Sample Paper- 04

Class 12th NEET (2024)

BOTANY

ANSWER KEY

1.	(1)	26.	(2)
2.	(3)	27.	(4)
3.	(2)	28.	(3)
4.	(2)	29.	(1)
5.	(1)	30.	(3)
6.	(3)	31.	(1)
7.	(3)	32.	(1)
8.	(4)	33.	(1)
9.	(1)	34.	(1)
10.	(3)	35.	(1)
11.	(2)	36.	(3)
12.	(2)	37.	(3)
13.	(1)	38.	(4)
14.	(4)	39.	(3)
15.	(1)	40.	(3)
16.	(1)	41.	(3)
17.	(3)	42.	(3)
18.	(3)	43.	(3)
19.	(1)	44.	(3)
20.	(3)	45.	(4)
21.	(4)	46.	(2)
22.	(3)	47.	(3)
23.	(3)	48.	(3)
24.	(3)	49.	(1)
25.	(2)	50.	(1)

Hint & Solution

1. **(1)**

Several hormonal and structural changes are initiated which lead to the differentiation and further development of the floral primordium.

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2. **(3)**

Synergid is haploid, zygote is formed by the fusion of male gamete and female gamete therefore zygote is diploid and PEN is triploid as it is formed by the fusion of secondary nucleus and male gamete.

3. **(2)**

The acceptance and rejection by continuous dialogue between pollen grain and pistil mediated by chemical components of pollen and pistil result in pollen pistil interaction. It is to facilitate the act of fertilisation in angiosperms.

4. **(2)**

The given diagram represents Multicarpellary, apocarpous gynoecium of Michelia.

5. **(1)**

Agamospermy is a kind of plant apomixis in which the embryos and seeds are formed by asexual reproductive methods without involving meiotic gametogenesis and sexual fusion of gametes. It occurs widely in ferns and the flowering plants.

6. **(3)**

This is a test cross. Hence, the genotype of violet coloured flowers will be heterozygous.

7. **(3)**

Linkage is an exception to the law of independent assortment.

8. **(4)**

The homologous chromosomes are assorted during anaphase I of meiotic division.

9. **(1)**

Marriages between close relatives are called consanguineous marriages. They should be avoided because it includes more recessive alleles to come together, e.g., a cross between Aa and Aa may have 25% chances of producing aa type progeny.

10. **(3)**

Mr. Sandival = $I^B I^B$ or $I^B i$	Mrs. Sandival =ii
Children = $I^B i$ and ii	

Hence, the children will have type B and type O blood groups only. So, Om is an adopted child.

11. **(2)**

The frequency of dominant allele (p) = 0.7

So, frequency of recessive allele (q) = $1 - p$

$= 1 - 0.7 = 0.3$.

Hence, the frequency of recessive phenotype (q^2) = $(0.3)^2 = 0.09$

12. **(2)**

Transfer of pollen grain to stigma of another flower is geitonogamy.

Transfer of pollen grain to stigma of same flower is autogamy.

Transfer of pollen grain to stigma of another flower of another plant is xenogamy.

13. **(1)**

The probability of a male or a female at each time in a pregnancy is always 50%.

14. **(4)**

nu body is also known as histone octamer. It is composed of two units each of H_2A, H_2B, H_3 and H_4.

15. **(1)**

The length of DNA molecule greatly exceeds the dimensions of the nucleus in eukaryotic cells. This DNA is accommodated by supercoiling in nucleosomes. It involves histone proteins and DNA.

16. **(1)**

*r*RNA is present in 80% of the total RNA in a cell. It does not exist independently, but it is present inside the ribosomes.

17. **(3)**

After four generations, total sixteen DNA molecules will be obtained in the following ratio:

$^{15}N/^{15}N = 0$, $^{15}N/^{14}N = 2$ and $^{14}N/^{14}N = 14$

18. (3)

The first charged *t*RNA (always charged with methionine amino acid) attaches itself to P site of ribosome in translation. Rest all other charged *t*RNAs always attach to the A site.

19. (1)

Francis and Crick proposed that the same transfer RNA may be able to recognize more than one codon. This proposal was termed as Wobble hypothesis. According to this hypothesis, the steric requirement between the anticodon of the *t*RNA and the codon of the *m*RNA is very strict for the first two positions but is more flexible at the third position. Hence, two codons that code for the same amino acid and differ only at the third position can be used the same *t*RNA in protein synthesis. This third position is known as Wobble Position.

20. (3)

Peptidyl transferase reaction does not consume a high-energy phosphate bond. Peptidyl transferase is a type of catalytic RNA (ribozyme). It is 23S *r*RNA in prokaryotes and 28S *r*RNA in eukaryotes.

21. (4)

If an error occurred during DNA replication in a cell, so that where there is supposed to be an A in one of the genes there is a C instead. Then a mutation will occur which is known as Point or substitution mutation. By this type of a mutation only an amino acid can be changed maximally in the complete polypeptide.

22. (3)

In (a), the sequence will be ABA BAB ABA BAB ABA BAB. Hence, it will be a heteropolypeptide.
In (b), the sequence will be ABC ABC ABC ABC ABC ABC. Hence, it will be a homopolypeptide.

23. (3)

Genes are present on chromosomes. Alternate forms of a gene is known as allele. Number of gene loci on chromosome can be more than one. In one gene loci two allele is present in diploid organism.

24. (3)

Grasshopper is an example of XO type of sex determination in which the males have only one X-chromosome besides the autosomes, whereas females have a pair of X-chromosomes.

