



## BOTANY

**SECTION-A**

1. In which of the following sets of families, the pollen grains are viable for months?

- (1) Solanaceae, Poaceae and Liliaceae
- (2) Brassicaceae, Liliaceae and Poaceae
- (3) Rosaceae, Liliaceae and Poaceae
- (4) Leguminosae, Solanaceae and Rosaceae

2. What is the function of tassels in the corn cob?

- (1) To trap pollen grains
- (2) To disperse pollen grains
- (3) To protect seeds
- (4) To attract insects

3. Pollen tablets are available in the market for;

- (1) Ex situ conservation.
- (2) In vitro fertilisation.
- (3) Breeding programmes.
- (4) Supplementing food.

4. Unisexuality of flower prevents;

- (1) Geitonogamy, but not xenogamy.
- (2) Autogamy, but not geitonogamy.
- (3) Both autogamy and geitonogamy.
- (4) Both geitonogamy and xenogamy.

5. Dichogamy which helps in cross-pollination is a floral mechanism in which?

- (1) Pollen sac and stigma are at different heights.
- (2) Anther and stigma mature at different times.
- (3) Structure of pollen sac and stigma functions as hurdles.
- (4) Pollen grain is unable to germinate on the stigma of the same flower.

6. Maximum height of a plant species is 60 cm and minimum height is 20 cm. What is the height of a plant with genotype AaBB?

- (1) 30                      (2) 40
- (3) 50                      (4) 80

7. What would be the sum of phenotypes and genotypes obtained from a trihybrid test cross?

- (1) 35                      (2) 8
- (3) 16                      (4) 24

8. How many types of gametes are possible from the product obtained in the cross ABcDE × AbcdE?

- (1) 32                      (2) 16
- (3) 4                        (4) 8

9. In a medicolegal case of accidental interchange between two babies in a hospital, the baby of blood group A could not be rightly given to a people;

- (1) With both husband and wife of group O.
- (2) Husband of group O and wife of group A.
- (3) Husband of group A and wife of group O.
- (4) Both husband and wife of group A.

10. If the kernel colour of wheat is determined by two polygenes, then the number of phenotypes possible is;

- (1) 2                        (2) 3
- (3) 4                        (4) 5

11. Non-albuminous seed is produced in;

- (1) maize
- (2) castor
- (3) wheat
- (4) pea.

12. Father's blood group is A and his son has O group. Which of the blood groups cannot be present in mother?

- (1) A                        (2) B
- (3) O                        (4) AB

13. A man with blood group A marries a woman having blood group AB. Which of the following types in the progeny of this couple would show that the man is heterozygous?

- (1) Type O                      (2) Type A
- (3) Type B                      (4) All of these

