Roll No. ☐☐☐☐☐☐☐☐

Q.P. Code 57/1/1

BIOLOGY (THEORY)

CBSE Class XII Board Examination 2024

Time allowed: 3 hours **Maximum Marks: 70**

General Instructions:

1. The paper has 33 questions in five sections (A to E); all questions are compulsory.
2. Section A: Q1–16 are multiple-choice (including Assertion–Reason) questions of 1 mark each.
3. Section B: Q17–21 are very short answer questions of 2 marks each.
4. Section C: Q22–28 are short answer questions of 3 marks each.
5. Section D: Q29–30 are case-based questions of 4 marks each, with an internal choice in one sub-part.
6. Section E: Q31–33 are long answer questions of 5 marks each.
7. There is no overall choice; where an internal choice (OR) is given, answer only one alternative.
8. Draw neat, properly labelled diagrams wherever needed.

SECTION A

Q1–16 are multiple-choice questions of 1 mark each.

1. Which of these plants bears both male and female flowers on the same plant, so that it can be pollinated by geitonogamy as well as xenogamy? **1**

(A) Papaya **(B)** Date palm

(C) Maize **(D)** Spinach

2. Which hormone, secreted by the human placenta, helps to maintain pregnancy? **1**

(A) Relaxin **(B)** Human chorionic gonadotropin

(C) Oxytocin **(D)** Human placental lactogen

3. In the periodic abstinence method of family planning, a couple should avoid coitus during which days of the menstrual cycle? **1**

(A) Day 5 to 10 **(B)** Day 13 to 15

(C) Day 10 to 17 **(D)** Day 16 to 20

4. Pick the INCORRECT pairing of human karyotype and feature: **1**

(A) 45 + XX – broad palm with a characteristic palm crease

(B) 44 + XXY – overall feminine development

(C) 44 + XO – sterile female with rudimentary ovaries

(D) 44 + XY – normal male

5. In nature there are 20 amino acids and 4 kinds of DNA bases, and a group of 3 bases codes for one amino acid. Suppose instead there were 96 amino acids and 12 kinds of bases. What would be the smallest number of bases needed in one codon? **1**

(A) 6 **(B)** 8

(C) 2 **(D)** 4

6. A schematic polynucleotide chain is drawn as a zig-zag backbone of alternating P (phosphate) and S (sugar) units, and each S is joined to a B (nitrogenous base) by a dotted line (S - - - - B). What bond does this dotted line stand for? **1**

(A) Hydrogen bond **(B)** Peptide bond

(C) N-glycosidic linkage **(D)** Phosphodiester bond

7. In which of these conditions is there a marked rise in the activity of mast cells in the human body? **1**

(A) Typhoid **(B)** Allergy

(C) Ascariasis **(D)** AIDS

8. Lactobacillus, which turns milk into curd, belongs to which category? **1**

(A) Cyanobacteria **(B)** Archaebacteria

(C) Chemosynthetic bacteria **(D)** Heterotrophic bacteria

9. Which transgenic animal is used to test the safety of polio vaccine? **1**

(A) Sheep **(B)** Goat

(C) Pig **(D)** Mice

10. The restriction endonuclease Hind II cuts DNA at a fixed point after recognising a specific sequence of how many base pairs? **1**

(A) Six base pairs **(B)** Four base pairs

(C) Seven base pairs **(D)** Three base pairs

11. What is the improved trait of the genetically modified crop 'Golden rice'? **1**

(A) High lysine content **(B)** Insect resistance

(C) High protein content **(D)** High vitamin-A content

12. What are the following called, respectively: (1) the rate at which consumers form new organic matter, and (2) the biomass available for consumption by herbivores and decomposers? **1**

(A) Gross primary productivity and net primary productivity

(B) Net primary productivity and secondary productivity

(C) Secondary productivity and net primary productivity

(D) Secondary productivity and gross primary productivity

13. Assertion (A): Indian law permits legal adoption, and it is one of the best ways for childless couples to become parents. **1**
Reason (R): Emotional, religious and social factors do not stand in the way of legal adoption of orphaned and destitute children in India.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true, but R is not the correct explanation of A.

