# Studentpad

## NEET BOTANY FULL PORTION PAPER 2022-23

| Time : 150 Min | Bot : Full Portion Paper | Marks : 200 |
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## Hints and Solutions

**01)** Ans: **D)** Endoplasmic reticulum
Sol: Endoplasmic reticulum provides support to the cell.

**02)** Ans: **C)** Age of a tree by counting the number of annual rings in the main stem

**03)** Ans: **D)** Peroxyacetyl nitrate (PAN)
Sol: PAN blocks photolysis of water in photosynthesis or hill reaction.

**04)** Ans: **C)** 20, 540
Sol: In $F_1$ generation, all the 20 plants would be heterozygous for the trait and so would possess yellow flower and round fruit. When heterozygous plants of $F_1$ generation undergo selfing, $F_2$ progeny gives 9 : 3 : 3 : 1 phenotypic ratio, where out of 16 plants 9 will have yellow flower with round fruit.
Therefore, in the given case, yellow flower with round fruit are $= 960 \times \frac{9}{16} = 540$.

**05)** Ans: **C)** Runner
Sol: Runners is the subaerial stem modification with long internode. They have long and thin internodes and branches creep over the surface of soil. There branches develop adventitious roots at nodes on lower side. Scaly leaves are present on nodes, from the axil of which arise aerial branches. When long branches break up by any method they form new plants. In this way large number of new plants are formed. Some examples are Doob grass, Oxalis, Hydrocotyle.

**06)** Ans: **A)** Rhizome

**07)** Ans: **D)** De Vries, Correns and Tschermak
Sol: Mendel died before his work could be appreciated by the rest of the scientific community. In 1900, three botanists, Correns of Germany, De Vries of the Netherlands and Tschermak of Austria rediscovered his work after reaching similar conclusions independently.

**08)** Ans: **A)** Photosystem II
Sol: Photosystem II is present in appressed part of grana thylakoids. It has chlorophyll a, b and carotenoids and it consists of a photocentre $(P_{680})$, oxygen evolving complex, light harvesting complex (LHC II) and some electron carriers. Oxygen evolving complex contains $Mn^{2+}$, $Ca^{2+}$ and $Cl^{-}$.

**09)** Ans: **D)** Ecology

**10)** Ans: **A)** Xylem is blocked
Sol: Xylem is responsible for transport of water. If xylem is blocked, plant will undergo wilting because of the lack of proper transport of water.

**11)** Ans: **B)** Crossing over
Sol: The crossing over is separation of linked genes (T.H. Morgan).

**12)** Ans: **A)** Phototropism
Sol: In photo tropism according to Cholondy Went theory, unilateral light produces more auxin and thus more growth on the shaded side resulting in bending.

**13)** Ans: **C)** Electron transport chain
Sol: In electron transport chain cycles, $O_2$ is directly used. An ETC couples a reaction between an electron donor (such as NADH) and an electron acceptor (such as $O_2$) to the transfer of $H^+$ ions across a membrane, through a set of mediating biochemical reactions. This creates proton gradient across the membrane which is used to produce adenosine triphosphate (ATP).

**14)** Ans: **D)** Both (b) and (c)
Sol: Sulphur and calcium elements in plants is not remobilised. The deficiency symptoms of some essential elements tend to appear first in the young tissues whenever these elements are relatively immobile and are not transported out of the mature organs. This aspect of mineral nutrition of plants is of a great significance and importance to agriculture and horticulture.

**15)** Ans: **C)** 50%
Sol: Escherichia coli completely radioactive DNA was allowed to replicate in non-radioactive medium for two generations (40 minutes). 50% bacteria are with radioactive DNA.
DNA extracted from the culture after another generation [that is after 40 minutes, II generation] was composed of equal amounts of this hybrid DNA and of 'light' DNA.

**16)** Ans: **A)** A large non-motile female gamete and a small motile male gamete
Sol: Oogamy is most advanced type of reproduction in which male gamete is motile smaller and non food storing called antherozoid while female gamete is food storing, nonmotile larger called oogonium.

**17)** Ans: **B)** 512

**18)** Ans: **B)** Exine only
Sol: At certain places, exine remains unthickened or missing and these places are called as germ pores.

**19)** Ans: **A)** Aphids

**20)** Ans: **C)** Penicillium notatum restrict the growth of Staphylococci.
Sol: Penicillium notatum restrict the growth of Staphylococci. Acetobacter aceti produces acetic acid and Saccharomyces cerevisiae is used for commercial production of ethanol. Streptococcus produces streptokinase which is genetically modified by to be used as a 'clot buster' for removing clots from the blood vessels of patients who have undergone myocardial infarction leading to heart attack. Bacteria which produces methane are collectively known as methanogens, and one such common bacterium is Methanobacterium. These bacteria are commonly found in the anaerobic sludge during sewage treatment.

