Sample Paper- 05

Class 11th NEET (2024)

BOTANY

ANSWER KEY

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

Hint & Solution

1. (4)

According to International Code for Botanical Nomenclature (ICBN) the first word denoting the genus starts with a capital letter while the specific epithet starts with a small letter.

2. (3)

R.H. Whittaker had proposed a five-kingdom system of biological classification in 1969. It is based on complexity of cell structure, body organization and mode of nutrition. The Kingdom Monera includes all prokaryotes. The blue-green algae, nitrogen fixing bacteria and methanogenic archaebacteria are all unicellular prokaryotes so they are included in the Kingdom Monera.

3. (4)

Reserve food material is not one of the primary bases for the five-kingdom classification system. The five-kingdom classification is primarily based on differences in cell structure, body organization, and mode of reproduction. Reserve food material is a characteristic used in further classifying organisms within the kingdoms, especially in the case of plants, but it's not one of the primary criteria for the five-kingdom classification itself.

4. (3)

Bacteria were originally placed in the kingdom Plantae by Carl Linnaeus, but this classification is outdated. In modern classification systems, bacteria are placed in the kingdom Monera.

5. (2)

Methanogens are archaebacteria which produce methane in marshy areas. *Nostoc* is a filamentous blue-green alga which fixes atmospheric nitrogen.
Mycoplasma lacks a cell wall and can survive without oxygen.
Chemosynthetic organisms use chemical reactions to convert inorganic substances into nutrients. **Example:** Sulfur bacteria, Nitrogen bacteria.

6. (2)

Heterocysts, specialized cells for nitrogen fixation, occur in certain blue-green algae (*Anabaena*).

7. (4)

Phylogenetic system brings out grouping according to evolutionary trends and genetic relationships.

8. (4)

The cell wall of green algae is made up of both cellulose and pectose. The outer layer is made up of pectose whereas, the inner layer is made up of cellulose. The cell wall is a thin, firm and transparent layer which is found as the outermost layer in green algae.

9. (4)

The correct statement with respect to bryophytes is (4) All of these: In bryophytes, sexual reproduction is oogamous type. Sex organs are multicellular in bryophytes. Archegonium is flask-shaped.

10. (4)

Bryophytes can be either thalloid (lacking differentiation into true stems, leaves, and roots) or have a leafy structure, depending on the group. Many bryophytes do contain chloroplasts, allowing them to perform photosynthesis. Bryophytes do possess archegonia, which are the female reproductive structures.

11. (1)

fragmentation and budding in the secondary protonema can also occur as a means of asexual reproduction in mosses.

12. (2)

Red algae produce Floridean starch. This type of starch is a storage carbohydrate found in red algae and is different from the starches found in other plant groups. It serves as a storage reserve in these algae.

13. (1)

(a) – (i); (b) – (ii); (c) – (iii); (d) – (iv)

14. (1)

Bryophytes are non-vascular plants, meaning they lack well-developed vascular tissues like xylem and phloem. They also typically have a simple root-like structure called rhizoids. While they do have chlorophyll and exhibit alternation of generations, the absence of a true vascular system and well-developed roots is a key characteristic of bryophytes.

15. (1)

CJD and BSE diseases are caused by Prions. Viroids are free, infectious and low molecular weight RNA molecules.

16. (2)

Root cap protects the root meristem from the friction of the soil. Meristematic zone cells are small and thin walled.

17. (2)

Aestivation is the arrangements of accessory floral organs (sepals or petals) in relation to one another in floral bud. It may be of open, valvate, twisted or imbricate type. In imbricate aestivation there is an irregular overlapping of petals or sepals by one another. Cassia, gulmohar, etc., show imbricate aestivation.

18. (2)

Leaves of dicotplants generally have reticulate venation. In some plants the leaf base become swollen called pulvinus. In a pinnately compound leaf a number of leaflets are present on a common axis called rachis. Long, thin, flexible leaves allow leaf blades to flutter in wind there by cooling the leaf and bringing fresh air to leaf surface.

19. (4)

Buds can be present in the axil of both simple and compound leaves.

20. (4)

Phyllode is a a modified petiole (stalk that connects the leaf to the stem or branch) or rachis (common axis of the leaflets of a compound leaf) that has become flattened and green to perform the functions of a leaf.

21. (4)

The inner membrane of mitochondria contains enzymes of ETS. The mitochondrial matrix contains Kreb Cycle.

22. (4)

Monocot seeds are generally endospermic. In maize, the seed coat is membranous and is generally fused with fruit wall. In monocot seed, the single large shield shape cotyledon is known as scutellum. In orchids, the seeds are non-endospermic.

23. (2)

Gibberellic acid increases yield of sugarcane. Ethylene premotes 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.

24. (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.

25. (1)

Cellular respiration is an exergonic process because the breaking of C–C bonds of complex compounds through oxidation within the cells, leads to release of considerable amount of energy.

26. (1)

Chemosynthetic pathway occur in stroma of chloroplast. Enzyme required for chemosynthetic pathway present in stroma.

27. (1)

Paper chromatography is a technique used to separate pigments according to their relative solubility and molecular weight. A chromatographic separation of the leaf pigments shows that the colour that we see in leaves is not due to a single pigment but due to four pigments: Chlorophyll a (appears bright or blue-green in the chromatogram) Chlorophyll b (yellow-green)
Xanthophylls (yellow)
Carotenoids (yellow to yellow-orange).

28. (4)

Collenchyma cells have the ability to elongate and grow as the plant organ they support grows. This growth potential is one of their advantages, as it allows them to provide support to actively growing parts of the plant while accommodating the plant's expansion

29. (4)

Stomata are formed by guard cells and regulate the process of transpiration and gaseous exchange. They are mainly present on the epidermis of leaves but can also be found on other plant organs like stems and some non-photosynthetic tissues.

