



Sample Paper-02

Dropper NEET (2024)

BOTANY

ANSWER KEY

1. (2)
2. (2)
3. (1)
4. (2)
5. (4)
6. (3)
7. (4)
8. (2)
9. (1)
10. (3)
11. (3)
12. (1)
13. (2)
14. (3)
15. (4)
16. (3)
17. (3)
18. (4)
19. (3)
20. (3)
21. (3)
22. (2)
23. (2)
24. (2)
25. (1)

26. (4)
27. (4)
28. (2)
29. (4)
30. (1)
31. (3)
32. (3)
33. (3)
34. (3)
35. (1)
36. (1)
37. (4)
38. (2)
39. (1)
40. (3)
41. (2)
42. (1)
43. (4)
44. (4)
45. (2)
46. (1)
47. (1)
48. (2)
49. (2)
50. (1)



HINTS AND SOLUTION

1. (2)
Parasites have evolved the following adaptations. (i) Loss of unnecessary sense organs, (ii) Presence of hook/adhesive organs and suckers. (iii) Loss of digestive system. (iv) High reproductive capacity. Other three options (1), (2) & (4) are correct statements.
2. (2)
Zone of maturation that bears unicellular root hairs which increases the surface area and helps in the absorption of water.
3. (1)
Puccinia belongs to Basidiomycetes. It lacks sex organs but proceeds sexual reproduction. Puccinia causes rust of wheat.
4. (2)
Chemotaxonomy = used in plant taxonomy to resolve confusions.
Numerical taxonomy = each character is given equal importance
Cytotaxonomy = based on chromosome number
5. (4)
A common test to find the genotype of hybrid is by test cross in which Crossing of F1 progeny with recessive parent.
6. (3)
In opposite type of phyllotaxy, a pair of leaves arise at each node and lie opposite to each other as in Calotropis and guava plants. So, assertion is true. If gynoecium is situated in the centre and other parts of the flower are located on the rim of the thalamus almost at the same level, it is called perigynous e.g., plum, rose, peach. However, in guava epigynous condition is seen. Therefore, Reason is false.
7. (4)
Ecosystem is sum total of biotic and abiotic components. Biotic components include living components while as abiotic components include non-living components.
8. (2)
When $\text{NADH} + \text{H}^+$ and FADH_2 donate their electrons in the ETS, the protons move from intermembrane space to mitochondrial matrix through $\text{F}_0\text{-F}_1$ particles.
9. (1)
Thylakoid membranes possess photosynthetic pigments and coupling factors. They occur in specific groups called photosystems. There are two photosystems. The grana lamellae have both PS I and PS II and the stroma lamellae lack PSII (P680) as well as NADP reductase enzyme.
10. (3)
Polymorphism in DNA sequence is the basis of dna fingerprinting.
11. (3)
Pili = Helps in adhesion and host invasion
Mesosome = Helps in ATP synthesis
Flagella = Helps in locomotion
Fimbriae = Helps to attach on rocks
12. (1)
The International Code of Botanical Nomenclature (ICBN) is a set of rules and recommendations dealing with the formal botanical names given to plant. The foundations of ICBN are given in book written by C. Linnaeus named Philosophia Botanica. It is independent of zoological nomenclature.
13. (2)
Operator interacts with repressor protein
Structural=Transcribes mRNA for polypeptide
Promoter Provides attachment site for RNA polymerase
Regulator =Controls the activity of operator gene.
14. (3)
During zygotene of meiotic prophase I, chromosomes start pairing and are called homologous chromosomes. A pair of homologous chromosomes lying together is called a bivalent. The complex formed by a pair of synapsed homologous chromosomes is called synaptonemal complex.



