Sample Paper-01

Dropper NEET (2024)

BOTANY

ANSWER KEY

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

HINTS AND SOLUTION

1. (1)

Meiosis occurs during the process of gamete formation which leads to the formation of haploid gametes. Though the parents contain two alleles during gamete formation, the factors or alleles of a pair segregate from each other such that a gamete receives only one of the two alleles. The two alleles of a gene are present on two homologous chromosomes.

2. (2)

Mendel crossed two parent plants having contrasting characters. He found that in the first filial generation, F_1 generation, the dominant of the two expressed while the recessive is suppressed. Apart from this, When the F_1 generation is self-crossed, in the F_2 generation, these recessive characters appear again. Therefore, it is not that they have disappeared.

3. (1)

The carrying capacity of an organism is the maximum population size of the species that the environment can sustain indefinitely beyond which there is no further growth.

4. (3)

Pteridophytes are used for medicinal purposes and as soil-binders. Evolutionarily, they are the first terrestrial plants to possess vascular tissues-xylem and phloem. In pteridophytes, the main plant body is a sporophyte. The pteridophytes are found in cool, damp, shady places though some may flourish well in sandy-soil conditions.

5. (3)

The rate of production of total organic matter during photosynthesis is called the gross primary productivity. It is also equal to the amount of carbon fixed during photosynthesis by all producers in that particular ecosystem.

6. (2)

The 'bakanae' (foolish seedling) disease of rice seedlings, was caused by a fungal pathogen *Gibberella* fujikuroi. E. Kurosawa (1926) reported the appearance of symptoms of the disease in rice seedlings when they were treated with sterile filtrates of the fungus. The active substances were later identified as gibberellic acid.

7. (3)

Funaria is a moss belonging to bryophytes under the kingdom Plantae.

Volvox is a green alga belonging to family Volvocaceae under the kingdom Plantae.

Anabaena is a blue-green alga belonging to phylum Cyanobacteria under the kingdom Monera

Mucor is a fungus belonging to phylum Zygomycota under the kingdom Fungi.

Funaria, *Volvox*, and *Mucor* have domain Eukaryota while *Anabaena* has domain Prokaryota. Eukaryotes have membrane-bound well-defined nucleus whereas. Prokaryotes do not have a membrane-bound nucleus because, in them, the genetic material lies freely in the cytoplasm. Hence, the true nucleus is absent in *Anabaena*.

8. (3)

Pollen grains are generally spherical measuring about 25-50 micro meters in diameter. It has a prominent two-layered wall. The hard outer layer called the exine is made up of sporopollenin which is one of the most resistant organic material known. Pollen grain exine has prominent apertures called germ pores where sporopollenin is absent.Therefore Outer layer is discontinuous. The inner wall of the pollen grain is called the intine. It is a thin and continuous layer made up of cellulose and pectin.

9. (1)

The promoter sequence needs to lie in front of the start site or upstream to it in the 5’ end and the terminator should lie in the 3' end downstream as transcription proceeds in the 5' to 3' direction.

10. (1)

Chalaza = Basal part of ovule

Nucellus = Parenchymatous mass

Micropyle = Integument is absent

Hilum = Junction between ovule and funicle

11. (1)

The codon is read in mRNA in a contiguous (continuous) fashion. There is no punctuation (comma) between the adjacent codons i.e., each codon immediately followed by the next codon.

12. **(1)**

The IUCN Red List (2004) documents the extinction of 784 species (including 338 vertebrates, 359 invertebrates and 87 plants) in the last 500 years. Some examples of recent extinctions include the dodo (Mauritius), quagga (Africa), thylacine (Australia), Steller's Sea Cow (Russia) and three subspecies (Bali, Javan, Caspian) of tiger.

13. **(1)**

Joseph Priestley performed a series of experiments that revealed the essential role of air in the growth of green plants. Joseph Priestley discovered oxygen in the year 1774.