14. Which of the following enzymes if present in a medium would affect the transformation in bacteria?

- (1) DNAase
- (2) RNAase
- (3) Protease
- (4) More than one option is correct



15. Which one of the following does not follow the central dogma of molecular biology?  
(1) HIV (2) Pea  
(3) Mucor (4) Chlamydomonas
16. Calculate the length of DNA sample, if it had 240 bp;  
(1) 340 A (2) 816 A  
(3) 1024 A (4) 120 A
17. A DNA molecule in which both strands have radioactive thymidine is allowed to duplicate in an environment containing non-radioactive thymidine. What will be the exact number of DNA molecules that contains the radioactive thymidine after three duplications?  
(1) One (2) Two  
(3) Four (4) Eight
18. How many amino acids will be coded by the mRNA sequence 5' -CCCUCAUAGUCAUAC-3', if one adenosine residue is inserted after every 12<sup>th</sup> nucleotide?  
(1) Five amino acids  
(2) Six amino acids  
(3) Two amino acids  
(4) Three amino acids
19. Escherichia coli cells were grown for many generations in  $^{15}\text{NH}_4\text{Cl}$  as sole nitrogen source. Subsequently, these cells were grown exactly for four generations in medium containing  $^{15}\text{NH}_4\text{Cl}$ . The DNA from these cells were isolated and separated. If  $^{15}\text{N}/^{15}\text{N}$  represents the two strands of DNA where both strands have heavy nitrogen;  $^{15}\text{N}/^{14}\text{N}$  as intermediate DNA; and  $^{14}\text{N}/^{14}\text{N}$  as DNA containing light nitrogen, the ratios for heavy : light DNA, respectively would be;  
(1) 1 : 0 : 7 (2) 1 : 1 : 6  
(3) 0 : 1 : 7 (4) 0 : 8 : 0
20. If E. coli containing  $^{14}\text{N}$  bases was allowed to grow for 60 minutes in a medium  $^{15}\text{N}$  containing nitrogenous bases, then what would be the proportions of light and hybrid densities DNA molecule?  
(1) 2 light : 6 hybrid  
(2) 2 light : 2 hybrid  
(3) 6 light : 2 hybrid  
(4) All light : No hybrid
21. For the strand separation and stabilisation during DNA replication which of the following set of enzyme and proteins are required?  
(1) SSBP, gyrase and primase  
(2) Topoisomerase, helicase and ligase  
(3) Gyrase, ligase and primase  
(4) Topoisomerase, helicase and SSBP
22. Endosperm is formed during the double fertilization by;  
(1) two polar nuclei and one male gamete  
(2) one polar nuclei and one male gamete  
(3) ovum and male gamete  
(4) two polar nuclei and two male gametes.
23. **Assertion (A):** Autogamy is pollination taking place or limited to the same flower  
**Reason (R):** Xenogamy is pollination between two flowers on different plants.  
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.  
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.  
(3) **Assertion (A)** is true, and **Reason (R)** is false.  
(4) **Assertion (A)** is false, and **Reason (R)** is true.
24. A pleiotropic gene;  
(1) is a gene evolved during Pliocene  
(2) is expressed only in primitive plants  
(3) Controls multiple traits in an individual  
(4) controls a trait only in combination with another gene
25. **Assertion (A):** One codon may code for more than one amino acid.  
**Reason (R):** A codon is degenerate and ambiguous.  
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.  
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.  
(3) **Assertion (A)** is true, and **Reason (R)** is false.  
(4) **Assertion (A)** is false, and **Reason (R)** is true.



26. Which of the following pairs is wrongly matched?
- Starch synthesis in pea : Multiple alleles
  - ABO blood grouping : Co-dominance
  - XO type sex determination: Grasshopper
  - T.H. Morgan : Linkage
27. Which one is the **incorrect** statement with regards to the importance of pedigree analysis?
- It confirms that DNA is the carrier of genetic information
  - It helps to trace the inheritance of a specific trait
  - It confirms that the trait is linked to one of the autosome
  - It helps to understand whether the trait in question is dominant or recessive
28. **Statement I:** In prokaryotes, the positively charged DNA is held with some negatively charged proteins in a region called nucleoid.  
**Statement II:** In eukaryotes, the negatively charged DNA is wrapped around the positively charged histone octamer to form nucleosome.  
In the light of the above statements, choose the correct answer from the options given below:
- Both Statement I and Statement II are false.
  - Statement I is correct but Statement II is false.
  - Statement I is incorrect but Statement II is true.
  - Both Statement I and Statement II are true.
29. The one aspect which is **not** a salient feature of genetic code, is its being?
- Specific
  - Degenerate
  - Ambiguous
  - Universal
30. Select the two correct statements out of the four (a-d) statements given below about lac operon.
- Glucose or galactose may bind with the repressor and inactivate it
  - In the absence of lactose the repressor binds with the operator region
  - The z-gene codes for permease
  - This was elucidated by Francois Jacob and Jacques Monod
- The correct statements are:
- (b) and (d)
  - (a) and (b)
  - (b) and (c)
  - (a) and (c)
31. Conversion of sugar into alcohol during fermentation is due to the direct action of ;
- temperature.
  - microorganisms.
  - zymase.
  - concentration of sugar solution.
32. Roquefort cheese is ripened by growing a specific fungus on it which gives it a particular \_\_\_\_\_
- texture
  - large hole
  - flavour
  - colour
33. In a cross between  $AABB \times aabb$ , the ratio of  $F_2$  genotypes between  $AABB$ ,  $AaBB$ ,  $Aabb$  and  $aabb$  would be:
- 9 : 3 : 3 : 1
  - 2 : 1 : 1 : 2
  - 1 : 2 : 2 : 1
  - 7 : 5 : 3 : 1
34. A population grows rapidly at first and then levels off as carrying capacity of it is;
- Limited by density dependent factors.
  - Limited by density independent factors.
  - Affected by an opportunistic species.
  - Relatively unaffected by limiting factors.
35. Which form of RNA has a structure resembling clover leaf?
- rRNA
  - hnRNA
  - mRNA
  - tRNA
- SECTION-B**
36. Population size in any given habitat is also known as \_\_\_\_.
- Population cluster
  - Population explosion
  - Population abundance
  - Population density
37. Read the following statement having two blanks (A and B).  
A drug used for .....A... patients is obtained from a species of the organism ....B....
- A = heart, B = Penicillium
  - A = organ-transplant, B = Trichoderma
  - A = swine flu, B = Monascus
  - A = AIDS, B = Pseudomonas.