15. (4)
Secondary treatment of sewage is commonly referred to as biological treatment. Secondary treatment of sewage involves usage of microbes. Primary treatment is commonly referred as physical treatment. It involves filtration and sedimentation.
16. (3)
The central cell of an embryo sac after triple fusion becomes the Primary endosperm nucleus and further develops into an endosperm. The coconut water is nothing but free-nuclear endosperm and the surrounding white kernel is the cellular endosperm.
17. (3)
Ethylene is synthesised in large amount in senescing tissues. Enhances respiration rate during ripening of fruits. Promotes rapid internode elongation in deep water rice plants. Promotes formation of root hair.
18. (4)
Hen king = X body & Y chromosome.
19. (3)
Recombination frequencies are directly proportional to the distance between the genes and therefore are used in linkage map preparation. Distance between two genes is measured in map unit. One map unit is equal to 1% recombination frequency and is also referred as centimorgan. This linear relationship holds true for lower values only; as the recombination frequency increases beyond 50%, the linear relationship does not hold true owing to double and multiple cross overs and recombination frequency is always less than map distance and never exceeds than 50%. In the question, the yellow body gene (y) and bobbed hair (b) gene are present 66 map unit apart which means that there is 50% chances of recombination between them (recombination frequency).
20. (3)
There are 20,000 species of ants, 3,00,000 species of beetles, 28,000 species of fishes and nearly 20,000 species of orchids.
21. (3)
A group of compactly arranged homogenous cells occupies the centre of each microsporangium. MMC (megaspore mother cell) undergoes meiosis to form megaspores. Megaspore later on forms female gamete (egg cell). Similarly, PMC (pollen mother cell) undergoes meiosis to form microspores. Microspore later on forms male gametes.
22. (3)
Substrate level phosphorylation i.e., ATP is not formed when 3 PGA-2-PGA.
23. (2)
When a colourblind male marries to a normal female and they have their first child as colourblind female.
Then the genotype of the father and mother is $X^C Y$ & $X^C X^C$ respectively.
24. (2)
Translation is the process of formation of protein from the mRNA which carries genetic code for amino acids or peptides.
The process of translation initiates with initiation codon AUG and terminate with stop codon i.e., UAA, UAG, UGA
25. (1)
The *Brassicaceae*, also classically called the *Cruciferae* (Latin, meaning 'cross-bearing') in reference to its four 'crossed petals', is commonly known as the mustard family. The flower of this family is actinomorphic (radial symmetry), bisexual, sepals are 4 which are dimerous (arranged in two whorls) and sepals are free, petals are 4 which are arranged in a single whorl and they are free, gynoecium is bicarpellary, syncarpous, unilocular ovary but it becomes bilocular due to the formation of false septum
26. (4)
Centrioles forms basal bodies of cilia or flagella. Centriole gives rise to spindle fibres at the time of cell division in animal cell. Centrosome is an organelle usually containing two cylindrical structures called centrioles. Both the centrioles in a centrosome lie perpendicular to each other in which each has an organisation like the cartwheel.



27. (4)
The diagram given represents anatomy of monocot leaf in which.
A = adaxial epidermis
B = xylem
C = mesophyll
D = sub stomatal cavity
E = abaxial epidermis
F = stoma
G = Phloem
28. (2)
Activated sludge-sediment in settlement tanks of sewage treatment plant is a rich source of aerobic bacteria.
Methanobacterium anaerobic organisms.
Biogas refers to a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen.
Activated sludge-sediment in settlement tanks of sewage treatment plant is a rich source of aerobic bacteria.
Biogas can be produced by anaerobic digestion with anaerobic bacteria.
29. (4)
Gibberellin was first isolated from fungus *Gibberella fujikuroi* and hence isolate was given gibberellin name. It is a plant growth regulator. It is involved in various processes like stem elongation, germination, dormancy, leaf and fruit senescence. Kinetin is a type of cytokinin, a plant hormone. It was first isolated from sperm DNA of herring fish. It helps in cell division.
30. (1)
When *Streptococcus pneumoniae* (pneumococcus) bacteria are grown on a culture plate, some produce smooth shiny colonies (S) while others produce rough colonies (R). This is because the S strain bacteria have a mucous (polysaccharide) coat, while R strain does not. So, assertion and reason both are true and reason is the correct explanation of assertion.
31. (3)
Sporozoans are endoparasites. They lack locomotory organelles like cilia, flagella, pseudopodia, etc., e.g., - Plasmodium. Pseudopodia are found in amoeboid protozoans, e.g., Amoeba, Entamoeba, etc
32. (3)
In angiosperms, most of the pollen grains are shed at 2-celled stage.
The outer hard layer of pollen is made up of sporopollenin.
The pollen grain of members of Solanaceae family remain viable for months after their release.
Pollen grains can be used as food supplement by humans.
33. (3)
Goats do not browse on *Calotropis*. *Calotropis* produces highly poisonous cardiac glycosides as defence against grazing animals. It is generally believed that competition occurs when closely related species compete for same resources that are limiting. But this is not true unrelated species also compete for same resources. This is called interspecific competition which proves to be the potent force in organic evolution.
34. (3)
Leaf is a lateral outgrowth of stem developed exogenously at the node. Leaves exhibit marked variations in their shape, size, margin, apex and extent of incisions of lamina.
35. (1)
As electrons move through the photosystems, protons are transported across the membrane. This happens because the primary acceptor 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. Hence, this molecule removes a proton from the stroma while transporting an electron. When this molecule passes on its electron to the electron carrier on the inner side of the membrane, the proton is released into the inner side or the lumen side of the membrane.
36. (1)
Ernst Mayr has been called the Darwin of the 20th century. He was a leading evolutionary biologist in his time. In unicellular organisms, reproduction is synonymous with growth.



