

NEET Biology Sample Paper 02

A) **Subject:** Biology

B) **Total Questions:** 50 Questions (All Compulsory)

C) **Marking Scheme & Rules:**

- Correct Answer: +4 marks
- Incorrect Answer: -1 mark (Negative marking)
- Unattempted Question: 0 marks
- Multiple Answers: Treated as incorrect, attracting -1 mark

Botany (Section A)

Q1. The label of a herbarium sheet does not carry information on:

- A. Date of collection
- B. Name of collector
- C. Local names
- D. Height of the plant

Q2. Which of the following are found in extreme saline conditions?

- A. Archaeobacteria
- B. Eubacteria
- C. Cyanobacteria
- D. Mycobacteria

Q3. Select the wrong statement:

- A. Mushrooms belong to Basidiomycetes.
- B. Morels and truffles are poisonous mushrooms.
- C. Yeast is unicellular and useful in fermentation.
- D. Penicillium is multicellular and produces antibiotics.

Q4. Floridean starch has a structure very similar to:

- A. Amylopectin and glycogen
- B. Amylose and cellulose

- C. Chitin and pectin
- D. Starch and cellulose

Q5. Which of the following is responsible for peat formation?

- A. Marchantia
- B. Riccia
- C. Funaria
- D. Sphagnum

Q6. The morphological nature of the edible part of coconut is:

- A. Perisperm
- B. Cotyledon
- C. Endosperm
- D. Pericarp

Q7. Match the following columns regarding placentation:

- A. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
- B. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
- C. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
- D. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

Q8. Stomata in grass leaves are:

- A. Dumb-bell shaped
- B. Kidney-shaped
- C. Rectangular
- D. Barrel-shaped

Q9. Secondary xylem and phloem in dicot stem are produced by:

- A. Apical meristems
- B. Vascular cambium
- C. Phellogen
- D. Axillary meristems

Q10. Which of the following cell organelles is responsible for extracting energy from carbohydrates to form ATP?

- A. Ribosome
- B. Chloroplast
- C. Mitochondrion
- D. Lysosome

Q11. The osmotic expansion of a cell kept in water is chiefly regulated by:

- A. Mitochondria
- B. Vacuoles
- C. Plastids
- D. Ribosomes

Q12. During cell growth, DNA synthesis takes place in:

- A. S phase
- B. G_1 phase
- C. G_2 phase
- D. M phase

Q13. The process of separation and purification of expressed protein before marketing is called:

- A. Upstream processing
- B. Downstream processing
- C. Bioprocessing
- D. Post-production preservation

Q14. What is the role of NADP reductase enzyme?

- A. Oxidation of NADPH
- B. Reduction of $NADP^+$ to $NADPH + H^+$
- C. Breakdown of water
- D. Formation of ATP

Q15. The oxygenation activity of RuBisCo enzyme in photorespiration leads to the formation of:

- A. 1 molecule of 3-carbon compound
- B. 1 molecule of 6-carbon compound
- C. 1 molecule of 2-carbon compound and 1 molecule of 3-carbon compound
- D. 2 molecules of 3-carbon compound

Q16. Which of the following is a representative of the "Link reaction" in aerobic respiration?

- A. Conversion of Glucose to Pyruvate
- B. Conversion of Pyruvate to Acetyl CoA
- C. Conversion of Citric acid to α -ketoglutaric acid
- D. Conversion of Succinyl CoA to Succinic acid

Q17. Fruit and leaf drop at early stages can be prevented by the application of:

- A. Ethylene
- B. Auxins
- C. Gibberellic acid
- D. Cytokinins

Q18. A typical angiosperm embryo sac at maturity is:

- A. 8-nucleate and 7-celled
- B. 7-nucleate and 8-celled
- C. 7-nucleate and 7-celled
- D. 8-nucleate and 8-celled

Q19. Pollination in water hyacinth and water lily is brought about by the agency of:

- A. Water
- B. Insects or wind
- C. Birds
- D. Bats

Q20. A gene showing codominance has:

- A. Alleles that are recessive to each other
- B. Both alleles independently expressed in the heterozygote

- C. One allele dominant on the other
- D. Alleles tightly linked on the same chromosome

Q21. Which of the following is required as an inducer for the expression of the Lac operon?

- A. Glucose
- B. Galactose
- C. Lactose
- D. Tryptophan

Q22. The association of histone H1 with a nucleosome indicates:

- A. Transcription is occurring.
- B. DNA replication is occurring.
- C. The DNA is condensed into a chromatin fibre.
- D. The DNA double helix is exposed.

Q23. In an ecosystem, the rate of production of organic matter during photosynthesis is termed:

- A. Secondary productivity
- B. Net primary productivity
- C. Gross primary productivity
- D. Net productivity

Q24. Which of the following is a primary consumer in a maize field ecosystem?