38. Secondary sewage treatment is mainly a;
- (1) physical process
  - (2) mechanical process
  - (3) chemical process
  - (4) biological process
39. Pyramid of numbers is;
- (1) Always upright.
  - (2) Always inverted.
  - (3) Either upright or inverted.
  - (4) Neither upright nor inverted.
40. Approximately how much of the solar energy that falls on the leaves of a plant is converted to chemical energy by photosynthesis?
- (1) Less than 1%
  - (2) 2–10 %
  - (3) 30 %
  - (4) 50 %
41. When we conserve and protect the whole ecosystem, its biodiversity at all levels is protected. This approach includes all of the following, except;
- (1) Biosphere reserves.
  - (2) Seed bank.
  - (3) National parks.
  - (4) Sanctuaries.
42. Since the origin and diversification of life on earth, how many episodes of mass extinction of species have occurred till date?
- (1) 2
  - (2) 3
  - (3) 4
  - (4) 5
43. Arrange the following in the decreasing order of their species diversity:  
Fishes, Birds, Reptiles, Amphibian
- (1) Fishes > Birds > Reptiles > Amphibian
  - (2) Fishes > Reptiles > Birds > Amphibian
  - (3) Reptiles > Fishes > Birds > Amphibian
  - (4) Amphibian > Fishes > Birds > Reptiles
44. For frugivorous (fruit eating) birds and mammals in the tropical forests of different continents, the slope of species area relationship is found to be approximately;
- (1) 0.6
  - (2) (1)3
  - (3) (1)15
  - (4) 1
45. Loss of biodiversity in a region may lead to;
- (1) Decline in plants production.
  - (2) Lowered resistance to environmental perturbations such as draught.
  - (3) Increase variability in certain ecosystem process such as plant productivity, water use, and pest and disease cycle.
  - (4) All of these.
46. Gause's principle of competitive exclusion states that;
- (1) no two species can occupy the same niche indefinitely for the same limiting resources
  - (2) larger organisms exclude smaller ones through competition
  - (3) more abundant species will exclude the less abundant species through competition
  - (4) competition for the same resources exclude species having different food preferences.
47. **Assertion (A):** The decomposition rate of lignin and chitin is slow in colder climates.  
**Reason (R):** The rate of decomposition is controlled by chemical and climatic factors.
- (1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
  - (2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
  - (3) **Assertion (A)** is true, and **Reason (R)** is false.
  - (4) **Assertion (A)** is false, and **Reason (R)** is true.
48. Decline in the population of indian native fishes due to introduction of *Clarias gariepinus* in river Yamuna can be categorised as;
- (1) co-extinction
  - (2) habitat fragmentation
  - (3) over-exploitation
  - (4) alien species invasion.
49. An ecosystem which can be easily damaged but can recover after some time if damaging effect stops will be having;
- (1) low stability and high resilience
  - (2) high stability and low resilience
  - (3) low stability and low resilience
  - (4) high stability and high resilience.



50. Farmers have reported over 50% higher yields of rice by using which of the following biofertilizers?

- (1) Cyanobacteria
- (2) Legume-*Rhizobium* symbiosis
- (3) Mycorrhiza
- (4) *Azolla pinnata*



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