25. (2)

Sickle cell anaemia is caused due to point mutation in which at the 6th position of beta globin chain, glutamic acid is replaced by valine. Thus, it is a qualitative defect in functioning of globin molecules. Thalassemia is caused due to either mutation or deletion which ultimately results in reduced rate of synthesis of one of the globin chains that make up haemoglobin. Hence, it is a quantitative defect in functioning of globin molecules.

26. (2)

In co-dominance and incomplete dominance, the genotypic & phenotypic ratios are same. In case of co-dominance the F(1) generation resembles both parents. So the given reason is not correct explanation of assertion

27. (4)

During Meselson and Stahl's experiments, heavy DNA was distinguished from normal DNA by centrifugation in CsCl gradient. When DNA is mixed with caesium chloride it will settle down at a particular height in centrifugation, with the heavier ones being more towards the bottom.

28. (3)

The process in which the DNA is replicated and two copies are synthesized is called DNA replication. It involves the formation of replication fork. The two strands of the DNA helix separate and the new strands are formed on the original strands, known as the template strands. The strand which is synthesized in 3'-5' direction is the leading strand and the strand which is synthesized in the opposite direction is the lagging strand which contains the Okazaki fragments. This strand is synthesized away from the replication fork.

29. (1)

In the dog flower *Antirrhinum* there are two types of flower color in pure state: red and white. When the two types of plants are crossed, the hybrid or plants of generation have pink flowers. This is due to a phenomenon called the incomplete dominance in which one allele for a specific trait is not completely expressed over its paired allele.

30. (3)

BOD refers to the amount of the oxygen that would be consumed if all the organic matter in one litre of water were oxidised by bacteria. The BOD test measures the rate of uptake of oxygen by microorganisms in a sample of water and thus, indirectly, BOD is a measure of the organic matter present in the water. The greater the BOD of waste water more is its polluting potential.

31. (1)

Biogas is a mixture of gases (containing predominantly methane) produced by the microbial activity and which may be used as fuel. Biogas production is a three-step microbial process.

32. (1)

Trichoderma is a fungus that has been proved as a useful microorganism for biological control of soil-borne plant pathogens. *Trichoderma* species are free-living fungi that are very common in the root ecosystems. They are effective biocontrol agents for several plant pathogens.

33. (1)

Biologists are not sure about how many prokaryotic species there might be. The problem is that conventional taxonomic methods are not suitable for identifying microbial species and many species are simply not culturable under laboratory conditions. If we accept biochemical or molecular criteria for delineating species for this group, then their diversity alone might run into millions.

34. (1)

Ecological Niche is the functional role of any species in an ecosystem or community. In other words it is an occupational address or profession of a species it means it is a functional position or status in an ecosystem.

35. (1)

Vital index of a population = $\frac{B}{D} \times 100$

Natality (Birth rate-*B*) refers to the number of births during a given period in the population that are added to the initial density. Mortality (Death rate-*D*) is the number of deaths in the population during a given period.

36. (3)

The Abingdon tortoise in Galapagos Islands became extinct within a decade after goats were introduced on the island. It was due to the greater browsing efficiency of the goats.

37. (3)

Plants (producers) are eaten by grasshopper (primary consumer) and the grasshoppers are eaten by lizard (secondary consumer). Plants (producers) are eaten by mouse (primary consumer) and the mice are eaten by snake (secondary consumer).

38. (4)

Grains $\rightarrow$ Cow $\rightarrow$ Humans
7000 kg 700 kg 70 kg

39. (3)

Here, grains are acting as producers, chicken eating grain as primary consumer and human eating chicken as a secondary consumer.

40. (3)

Primary productivity is defined as the amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis. It is expressed in terms of weight ($g/m^2/yr$) or energy ($kcal/m^2/yr$). It is the rate of conversion of light to chemical energy in the ecosystem.

41. (3)

The "World Summit" on Sustainable Development held in 2002 in Johannesburg, South Africa, 190 countries pledged their commitment to achieve by 2010, a significant reduction in the current rate of biodiversity loss at global, regional and local levels.

42. (3)

Gametes of threatened species can be preserved in viable and fertile condition for long periods using cryopreservation techniques, eggs can be fertilised *in vitro* and plants can be propagated using tissue culture methods.

43. (3)

Natural zone of biosphere reserve is managed to accommodate a greater variety for resource, use strategies, research and educational activities. It is the outermost zone and is also known as manipulation zone.

44. **(3)**

When large habitats are broken up into small fragments due to various human activities, mammals and birds requiring large territories and certain animals with migratory habits are badly affected leading to population declines.

45. **(4)**

Many species extinctions in the last 500 years (including Steller's sea cow and passenger pigeon) were due to over-exploitation by humans.

46. **(2)**

Presently, 12 percent of all bird species, 23 per-cent of all mammal species, 32 percent of all amphibian species and 31 percent of all gymnosperm species in the world face the threat of extinction.

47. **(3)**

The number of individual of the same species that have come into the habitat from elsewhere during the time period under consideration is called Immigration. It increases population density.

48. **(3)**

Depending on the type of the raw material used for fermentation and the type of processing (with or without distillation) different types of alcoholic drinks are obtained.

Wine and beer are produced without distillation whereas whisky, brandy and rum are produced by distillation of the fermented broth.

49. **(1)**

In an expanding population, the number of individuals in pre-reproductive age is more than that in reproductive age. And the number of individuals of reproductive age is more than that of post-reproductive age.

50. **(1)**

Decomposition is largely an oxygen requiring process. The first law states that energy is neither created, nor destroyed; it can only be converted from one form to another. This is true in energy flow in the ecocystem. The second law states that there is loss of energy at each step of energy flow.