**21)** Ans: **B)** Both the statement 1 and the statement 2 are true and the statement 2 is a correct explanation of the statement 1
Sol: In mitochondria ATP production takes place. Hence, mitochondria is known as Power house.

**22)** Ans: **D)** Gymnosperms

**23)** Ans: **A)** Multicellular rhizoids
Sol: Rhizoids are branched, multicellular, arise from base of axis. These help in fixation as well as absorption of water and minerals

**24)** Ans: **A)** A-(iii), B-(i), C-(iv), D-(ii)
Sol: (a) A-(iii), B-(i), C-(iv), D-(ii)

**25)** Ans: **D)** (a), (b) and microbes also living in their natural habitats
Sol: The term biodiversity was introduced by sociobiologist Edward Wilson (1992). Biological diversity is the occurrence of different types of ecosystems (ecological diversity), different species of organism with the whole range of their variants or biotypes (species diversity) and genetic variation in a species adapted to different climates (genetic diversity). Species diversity considers species of all the plants, animals and microorganisms. The maintenance of a high level of biodiversity is important for the stability of ecosystems.

**26)** Ans: **D)** All of these

**27)** Ans: **B)** IUCN
Sol: IUCN (International Union of Conservation of Nature and Natural Resources) is now called World Conservation Union (WCU). It has its headquarters at Morges, Switzerland. It publishes and maintain a red data book or red list which is a catalogue of taxa facing risk of extinction. Red data book or red list was initiated in 1963. The Red list of year 2000 has made assessment of 18,000 species.

**28)** Ans: **B)** Three
Sol: Chikungunya virus causes the chikungunya. Colostrum is the first breast milk of mother which contains antibodies (especially IgA) which protect the infant by the age of three months. Beer is manufactured by fermentation of barley malt by yeast species.
Tissue culture can be used to obtain virus- free healthy plants from diseased plants.

**29)** Ans: **A)** Cycas stem

**30)** Ans: **A)** A museum has collection of photographs of plants and animals.
Sol: Museums have collections of preserved plant and animal specimens for study purpose and reference. Specimens are preserved in the containers or jars in preservative solutions. Plant and animal specimens may also be preserved as dry specimens. Insects are preserved in insect boxes after collecting, killing and pinning. Larger animals like birds and mammals are usually stuffed and preserved. Museums often have collections of skeletons of animals too.

**31)** Ans: **A)** 31
Sol: The equation of photosynthesis is
$6CO_2 + 12H_2O \rightarrow C_6H_{12}O_6 + 6H_2O + 6O_2$
NO. of $CO_2$ molecules utilized =6
No. of $H_2O$ molecules utilized = 12
No. of $C_6H_{12}O_6$ (sugar) molecules produced =1
No. of $H_2O$ molecules produced = 6
No. of $O_2$ molecules produced = 6
So, total number of $CO_2, H_2O, O_2$ and sugar utilized and produced = 6 +12 + 1 + 6 + 6=31.

**32)** Ans: **C)** The statement 1 is false but statement 2 is true
Sol: Fruticose lichens have a most complex thallus which is slender and freely branched. The branches may be cylindrical or ribbon-like and form thread-like or twig-like tufts. The thallus is attached only at the base by a flattened disc.

**33)** Ans: **A)** Turgid
Sol: When a cell is placed in distilled water, water start moving into the cell by the process of endosmosis, and cell become turgid.

**34)** Ans: **A)** Atmospheric nitrogen into ammonia
Sol: The enzyme nitrogenase present in $N_2$ fixers catalyses the conversion of free nitrogen into ammonium (first stable product) and it has two subunits, i.e., Fe protein (non-haeme iron protein) and Mo-Fe protein (iron molybdenum protein). The Fe protein component reacts with ATP and reduces Mo-Fe protein which then reduces $N_2$ to ammonia. Nitrogenase enzyme, cannot function in aerobic conditions as it is highly sensitive to molecular

oxygen $(O_2)$. So, for its activity it requires anaerobic conditions.

**35)** Ans: **B)** flowering
Sol: Through their effects on plant growth regulators, flowering affect by the temperature and light in the plants. The effect of photoperiods or daily duration of light hours (and dark periods) on flowering is known as photoperiodism. For eg. in short day plants flowering occurs when day length is below critical period, e.g., dahlia, rice etc. In long day plants, flowering occurs when day length is above critical period, e.g., spinach, lettuce etc. In short-long day plants, short photoperiod is required for floral initiation and long photoperiod is required for blossoming and vice-versa for long-short day plants. Photoperiodic response is mediated by phytochrome, a pigment which perceives the photoperiod stimulus in leaves. It shows reversible change in red and far-red wavelength. Besides correct photoperiod, some plants require low temperature for flowering. These plants remain vegetative during the warm season flower in winter on receiving low temperature. This was found by Lysenko, that the cold requiring annula and biennial plants can be made to flower in one growing season by providing low temperature treatment (vernalization). Stimulus of vernalization is perceives by meristematic cells, e.g., shoot tips, root apex, etc., and is named as vernalin.

