FYUGP
1st sem, 2023 (Science)

Total number of printed pages–7

2023

BIOTECHNOLOGY

Paper : BIT 0100104

(Introduction to Living World)

Full Marks : 45

Time : Two hours

The figures in the margin indicate full marks for the questions.

Questions **1**, **2** *and* **3** *are compulsory. Answer* ***any one*** *from the rest.*

1. Choose the correct answer : 1×5=5

   (a) Which of the equations shows the correct conversion of CO_2 and H_2O into carbohydrates in plants ?

   (i) $$6CO_2 + 6H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} C_6H_{12}O_6 + 6O_2 + 12H_2O$$

   (ii) $$6CO_2 + 6H_2O \xrightarrow[\text{Heat energy}]{\text{Chlorophyll}} C_6H_{12}O_6 + 6O_2 + 12H_2O + 2NH_3$$

(iii) $6CO_2 + 12H_2O \xrightarrow[Sunlight]{Chlorophyll} C_6H_{12}O_6 + 6O_2 + 12H_2O + 2CO_2 \uparrow$

(iv) $6CO_2 + 12H_2O \xrightarrow[Sunlight]{Chlorophyll} C_6H_{12}O_6 + 6O_2 + 6H_2O$

(b) Homozygosity and heterozygosity of an individual can be determined by

(i) back cross

(ii) test cross

(iii) self-fertilization

(iv) All of the above

(c) The natural place of an organism where it thrives is called

(i) habitat

(ii) niche

(iii) biome

(iv) locality

(d) The scientific name of muga silkworm is

(i) Philosamia ricini

(ii) Antheraea polyphemus

(iii) Antheraea assamensis Helfer

(iv) Antheraea mylitta

(e) Type I (Polyethylene terephthalate) plastic that can be reused is commonly found in

(i) soft drinks and water bottles

(ii) laundry detergents

(iii) water pipes

(iv) shopping bags

2. Answer to the point : ***(any five)*** 2×5=10

(a) Who is regarded as the father of taxonomy? What is taxonomic survey and what is its importance?

(b) Mention *four* differences between osmosis and diffusion.

(c) Define nutrition. Name *two* food items that are nutritionally rich in vitamins.

(d) Name the principles of inheritance. Who was Gregor Johan Mendel?

(e) What are trophic levels? How does energy flow in an ecosystem?

(f) Define adaptation and its types.

(g) Name *four* fermented foods from North-East India.

(h) Define pisciculture. Name *two* ornamental fishes from India.

(i) Define bioremediation with examples.

(j) Name *four* microbes/fungi that are used to produce biofertilizers.

3. Answer in short : ***(any four)*** 5×4=20

(a) Define the terms solute, solvent and solution with examples. What are colloids and what are colloidal properties. 3+2=5

(b) With the help of a flowchart and schematic representation write in short about the process of digestion in vertebrates.

(c) With a digrammatic representation explain in short about Frederick Griffith's experiments with Streptococcus that proved DNA as the genetic material.

(d) What is polyploidy ? Mention the types of polyploidy with examples. Mention as to how polyploidy differs from aneuploidy. 1+3+1=5

(e) What do you understand by energy flow in an ecosystem ? With a diagrammatic representative chart mention about productivity in an aquatic ecosystem. 2+3=5

(f) What is apiculture ? Mention the types and species of honey bees found in North-East India. With a diagram explain the process of apiculture. 1+1+3=5

(g) Define sericulture. Mention the names of silkworm endemic to North-East India and the types of silk they produce. Name a few primary and secondary host plants used in sericulture. 1+2+2=5

(h) Mention the differences between conventional and non-conventional energy sources. What do you understand by sustainable exploitation and management of resources ? 3+2=5

4. With suitable diagrams and flowcharts explain about the processes of digestion, absorption, assimilation and excretion in vertebrates. 2+2+2+2+2=10

5. What is meant by a population? With suitable examples explain in short about population interactions (viz, competition, predation, symbiosis, mutualism, commensalism, parasitism, and camouflage). Define Hardy-Weinberg equilibrium and mention its significance in population biology. 1+7+2=10

6. What do you understand by the term 'domestication'? Explain as to how human interventions led to the domestication of microbes that are used for the preparation of fermented foods. Name a few fermented foods of North-East India. Write in short about secondary metabolite production using microbes and mention about *two* antibiotics produced by microbes. 1+3+2+3+1=10

7. Write short notes on : ***(any two)*** 5+5=10

   (a) Microbes and biofertilizers

   (b) Structural organization of cell organelles

   (c) GMO's and bioremediation

   (d) Survey and conservation strategies

   (e) Animal and plant breeding