- A. Grasshopper
- B. Wolf
- C. Phytoplankton
- D. Lion

Q25. The historic Convention on Biological Diversity, 'The Earth Summit', was held in Rio de Janeiro in:

- A. 1985
- B. 1992
- C. 1986
- D. 2002

Zoology (Section B)

Q26. Match the following columns and select the correct option:

- A. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
- B. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
- C. (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)
- D. (a)-(i), (b)-(iv), (c)-(iii), (d)-(ii)

Q27. Cuboidal epithelium with brush border of microvilli is found in:

- A. Ducts of salivary glands
- B. Proximal convoluted tubule of nephron
- C. Eustachian tube
- D. Lining of intestine

Q28. Goblet cells of the alimentary canal are modified from:

- A. Squamous epithelial cells
- B. Columnar epithelial cells
- C. Chondrocytes
- D. Compound epithelial cells

Q29. The enzyme that is not present in succus entericus is:

- A. Nucleosidase
- B. Lipase
- C. Maltase
- D. Nuclease

Q30. Identification of the "P-wave" in a standard ECG represents:

- A. Contraction of both the atria
- B. Initiation of the ventricular contraction
- C. End of systole
- D. Beginning of the T-wave

Q31. Which of the following is correct regarding the transport of CO_2 in blood?

- A. 70% as bicarbonates
- B. 20-25% as carbamino-haemoglobin
- C. 7% in dissolved state in plasma
- D. All of these

Q32. Name the ion responsible for unmasking active sites for myosin for cross-bridge activity during muscle contraction:

- A. Calcium
- B. Magnesium
- C. Sodium
- D. Potassium

Q33. Which part of the human ear plays no role in hearing as such but is otherwise very much required?

- A. Eustachian tube
- B. Organ of Corti
- C. Vestibular apparatus
- D. Ear ossicles

Q34. Match the following columns:

- A. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
- B. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
- C. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
- D. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

Q35. Capacitation occurs in:

- A. Rete testis
- B. Epididymis
- C. Vas deferens
- D. Female reproductive tract

Q36. Select the correct sequence for transport of sperm cells in male reproductive system:

- A. Testis → Epididymis → Vasa efferentia → Vas deferens → Ejaculatory duct → Urethra
- B. Seminiferous tubules → Rete testis → Vasa efferentia → Epididymis → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus
- C. Seminiferous tubules → Vasa efferentia → Epididymis → Inguinal canal → Urethra
- D. Testis → Epididymis → Vasa efferentia → Rete testis → Inguinal canal → Urethra

Q37. Which of the following is a non-steroidal oral contraceptive pill?

- A. Mala-D
- B. Mala-N
- C. Saheli
- D. Quinestrol

Q38. According to Darwin, the organic evolution is due to:

- A. Interspecific competition
- B. Intraspecific competition
- C. Reduced feeding efficiency in one species due to the presence of interfering species
- D. Both (1) and (2)

Q39. The "Analogous structures" are a result of:

- A. Divergent evolution
- B. Convergent evolution
- C. Shared ancestry
- D. Genetic drift

Q40. In which disease does a mosquito-transmitted pathogen cause chronic inflammation of lymphatic vessels?

- A. Elephantiasis
- B. Ascariasis
- C. Ringworm disease
- D. Amoebiasis

Q41. Which of the following immune responses is responsible for rejection of kidney graft?

- A. Cell-mediated immune response
- B. Humoral immune response
- C. Inflammatory immune response
- D. Auto-immune response

Q42. The vitamin whose content increases following the conversion of milk into curd by Lactic Acid Bacteria is:

- A. Vitamin C
- B. Vitamin D
- C. Vitamin B12
- D. Vitamin E

Q43. The first human hormone produced by recombinant DNA technology is:

- A. Insulin
- B. Estrogen
- C. Thyroxine
- D. Progesterone

Q44. The process of RNA interference has been used in the development of plants resistant to:

- A. Nematodes
- B. Fungi
- C. Viruses
- D. Insects

Q45. Which of the following is not a feature of the plasmids?

- A. Circular structure
- B. Transferable
- C. Single-stranded
- D. Independent replication

Q46. Match the following columns:

- A. (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

B. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

C. (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)

D. (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)

Q47. A population has more young individuals compared to the older individuals. What would be the status of the population in ten years?

A. It will decline

B. It will stabilize

C. It will increase

D. It will first decline then stabilize

Q48. In a growing population of a country:

A. Pre-reproductive individuals are more than the reproductive individuals.

B. Reproductive individuals are less than the post-reproductive individuals.

C. Reproductive and pre-reproductive individuals are equal in number.

D. Pre-reproductive individuals are less than the reproductive individuals.

Q49. Which of the following is a primary lymphoid organ?