30. (4)

In multicellular organisms, the number of cells is not necessarily inversely proportional to the size of the organism. Organisms can vary widely in size while still having a multicellular body plan. The number of cells in an organism depends on its complexity and functional requirements. Larger organisms tend to have more cells because they need specialized cells for various functions.

The reason given, that all cells in the living world are of the same size, is not accurate either. Cells come in various sizes and shapes, depending on their functions. For example, red blood cells are smaller and have a different shape than skin cells or muscle cells. Cells can vary significantly in size and structure to perform their specific roles within an organism.

31. (3)

Under anaerobic condition pyruvate gives rise to lactate in some bacteria. Under anaerobic condition pyruvate give rise to ethyle alcohol and carbon di oxide.

32. (1)

Agranular ER of muscle cells is also called sarcoplasmic reticulum is a specialized type of endoplasmic reticulum found in muscle cells. It plays a critical role in regulating calcium ion levels in muscle cells, which is essential for muscle contraction.

33. (4)

Cytoskeleton is a glycolipid structure for mechanical support, motility and maintenance of the shape of the cell.

34. (2)

The cell cycle is regulated by various genes and checkpoints that ensure the orderly progression of events in the cell cycle. These genetic controls help maintain the integrity of the cell cycle and prevent uncontrolled cell division.

35. (3)

During anaphase, each pair of chromosomes is separated into two identical, independent chromosomes. The chromosomes are separated by a structure called the mitotic spindle. The mitotic spindle is made of many long proteins called microtubules, which are attached to a chromosome at one end and to the pole of a cell at the other end. The sister chromatids are separated simultaneously at their centromeres. The separated chromosomes are then pulled by the spindle to opposite poles of the cell.

36. (2)

In anaphase I, the paired homologous chromosomes would separate from each other and move to opposite ends of the cell as the kinetochore microtubules shorten. This stage begins as soon as homologous chromosomes begin separating and ends when the chromosomes arrive at opposite ends of the cell.

37. (1)

Holoenzyme = Apoenzyme + Coenzyme

38. (4)

The first division of meiosis is characterized by pairing between homologous chromosomes and exchange of segments between them, so that if the normal diploid number is 50, 25 chromosome groups or 25 pairs are expected to be seen in metaphase I.

39. (4)

In Kreb's cycle, the FAD precipitates as electron acceptor during the conversion of Succinic acid to fumaric acid

40. (2)

During diplotene the recombined homologous chromosomes of the bivalents tend to separate from each other except at the site of crossovers. If they fail to separate during anaphase I one cell would have (n + 1) set of chromosome and one cell would have (n –1) set of chromosome.

41. **(1)**

Calvin, Benson and Basshamutilised C_{14} (with long life) to trace the path of carbon in photosynthesis. Calvin was awarded Nobel Prize in 1961 in recognition to his work with Cl4 isotope. He discovered the cycle involved in carbon assimilation, known as Calvin cycle or C_3-cycle.

42. **(4)**

The Calvin cycle requires ATP and NADPH, which are products of the light-dependent reactions that occur during the day when there is light. Without these energy-rich molecules produced during the day, the Calvin cycle cannot proceed efficiently at night.

43. **(3)**

In non-cyclic photophosphorylation, there is involvement of both Photosystem I (PS I) and Photosystem II (PS II). PS II primarily generates ATP, while PS I is responsible for the generation of NADPH. NADP reductase activity requires H+ from the stroma.

44. **(2)**

Glucose is first converted to fructose-1,6-bisphosphate in a series of steps that use up two ATP. Then, unstable fructose-1,6-bisphosphate splits in two, forming two three-carbon molecules called DHAP and glyceraldehyde-3-phosphae. A G3P molecule contains three fixed carbon atoms, so it takes two G3Ps to build a six-carbon glucose molecule.

45. **(1)**

Wherever the NADH2 (NADH+H+) and FADH2 are produced during glycolysis, connecting link reaction and Krebs cycle, they are oxidised with the help of various electron carriers and enzymes. This process involves various electron carrier proteins and is called electron transport system or oxidative phosphorylation. There are several protein complexes, like :

Complex I is the NADH dehydrogenase complex which receives electrons from NADH and transfers to Ubquinone.

Complex II is the FADH2 complex also gives electrons to Ubiquinone. The reduced ubiquinone (ubiquinol) is then oxidised with the transfer of electrons to cytochrome c via the cytochrome bc1 complex. This is the complex III.

Complex IV refers to cytochrome c oxidase complex containing cytochromes a and a3, and two copper centres.

Cytochrome c is a small protein (Fe-Cu protein) attached to the outer surface of the inner membrane and acts as a mobile carrier for transfer of electrons between complex III and IV. This gives the electron to oxygen.

46. **(4)**

Chemosynthetic bacteria obtain energy from in organic chemical. Ex- Nitrifying bacteria

47. **(1)**

Energy required for ATP synthesis in PSII comes from proton gradient.

48. **(3)**

During light reaction of photosynthesis ATP, Hydrogen donor an oxygen is produced.

49. **(1)**

Mitochondria are the site of aerobic respiration where ATP (adenosine triphosphate) is produced, making them the "powerhouses" of the cell.

50. **(3)**

Cycas and *Azolla* plants are associated with Anabaena. Anabaena is a genus of nitrogen-fixing cyanobacteria that can form symbiotic associations with these plants, helping them fix atmospheric nitrogen into a form that can be used by the plants for their growth.