**36)** Ans: **B)** Circular DNA

**37)** Ans: **B)** RNA polymerase
Sol: Enzyme involved in transcription is RNA polymerase -II which contain five polypeptide $\alpha, \beta, \beta, \omega$ and $\sigma$.

**38)** Ans: **B)** noise
Sol: The Air (Prevention and Control of Pollution) Act, came into frce in 1981, which was amended in 1987 to remove the difficulties encountered during implementation, to give more powers on the implementing agencies and to impose more stringent penalties for violation of the provisions of the Act. The main oncern was also to amend the definition of air pollutants to include noise also. This is also known as the Air (Pollution and Control of Pollution) Amendment Act, 1987.

**39)** Ans: **A)** sclerenchyma
Sol: Sclerenchyma is simple mechanical tissue. The term sclerenchyma was introduced by Mettenius(1865). Mature sclerenchyma cells are dead and empty and these cells have highly thickened and usually lignified, secondary cell wall. The cell cavity (lumen) is highly reduced and sometimes almost closed (obliterated). Sclerenchyma cells may be short or long. On the basis of cell length, sclerenchyma cells are classified into two general types namely, fibres and sclereids. Fibres give mechanical strength and rigidity to the plant organs.

**40)** Ans: **C)** S-phase
Sol: Cell cycle comprises of four phases $G_1$, S, $G_2$ and M phase. The first check point is present at the end of cell cycle's $G_1$ phase, just before entry S phase, making the key decision of whether the cell should divide, delay division or enter a resulting stage. Many cells stop at this stage and enter $G_0$ (resting stage) and the second check point is present at the end of $G_2$ phase, triggering the start of M phase (mitosis). Cell cycle is arrested at this phase if it sees any DNA damage. The third checkpoint located at metaphase (spindle checkpoint). The mitotic spindle check point occurs at the point in metaphase where all the chromosomes should have aligned at the mitotic plate and be under bipolar tension and this is sensed and initiates anaphase entry. The sensing allows degradation of cyclin B, which ensures that it no longer inhibits the anaphase promoting complex, and thus cycle continues. Therefore, cell division cannot be stopped in S phase of the cell cycle.

**41)** Ans: **C)** a and d
Sol: Correct statements are as follows:
- Asexual reproduction is common among single-celled organisms, and in plants and animals with relatively simple organisations.
- While in animals and other simple organisms the term asexual reproduction is used unambiguously, in plants, the term vegetative reproduction is frequently used.

**42)** Ans: **B)** Nucellus or integuments

**43)** Ans: **D)** both apical and axillary meristems
Sol: Meristem is a localized group of cells, that are actively dividing and undifferentiated but ultimately giving rise to permanent tissue. Although the plant is infected with a virus, yet the meristem is free of virus. So, meristem can be removed and grown in vitro to obtain virus free plants. Cultivation of axillary or apical shoot meristems is called meristem culture. The apical or axillary meristems are generally free from virus.

**44)** Ans: **D)** Halophytes
Sol: Pneumatophore roots are the aerial roots which have important role in respiration of halophytic plants.

**45)** Ans: **A)** Both the statement 1 and statement 2 are true but the statement 2 is not a correct explanation of the statement 1
Sol: Morphologically Funaria looks dioecious, but it is monoecious. The antheridia (male sex organ) are formed at the summit of a relatively small, main leafy shoot which develops first. It is in fact the parent plant. The female branch arises later as a lateral outgrowth from the base of the parent male shoot. When the two kinds of the sex organs are borne in separate clusters on two distinct branches

of the same plant the arrangement is called monoecious. Funaria is protandrous (male matures first). This ensures cross fertilization.

**46)** Ans: **D)** Fertilisation of the egg and the central cell by two sperms brought by the same pollen tube
Sol: Double fertilisation refer to the fusion of two male gametes brought by a pollen tube to two different cells of the same female gametophyte in order to produce two different structures. It is found only in angiosperms where it was first discovered by Nawaschin in 1898 in Fritillaria and Lilium. Out of the two male gametes one fuses with egg or oosphere to perform generative fertilisation (syngamy or true fertilisation). It gives rise to a diploid zygote or oospore. The second male gamete fuses with the two haploid polar nuclei or diploid secondary nucleus of the central cell to form a triploid primary endosperm nucleus (PEN) and this is known as vegetative fertilisation (or triple fusion).

**47)** Ans: **C)** Pyramid of biomass in a lake

**48)** Ans: **B)** Prokaryotes
Sol: Operon model was given by Jacob and Monad (1961) for regulation of protein synthesis in prokaryotes (Bacteria).

**49)** Ans: **B)** Plants are grown in controlled environment

**50)** Ans: **A)** FAD
Sol: In dehydrogenation, process converts succinate into 4-carbon fumarate with the aid of an enzyme, succinate dehydrogenase which also liberates a pair of hydrogen atoms. The latter pass to $FAD^+$ forming $FADH_2$.