A. Spleen

B. Tonsils

C. Bone marrow

D. Peyer's patches

Q50. The drug "Cyclosporin-A" is used for:

A. Dissolving blood clots

B. Lowering cholesterol

C. Immunosuppression

D. Enhancing fertility

Solutions

1. **(D)** A herbarium label typically includes the date and place of collection, English, local and botanical names, family, and the collector's name. It does not record the height of the plant.
2. **(A)** Archaeobacteria, specifically halophiles, are known for their ability to survive in extremely saline environments due to their unique cell wall and membrane structure.
3. **(B)** While many fungi are poisonous, morels and truffles are actually considered delicacies and are edible members of Ascomycetes.
4. **(A)** Floridean starch, the storage material in red algae (Rhodophyceae), is structurally very similar to amylopectin and glycogen.
5. **(D)** Sphagnum, a moss, provides peat that has long been used as fuel and as packing material for trans-shipment of living material because of its water-holding capacity.
6. **(C)** In a coconut, the surrounding white kernel is the cellular endosperm, and the coconut water in the center is free-nuclear endosperm. Both are the edible parts.
7. **(A)** • Marginal: Pea • Parietal: Argemone • Axile: China rose • Free central: Primrose
8. **(A)** In grasses (monocots), the guard cells are dumb-bell shaped, unlike the kidney-shaped guard cells found in dicots.
9. **(B)** The vascular cambium is a lateral meristem responsible for secondary growth in dicot stems, producing secondary xylem towards the inside and secondary phloem towards the outside.
10. **(C)** Mitochondria are the "powerhouses" of the cell, where aerobic respiration occurs and energy from carbohydrates is converted into ATP.
11. **(B)** In plant cells, the vacuole can occupy up to 90% of the volume. The vacuolar membrane (tonoplast) facilitates the transport of ions against concentration gradients, regulating the cell's osmotic potential.
12. **(A)** DNA replication or synthesis occurs during the S (Synthesis) phase of the cell cycle. The amount of DNA per cell doubles during this period.
13. **(B)** Downstream processing refers to the stages after the completion of the biosynthetic stage, involving the separation and purification of the desired product.
14. **(B)** During the light-dependent reactions of photosynthesis, the NADP reductase enzyme is located on the stroma side of the thylakoid membrane and reduces $NADP^+$ to $NADPH + H^+$.
15. **(C)** In photorespiration, RuBisCo binds with O_2 instead of CO_2 . This results in the formation of one molecule of phosphoglycerate (3C) and one molecule of phosphoglycolate (2C).

16. **(B)** The "Link reaction" (or oxidative decarboxylation) connects glycolysis to the Krebs cycle. It involves the conversion of pyruvate into Acetyl CoA by the enzyme pyruvate dehydrogenase.
17. **(B)** Auxins like IAA and NAA are used to prevent the premature drop of fruits and leaves, although they promote the abscission of older, mature parts.
18. **(A)** A typical angiosperm embryo sac at maturity, though 8-nucleate, is 7-celled (three antipodals, two synergids, one egg cell, and one large central cell with two polar nuclei).
19. **(B)** In most aquatic plants like water hyacinth and water lily, the flowers emerge above the level of water and are pollinated by insects or wind as in most land plants.
20. **(B)** In codominance, the F1 generation resembles both parents. A classic example is the ABO blood grouping in humans, where both I^A and I^B alleles are expressed.
21. **(C)** Lactose (or allolactose) acts as the inducer in the Lac operon. It binds to the repressor protein, preventing it from binding to the operator, thereby allowing transcription.
22. **(C)** The binding of histone H1 (the linker histone) to the nucleosome helps to stabilize the structure and is a key step in folding the "beads-on-a-string" chromatin into thicker chromatin fibers.
23. **(C)** Gross Primary Productivity (GPP) is the total rate of organic matter production through photosynthesis. Net Primary Productivity (NPP) is GPP minus respiration losses (R).
24. **(A)** In a maize field, the maize plant is the producer. The grasshopper, which feeds directly on the plant, is the primary consumer.
25. **(B)** The Earth Summit (United Nations Conference on Environment and Development) was held in Rio de Janeiro in 1992 to address biodiversity conservation and sustainable use of resources.
26. **(A)** • 6–15 pairs of gill slits: Cyclostomes (e.g., Petromyzon). • Heterocercal caudal fin: Chondrichthyes (cartilaginous fish). • Air bladder: Osteichthyes (bony fish). • Poison sting: Trygon (Stingray).
27. **(B)** Cuboidal epithelium with a brush border of microvilli is a characteristic of the Proximal Convoluted Tubule (PCT) of the nephron. This modification greatly increases the surface area for the reabsorption of water and solutes.
28. **(B)** Goblet cells are specialized unicellular glands that secrete mucus. They are modified from simple columnar epithelial cells found in the lining of the stomach and intestines.
29. **(D)** Succus entericus (intestinal juice) contains various enzymes like disaccharidases (maltase), dipeptidases, lipases, and nucleosidases. Nucleases (like DNase and RNase) are present in the pancreatic juice, not the intestinal juice.

