Sample Paper-01

Class 11th NEET (2024)

# BOTANY

## ANSWER KEY

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

## HINTS AND SOLUTION

**1.** **(1)**

Family = Solanaceae
Kingdom = plantae
Order = Polymoniales
Species = tuberosum
Genus = Solanum

**2.** **(2)**

In biological terms, a species is defined as a group of individual organisms with fundamental similarities that are capable of interbreeding to produce fertile offspring in nature. When two different species breed together, the offspring are typically sterile, and such matings do not result in fertile offspring in the wild. This is one of the key criteria for defining distinct species.

**3.** **(4)**

"Subfamily" is a category that falls below the level of "Family" and is more specific than "Family." It is not commonly used in the standard biological classification hierarchy. The other options (Species, Class, and Phylum) are all well-established and commonly used categories in taxonomy.

**4.** **(3)**

Hilum is a scar seen on the seed coat through which the developing seeds are attached to the fruit.

**5.** **(4)**

Carl Linnaeus' system of classification is considered an artificial system because it is based on a few easily observable external morphological characteristics and does not take into account the evolutionary relationships or phylogeny among organisms. It is primarily focused on organizing and categorizing species based on shared physical similarities and differences rather than on their evolutionary history. This system is useful for identifying and naming organisms but does not reflect their evolutionary relatedness.

**6.** **(4)**

One of the main differences between eubacteria and archaebacteria is the composition of their cell membranes and cell walls. Archaebacteria have cell membranes and cell walls with different chemicals, such as ether-linked lipids in their cell membranes and unique cell wall components like pseudopeptidoglycan or other distinct molecules, which set them apart from eubacteria. Eubacteria, on the other hand, typically have cell walls made of peptidoglycan and different lipid structures in their cell membranes. These differences in cell membrane and wall composition reflect the evolutionary divergence between these two groups of prokaryotes.

**7.** **(1)**

Bacteria typically contain circular DNA molecules known as plasmids, which are separate from their main chromosomal DNA. This circular DNA is one of the characteristics of bacterial genomes.

**8.** **(1)**

Influenza, commonly known as the flu, is caused by viruses, not bacteria. Cholera, tetanus, and typhoid are indeed bacterial infections caused by Vibrio cholerae, *Clostridium tetani*, and *Salmonella typhi*, respectively.

**9.** **(4)**

The natural system of classification is based on both morphology (the physical characteristics of organisms) and affinities (evolutionary relationships between organisms).

**10.** **(1)**

(A) Agar - (I) *Gelidium*, *Gracillaria*
(B) Algin - (II) Brown algae
(C) Carrageen - (III) Red algae
(D) *Chlorella* and *Spirulina* - (IV) Single-cell protein, used as food supplements by space travellers

So, the correct option is:
(A) – (I); (B) – (II); (C) – (III); (D) – (IV)

**11.** **(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.

**12. (3)**
Sex organs in bryophytes are multicellular and jacketed.

**13. (4)**
All of the given statements are true about bryophytes. They are thalloid or leafy, they contain chloroplasts, and they possess archegonia.

**14. (4)**
Many species of *Porphyra*, *Laminaria*, and *Sargassum* are used as food. Agar is indeed used in microbiology and food preparation. Algae have various uses and benefits for humans.

**15. (4)**
"Bentham and Hooker," is not the proponent of the Phylogenetic system of classification. They are known for their work on the natural system of classification, which is a different system from the Phylogenetic system.

**16. (3)**
Karyotaxonomy is based on the "number of chromosomes."

**17. (1)**
Haustorial roots are exceptional to plants like *Cuscuta*, which is a parasitic plant.

**18. (2)**
The primary roots and its branches constitute the taproot system. Fibrous roots are observed in wheat plants, whereas tap roots are observed in mustard plants. - This statement is correct.

**19. (3)**
Stems can bear both terminal buds (at the tip of the stem) and axillary buds (in the leaf axils). These axillary buds have the potential to develop into branches or flowers.

**20. (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.

**21. (4)**
"Epipodium" is indeed an alternate term for "lamina" in botanical terminology.

**22. (2)**
(a) – Stipule; (b) – Axillary bud; (c) – Leaf base; (d) – Petiole; (e) – Lamina

**23. (3)**
Neem (*Azadirachta indica*) has pinnately compound leaves, meaning that it consists of multiple leaflets arranged along a central midrib. However, the leaflets in a pinnately compound leaf do not touch the midrib (Rachis) at many places. Instead, they are attached to the midrib by individual petiolules.

**24. (1)**
Presence of one cotyledon is a defining feature of monocot. Out of the given examples 'Wheat and maize' both are monocot.

**25. (4)**
The embryo is made up of a radicle, embryonal axis, and one or two cotyledons, depending on whether it's a monocot or dicot embryo.

**26. (4)**
Floral features are represented in the summarized form as both a floral formula and a floral diagram.

**27. (3)**
Secondary meristems do not give birth to primary permanent tissues. Primary permanent tissues are formed from primary meristems, such as the apical meristem. Secondary meristems are responsible for adding growth in width through the production of secondary tissues like secondary xylem and secondary phloem.

