  $\text{CO}_2$  accumulation takes place.

Reason (R): Cyanobacteria have chloroplasts.

Answer

117. Assertion (A): According to overdominance hypothesis, heterozygotes in at least some of the loci are superior to both the relevant homozygotes.

Reason (R): Heterozygosity is essential for and is the cause of heterosis while homozygosity resulting from inbreeding produce inbreeding depression.

Answer

118. Assertion (A): Batch cultures are ideal systems for studies related to various aspects of cellular behaviour

Reason (R): Batch cultures are characterised by a constant change in the pattern of cell growth and metabolism.

Answer

119. Assertion (A): Reciprocal translocation involve mutual exchange of chromosomal segments between two non-homologous chromosomes

Reason (R): Reciprocal translocations have no evolutionary significance.

Answer

120. Assertion (A): All the plants belonging to a single clone are phenotypically identical

Reason (R): All the plants within a clone are derived from vegetative cells through mitosis and have the same genetic constitution.

Answer