30. (A) In a standard ECG, the P-wave represents the electrical excitation (depolarization) of the atria, which leads to the contraction of both the atria.
31. (D) CO_2 is transported in the blood in three main ways: • As bicarbonate ions (HCO_3^-): 70 • As carbamino-haemoglobin: 20-25 • Dissolved in plasma: 7
32. (A) During muscle contraction, a nerve impulse causes the release of Calcium ions (Ca^{2+}) from the sarcoplasmic reticulum. These ions bind to troponin on the actin filaments, which unmasks the active sites for myosin to form cross-bridges.
33. (C) The vestibular apparatus (comprising semicircular canals and the otolith organ) is located above the cochlea. While the cochlea is responsible for hearing, the vestibular apparatus is essential for maintaining body balance and posture.
34. (A) • Pituitary gland deficiency: Diabetes insipidus (ADH deficiency). • Thyroid gland hyperactivity: Graves' disease. • Adrenal gland deficiency: Addison's disease. • Pancreas (Insulin deficiency): Diabetes mellitus.
35. (D) Capacitation is the final step in the maturation of spermatozoa, which occurs after they are deposited in the female reproductive tract. This process enables the sperm to fertilize the ovum.
36. (B) The correct pathway for sperm transport is: Seminiferous tubules → Rete testis → Vasa efferentia → Epididymis → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus.
37. (C) 'Saheli' is a non-steroidal oral contraceptive pill developed by the Central Drug Research Institute (CDRI), Lucknow. It contains Centchroman and is taken once a week.
38. (D) Darwinian evolution emphasizes natural selection where individuals with superior fitness (often determined by competitive ability) survive. This involves both competition within a species (intraspecific) and between different species (interspecific) for resources.
39. (B) Analogous structures (e.g., wings of a butterfly and a bird) perform similar functions but have different anatomical origins. They are the result of convergent evolution, where different species adapt to similar environmental pressures.
40. (A) Elephantiasis (or Filariasis) is caused by the filarial worms *Wuchereria bancrofti* and *W. malayi*. These parasites are transmitted by the *Culex* mosquito and cause chronic inflammation of the lymphatic vessels, typically in the lower limbs.
41. (A) The cell-mediated immune (CMI) response, primarily involving T-lymphocytes, is responsible for the body's ability to distinguish between "self" and "non-self" and is the primary cause of kidney or other organ graft rejection.
42. (C) Lactic Acid Bacteria (LAB) grow in milk and convert it into curd. During this process, LAB produce acids that coagulate and partially digest milk proteins, while also increasing the nutritional quality by significantly increasing Vitamin B12 content.

43. (A) Insulin was the first human hormone produced using recombinant DNA technology. In 1983, the American company Eli Lilly prepared two DNA sequences corresponding to the A and B chains of human insulin and introduced them into *E. coli* plasmids.
44. (A) RNA interference (RNAi) is a cellular defense mechanism used to silence specific mRNA. In biotechnology, it has been used to create tobacco plants resistant to the nematode *Meloidogyne incognita*.
45. (C) Plasmids are small, extrachromosomal, double-stranded, circular DNA molecules found in bacteria. They are capable of independent replication and can be transferred between bacteria (transformation/conjugation).
46. (A) • EcoRI: *Escherichia coli* • BamHI: *Bacillus amyloliquefaciens* • HindIII: *Haemophilus influenzae* • Taq Polymerase: *Thermus aquaticus*
47. (C) A population with a high proportion of young (pre-reproductive) individuals is an expanding or growing population. In ten years, these individuals will move into the reproductive age group, leading to an increase in the total population size.
48. (A) In a growing population pyramid, the base is broad because the number of pre-reproductive individuals is greater than the number of reproductive individuals, ensuring future growth.
49. (C) Primary lymphoid organs are where lymphocytes mature and differentiate. These are the Bone Marrow (where all blood cells including B-cells are produced) and the Thymus (where T-cells mature).
50. (C) Cyclosporin-A is a bioactive molecule produced by the fungus *Trichoderma polysporum*. It acts as an immunosuppressive agent, used to prevent the immune system from attacking a newly transplanted organ.