**28. (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.

**29. (2)**
When it can be divided into two similar halves only in one particular vertical plane, it is zygomorphic, e.g, pea, gulmohur, bean, Cassia.

**30. (3)**
Red algae produces hydrocolloid 'caragreen'.
e.g; *Porphyra* and *Gelidium*.

**31. (4)**

Casparian strips are made up of suberin and found as depositions in the endodermis of plant roots. These strips play a crucial role in controlling the movement of water and solutes into the vascular system of the plant.

**32. (4)**

All of the provided statements are accurate:
Anything less than a complete structure of a cell does not ensure independent living.
Anton Van Leeuwenhoek was the first to see and describe a living cell.
Robert Brown discovered the cell nucleus.

**33. (2)**

The correct arrangement is with the polar heads facing outward, towards the aqueous environment, and the hydrophobic tails facing inward, away from the aqueous environment. This arrangement is known as the lipid bilayer structure of the cell membrane.

**34. (4)**

The Golgi apparatus, also known as the Golgi complex or dictyosome, is involved in packaging, modifying, and sorting proteins and lipids for transport within or outside of the cell. So, the correct answer is:
(4) Packages and modifies proteins.

**35. (1)**

Lysosomes are organelles known as the "cell's stomach" or "garbage disposal" because they contain hydrolytic enzymes that can break down various cellular waste materials and debris, acting as intracellular scavengers.

**36. (1)**

The correct statements are:

(a) In the 24-hour average duration of the cell cycle of a human cell, cell division proper lasts for only about an hour.

(b) Interphase lasts more than 95% of the duration of the cell cycle.

So, the correct answer is:

(1) (a) and (b)

**37. (4)**

The longest and shortest phases of mitosis are: Prophase and anaphase. Respectively

**38. (2)**

If cells with 20 bivalents undergo meiosis I, they start with 20 pairs of chromatids. So, after meiosis I, there will be 40 chromatids in each nucleus.

**39. (4)**

Diakinesis is characterized by all of the mentioned features:

(1) Condensation of chromosomes.
(2) Assemblage of the spindle fibers.
(3) Disappearance of the nucleolus and nuclear membrane.

**40. (1)**

(a) Bivalents are sometimes referred to as tetrads because they consist of two homologous chromosomes, each with two sister chromatids, making a total of four chromatids.

(b) A bivalent indeed means 4 chromatids and 2 centromeres, as explained in (a).

(c) As mentioned in (a), a bivalent consists of 2 homologous chromosomes, each with two sister chromatids.

(d) Bivalents typically form during the zygotene stage of meiosis.

So, all of the statements (a), (b), (c), and (d) are correct regarding bivalents.

**41. (1)**

Chemotaxonomy is a branch of taxonomy which deals with chemical constituents of plant.

**42. (2)**

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

**43. (3)**

Joseph Priestley's experiment concluded that both (1) burning candle removes air (specifically oxygen), and (2) mint plant restores the air (oxygen production through photosynthesis).

**44.** **(4)**

Photosynthesis will not take place in this setup because intact chloroplasts are needed for the process. While the student has provided chlorophyll, light, and water, the setup lacks the appropriate cellular structures like intact chloroplasts that are found in plant cells. Chloroplasts are the organelles where photosynthesis occurs, and they contain the necessary enzymes and structures for the process. Chloroplasts are not present in soda water, so photosynthesis cannot proceed as expected.

**45.** **(3)**

The root apex, shoot apex and many other regions consists meristematic tissue. By mitotic divisions of the meristematic cells new cells are produced. These cells have cellulosic cells walls, contains large nucleus and rich in protoplasm. It is called the phase of cell formation or cell division.

**46.** **(4)**

Increasing carbon dioxide ($CO_2$) concentration in the environment, especially in controlled environments like greenhouses, can indeed enhance the productivity of many plants, including tomatoes and bell peppers. This process is known as $CO_2$ enrichment and is a common practice in agriculture to boost crop yields.

**47.** **(1)**

Krebs' cycle also known as TCA cycle or citric acid cycle, is a common pathway of oxidative breakdown of carbohydrates, fatty acids and amino acids. Amino acids enter the Krebs' cycle directly as glutamate (for α-Ketoglutarate) and aspartate (for oxaloacetate) after their deamination. Fats produce fatty acids and glycerol. Glycerol is phosphorylated and oxidized to form glyceraldehyde 3-phosphate. Fatty acids undergo β-oxidation to produce acetyl CoA. Acetyl CoA enters Krebs' cycle.

**48.** **(4)**

Fermentation has various industrial and culinary applications, including:

(a) Production of alcohol in the brewing industry.
(b) Making of dough in the baking industry.
(c) Curing of tea and tobacco.
(d) Production of vinegar by acetic acid bacteria.

**49.** **(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.

**50.** **(4)**

Vascular bundles in monocotyledons are considered closed because cambium is absent.

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