14. **(1)**

This whole scheme of transfer of electrons, starting from the PS II, uphill to the acceptor, down the electron transport chain to PSI, excitation of electrons, transfer to another acceptor, and finally downhill to $NADP^+$ causing it to be reduced to $NADPH^+$ H^+ is called as the Z scheme, due to its characteristic shape. This shape is formed when all the carriers are placed in a sequence on the redox potential scale.

15. **(4)**

$\log S = \log C + Z \log A$

$= 0.8 + 0.3 \times 4 = 0.8 + 1.2 = 2.0$

16. **(1)**

Golgi apparatus remains in close association with the endoplasmic reticulum because a number of proteins synthesised by ribosomes on the ER are modified in the cisternae of the GB before they are released from the trans face.

17. **(4)**

During telophase, chromatids have reached their respective poles, decondense and lose their individuality

18. **(4)**

As electrons move through the photosystems, protons are transported across the membrane. This happens because the primary accepter of electron which is located towards the outer side of the membrane transfers its electron not to an electron carrier but to an H carrier (proton carrier).

19. **(2)**

The dicot plants not only show open form of growth i.e; form of growth wherein new cells are always being added to the plant body by the activity of the meristem. They also have open vascular bundles i.e; possess cambium. Plant growth can be measured in the form of absolute growth rate & relative growth rate.

20. **(2)**

The axonemal microtubules (9 + 2 array) are arranged in a cylindrical manner throughout the length of cilium or flagellum.

The axoneme usually has nine pairs or doublets of radially arranged peripheral microtubules and a pair of centrally located microtubules.The base of a cilium or flagellum is made up of centriole-like structure having 9+0 arrangement.

21. **(4)**

The evolution of the C_4 photosynthetic system is probably one of the strategies for maximizing the availability of CO_2 while minimizing water loss.

22. **(2)**

The chemical energy of food is the main source of energy required by all living organisms. This energy is transmitted to different trophic levels along the food chain. However, After the primary producer level in an ecosystem, no new chemical energy is added at successive trophic levels.

23. **(1)**

The plant cell uses the strategy to catabolise the glucose molecule in such a way that not all the liberated energy goes out as heat. The key is to oxidise glucose not in one step but in several small steps enabling some steps to be just large enough such that the energy released can be coupled to ATP synthesis.

24. **(1)**

The parenchymatous cells which lie between the xylem and the phloem in dicot root are called conjunctive tissue. Conjunctive tissue also help in secondary growth in dicot roots by forming vascular cambium. In dicot root, pericycle is completely parenchymatous. During secondary growth, a part of pericycle present outer to the protoxylem, transformed into a secondary meristem called vascular cambium.

25. (1)

The figure below shows age sex pyramids of populations A and B twenty years apart. 'A' is more recent and shows slight reduction in the growth rate.

26. (3)

The predator develops a preference to other diets and may itself becomes a pest; is one of the major difficulties in the biological control of insect pests. Biological control is a component of an integrated pest management strategy reduces the pest populations by natural enemies and typically involves an active human role. Natural enemies of insect pests, also known as biological control agents, include predators, parasitoids, and pathogens. Biological control of weeds includes insects and pathogens.

27. (3)

Baby 3 belongs to the Sisodia family.

28. (1)

Respiratory infection is caused by Adenovirus. Adenoviruses are a group of viruses that typically cause respiratory illnesses, such as a common cold, conjunctivitis (an infection in the eye that is sometimes called pink eye), croup, bronchitis, or pneumonia. In children, adenoviruses usually cause infections in the respiratory tract and intestinal tract.

29. (2)

In above diagram, (i) & (ii) are 98.7% & 1.3% respectively.

30. (2)

Leaves of gymnosperms are well adapted to withstand extremes of temperature, humidity and wind. In Cycas the pinnate leaves persist for a few years. In Cycas stems are unbranched. In Pinus male or female cones are borne on the same tree.

31. (2)

The interphase nucleus has a loose and indistinct network of nucleoprotein fibres called chromatin, but during different stages of cell division, cells show ’structured chromosomes" in place of the nucleus.

