Roll No. ☐☐☐☐☐☐☐☐

Q.P. Code 57/2/1

BIOLOGY (THEORY) – TERM II

CBSE Class XII Board Examination 2022 (Term 2)

Time allowed: 2 hours **Maximum Marks: 35**

General Instructions:

1. The paper has 13 questions and all of them must be answered.
2. It is divided into three sections: Section A (6 questions of 2 marks), Section B (6 questions of 3 marks) and Section C (one case-based question of 5 marks).
3. There is no overall choice, but some questions offer an internal choice; answer only one alternative in those.
4. Draw neat, properly labelled diagrams wherever needed.

SECTION A

Q1–6 carry 2 marks each.

1. Filariasis rarely kills, yet it causes a lot of suffering, deformity and disability in people. Name (scientifically) any two helminths that cause filariasis and give two long-term (chronic) effects of the disease. **2**

2. Justify with two reasons the statement that humans digest curd more easily than milk. **2**

3. An AIDS patient usually dies of opportunistic infections – infections a healthy person would easily have overcome. **2**

(i) Give one reason why an HIV patient falls prey to such infections.

(ii) Name (scientifically) one bacterium and one parasite that commonly attack AIDS patients.

(iii) Expand the name of the most widely used diagnostic test for AIDS.

OR

Cigarette packets carry a statutory health warning, yet smoking is still common. List four major health hazards faced by a smoker.

4. Two biogas plants are shown. Both have a slurry inlet tank, a digester, a gas holder with a gas pipe and a sludge outlet. Plant A is fed with a slurry of (cattle) dung, while plant B is fed with a slurry of human excreta. Which plant would be used for producing gas fuel and electricity, and why? Give reasons. **2**

5. Describe the two physiological features that allow a kangaroo rat to live in desert conditions. **2**

6. Two graphs show how solar radiation on Earth changes over the year (January to December). In graph (X) the radiation rises steeply from a low value to a sharp peak in mid-year and falls steeply again, staying above a dashed reference level only for a few months. In graph (Y) the curve stays high and almost flat all year, always above the dashed level. **2**

(i) Which graph represents (I) a tropical region and (II) a temperate region?

(ii) Which region, X or Y, will have greater biological diversity? Give two reasons.

OR

(i) When prickly pear cactus was brought into Australia in the early 1920s, it spread over millions of hectares of rangeland, reaching very high densities and disturbing the ecosystem. Why did it spread so fast?

(ii) State the importance of the prey–predator relationship in a habitat.

SECTION B

Q7–12 carry 3 marks each.

7. After several rounds of asexual multiplication in the human body (which cause malaria), Plasmodium enters its sexual phase. Describe the sexual stages of the parasite, starting from when a female Anopheles mosquito bites an infected person, up to the formation of the mature infective stage. **3**

8. (a) Name the kind of immunity that protects the developing foetus in the womb against many infections like a 'biological shield', and say what it means.
(b) Many infants stay free of serious infections for at least three months after birth, and longer if they are breast-fed. Explain why. **3**

9. Modern genetic engineering lets us purify and isolate DNA easily. Name and explain the technique and steps used to separate and isolate the DNA fragments produced after cutting with restriction endonucleases. **3**

10. "Some species in an ecosystem have a much greater influence on its major services than others." How did Paul Ehrlich explain this idea through his 'rivet popper hypothesis'? **3**

OR

(i) What damage did the introduction of the Nile perch into Lake Victoria (East Africa) cause to the native species of the lake?
(ii) Name two invasive weeds that threaten the native species of India.

11. A picture shows a large, dense natural habitat that, over time and because of human activities, is being broken up by gaps into smaller and smaller isolated patches – a process that keeps increasing and is said to put the species living there at great risk. **3**
(a) Do you agree? Give two reasons.
(b) What is the ecological term for such patches formed within an original habitat?

12. Biotechnology is used in agriculture to make pest-resistant plants with 'cry' genes taken from a bacterium. Name this bacterium and explain why the cry gene product kills the insect pest but does not harm the bacterium itself. **3**

SECTION C

Q13 is a case-based question of 5 marks.

13. rDNA technology lets scientists isolate, sequence and manipulate single genes, bringing breakthroughs in medicine and agriculture. A flow diagram shows the basic steps of genetically modifying an organism: (1) a restriction enzyme cuts out the gene of interest; (2) a restriction enzyme cuts a plasmid vector; step (X) joins the two to give (3) rDNA (recombinant vector); (4) the rDNA is put into E. coli; step (Y) shows many E. coli cells, each carrying many copies of the plasmid. **5**

(i) Are two different restriction endonucleases used – one for the vector and another for the DNA to be cloned? Give a reason.

(ii) Which enzyme is used at step (X) to join the foreign DNA to the vector?

(iii) What is step (Y), in which many copies of the foreign DNA are made in transformed E. coli, called?

(iv) Draw a diagram of the E. coli cloning vector pBR322 showing: (I) one restriction site in the tetracycline-resistance gene, (II) one restriction site in the ampicillin-resistance gene, (III) the ori.

(v) What does 'rop' code for in pBR322?

OR

RNA interference (RNAi) is promising both as a medicine and for pest control. In a 2006 experiment, Tracy Zimmerman and co-workers used RNAi to lower the 'ApoB' level in Cynomolgus monkeys; some people have mutations giving high ApoB, which raises lipoproteins and blood cholesterol and predisposes them to coronary artery disease. One group got siRNA at 1 mg/kg (Y), a second at 2.5 mg/kg (Z) and a third was injected with saline as control (X). A bar graph of relative serum cholesterol (% per dose) at 24, 48, 144 and 264 hours shows: saline X ≈ 90, 96, 109, 112; 1 mg/kg Y ≈ 80, 74, 90, 94; 2.5 mg/kg Z ≈ 65, 55, 46, 37.

(i) What do you conclude from bars X and Z at 264 hours?

(ii) In which category of organisms does RNAi occur naturally, and why?

(iii) What is the basic principle by which RNAi silences a chosen gene?

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Questions restated from the CBSE Class XII Board Examination 2022 (set 57/2/1) for practice. Reading passages and map items are described, not reproduced.