37. (4)
38. (2)
Amazon rain forest is home to more than 40,000 species of plants, 3,000 of fishes, 1,300 of birds, 427 of mammals, 427 of amphibians, 378 of reptiles and more than 1,25,000 invertebrates.
39. (1)
Productivity levels of an ecosystem depend upon plant species inhabiting a particular area, their photosynthetic capacity, availability of nutrients, sunlight, moisture and a variety of other environmental factors. The annual net primary productivity of the whole biosphere is approx. 170 billion tons (dry weight) of organic matter. Of this, despite occupying about 70% of earth's surface, oceans contribute only 32% of total productivity (55 billion tons out of 170 billion tons), thus, oceans are low productivity ecosystems. It is because, in oceans, productivity is limited by light which decreases with increasing water depth.
40. (3)
In anaphase I, homologous chromosomes move to the opposite poles with both their chromatids. In anaphase II the sister chromatids separate. Thus, at the end of meiosis four haploid cells are formed.
41. (2)
Conservation in the natural habitat is called in situ conservation. Botanical garden is an example of ex-situ conservation.
42. (1)
Decomposition is the process of breaking down organic matter into simple inorganic matter. Under same environmental conditions, the rate of decomposition varies due to change in composition of detritus. If detritus is rich in lignin and chitin, the decomposition rate is slow. If detritus is rich in nitrogen, the decomposition rate is relatively high. Warm and moist environment favours decomposition whereas low temperature and anaerobiosis (due to excessive moisture) inhibit decomposition.
43. (4)
The annual net primary productivity of the whole biosphere is approximately 170 billion tons (dry weight) of organic matter. Of this, despite occupying about 70 percent of the surface, the productivity of the oceans are only 55 billion tons. Rest of course, is on land i.e; 115 billion tons.
44. (4)
(Order being higher category is the assemblage of families which exhibit a few similar characteristics. Dog (*Canis familiaris*) and Cat (*Felis domesticus*) belong to two different families – *Canidae* and *Felidae* respectively.)
45. (2)
Gibberellic acid increases yield of sugarcane. Ethylene Promotes sprouting of potato tuber. Seed germination is inhibited by ABA. Apical dominance is promoted by auxin not by cytokinin. So, option (2) is correct answer.
46. (1)
The cells of epidermis bear a number of hairs. The root hairs are unicellular elongations of the epidermal cells and help absorb water and minerals from the soil. On the stem the epidermal hairs are called trichomes. The trichomes in the shoot system are usually multicellular. They may be branched or unbranched and soft or stiff. They may even be secretory. The trichomes help in preventing water loss due to transpiration.
47. (1)
In Kranz anatomy, the bundle sheath cells are characterized by having a large number of agranal chloroplasts, thick walls impervious to gaseous exchange and no intercellular spaces. Thus, the correct answer is 'thick walls, no intercellular spaces and large number of chloroplasts'
48. (2)
Based on the destination of pollen grains, two types of pollination are recognised. When pollen grains are transferred from an anther to the stigma of the same flower the process is a type of self pollination called autogamy. Cross-pollination is further classified depending on whether the pollination has occurred between two flowers on the same plant (geitonogamy) or between the flowers on different plants (xenogamy).



49. (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. Thalassaemia 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.

50. (1)

There are 64 codons, out of which 61 codons code 20 amino acids. It is to be remembered that one amino acid can be coded by one or more codons. The rest 3 i.e. UGA, UAA and UAG are non-sense codons i.e; they don't code for any of the 20 amino acids.



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