32. (4)

Joseph Priestley = Plants purify fouled air
Jan Ingenhousz = Source of oxygen is H_2O, not CO_2
Julius von Sachs = Oxygen is released from the green parts of the plants
Cornelius van Niel = Green plant parts synthesize sugar

33. (2)

Banana are formed without the act of fertilization. In apple, false fruit is formed i.e. False fruits develop from any other part of the plant except ovary. In mango, true fruit is formed i.e., true fruit is fruit which develops only from ovary.

34. (1)

Family = Solanaceae, Kingdom = Plantae
Order = Polymoniales.
Specific epithet = tuberosum
Genus = Solanum

35. (4)

The figures where transformation of R type into S type will occur, w.r.t Griffith’s transformation experiments are (1), (2) & (4). because DNA is present there. However in figure (3) due to addition of dnase, DNA is cleaved as a result of which no transformation occurs there.

36. (3)

Flowers of plants X and Y need to produce odour and nectar for completion of processes P(Geitonogamy) and Q (Xenogamy) if they are entomophilous.

37. (3)

Centrioles have an organization like cartwheel. Centrioles are made up of nine evenly spaced peripheral fibrils of tubulin protein. Each peripheral fibril of centriole is triplet. Centrioles are spherical structures that lie perpendicular each other.

38. (2)

Neurospora is extensively used in biochemical and genetical studies. Mycelium is branched and septate. The asexual spores are conidia produced exogenously on the special mycelium called conidiophores.

39. **(4)**
During alcoholic fermentation by yeast two molecules of glucose produce 4 molecules of ethanol + 4 molecules of CO_2.

40. **(4)**
Growth rate = Birth rate-death rate For country P, it is 10/1000. For country Q, It is 15/1000 For country R, it is 17/1000. For country S, It is 7/1000 Hence, country S has the least population growth rate.

41. **(2)**
The nucleoli are spherical structures present in the nucleoplasm. The content of nucleolus is continuous with the rest of the nucleoplasm as it is not a membrane bound structure. It is a site for active ribosomal RNA synthesis.

42. **(1)**
Meiocyte is a cell that has undergone meiosis. Meiosis is a reductional division. So the cell must have 10 pg DNA in meiosis I, which is then reduced to 20 pg following reductional division.

43. **(1)**
A species is a taxonomic group or category that included all the interbreeding organisms of a population. Here, sativum, tuberosum, and indica all represent species of different plants. Hence, they represent the same taxonomic group.

44. **(2)**
Root cap protects the root meristem from the friction of the soil.
Meristematic zone cells are small and thin walled.

45. **(1)**
If the gynoecium occupies the highest position in comparison to the other parts of the flower, then such kind of flower is described as hypogynous. The ovary is superior (having flower parts attached below the ovary). Examples are mustard, china rose, hibiscus, brinjal, etc.

46. **(2)**
Radial vascular bundle are present in roots.
Radical vascular bundles are those in which xylem and phloem occur in different radii.

47. **(4)**
A higher concentration of ABA leads to seed dormancy and promotes senescence whereas a higher concentration of GA promotes seed germination and delays senescence. Therefore ABA & GAs act as antagonists to each other.

48. **(4)**
According to the mechanism of resource partitioning (supported by Mac Arthur), if two species compete for the same resource, they could avoid competition by choosing, for instance, different times for feeding or different foraging patterns. Two species evolve to become different too reduce competition, so that species can co-exist.

49. **(3)**
In alcoholic fermentation, pyruvate is first converted into acetaldehyde with the help of the enzyme pyruvate decarboxylase, and carbon dioxide is released. In the next step, acetaldehyde is reduced to ethanol.

50. **(3)**
In Calvin cycle, when one molecule of RuBP(5C) combines with one molecule of CO_2 (1C) two molecules of 3-PGA (3C) are formed. Therefore, for the production of 6 molecules of 3-PGA three molecules of RuBP and three molecules of CO_2 are required.