(C) A is true, but R is false.

(D) A is false, but R is true.

14. Assertion (A): Linked genes do not give the dihybrid F_2 ratio of 9 : 3 : 3 : 1. **1**
Reason (R): Linked genes do not assort independently.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true, but R is not the correct explanation of A.

(C) A is true, but R is false.

(D) A is false, but R is true.

15. Assertion (A): Agrobacterium tumefaciens is a pathogen of several monocot plants. **1**
Reason (R): It can transfer a piece of DNA called T-DNA that transforms normal plant cells into a tumour.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true, but R is not the correct explanation of A.

(C) A is true, but R is false.

(D) A is false, but R is true.

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16. Assertion (A): The Government of India has set up an organisation called GEAC to decide on the validity of GM research. **1**
Reason (R): Genetically modified organisms have no effect when they are introduced into an ecosystem.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true, but R is not the correct explanation of A.

(C) A is true, but R is false.

(D) A is false, but R is true.

SECTION B

Q17–21 are very short answer questions of 2 marks each.

17. A table gives terms and the part of a plant each represents. Fill in A, B, C and D: **2**

(i) Pericarp → A

(ii) B → cotyledon in the seed of the grass family

(iii) Embryonal axis → C

(iv) D → remains of nucellus in a seed

18. A picture shows a series of giraffe-like animals: the first has a short neck and grazes on the ground, and each next one has a longer neck, reaching leaves higher up on trees. Name the naturalist who explained evolution using this example, and give his explanation. **2**

19. Write the basic steps of the Assisted Reproductive Technologies (ART) programme used to help childless couples. Why is it also called the 'test tube baby' programme? **2**

20. A farmer was bitten by a poisonous snake while working in his field. At the nearby health centre the doctor gave him an injection that saved his life. **2**

(i) What did the doctor inject and why? (1½)

(ii) What kind of immunity does this injection give? (½)

OR

Why do organic farmers not recommend wiping out insect pests completely? Explain with reason.

21. A pyramid of biomass is drawn with two bars: the upper, wider bar 'A' is labelled PC (primary consumers) and the lower, narrower bar 'B' is labelled PP (primary producers). Name the standing crops likely to occupy levels A and B. Name this type of pyramid and the ecosystem in which it is found. **2**

SECTION C

Q22–28 are short answer questions of 3 marks each.

22. Explain how oral contraceptive pills taken by women act. What schedule must be followed for them to be effective? **3**

23. (a) Name the type of DNA on which DNA fingerprinting is based and write two of its features. (1 + 1)
(b) Give any two applications of DNA fingerprinting. (½ + ½) **3**

24. (a) Explain the significance of S.L. Miller's experiment. Name the scientists whose hypothesis led him to perform it. (2½)
(b) How does the analysis of meteorites support this hypothesis? (½) **3**

25. Fill in A to F in this table of human diseases (disease – causative organism – symptoms): **3**

- Pneumonia – Streptococcus – A
- Typhoid – B – high fever, weakness, headache, stomach pain
- Common cold – Rhinovirus – C
- Ringworm – D – dry scaly lesions on the body, redness, itching
- Ascariasis – Ascaris – E
- F – Entamoeba histolytica – constipation, cramps, stools with mucus and blood clots

26. In a family the father, the daughter and the son are colour blind, while the mother has normal vision. Did the son and the daughter both inherit the disorder from their father? Show a cross to justify your answer. **3**

27. (i) What are transgenic animals? (1)
(ii) Name the first transgenic cow and state why it is important. (2) **3**

OR

(i) Explain how the restriction enzyme EcoRI is named. (2)
(ii) Using only an illustration, show how EcoRI acts on a DNA polynucleotide. (1)

28. (a) Explain how the orchid Ophrys makes sure it is pollinated by one particular species of bee. (2)
(b) Using this example, describe co-evolution. (1) **3**

SECTION D

Q29 and Q30 are case-based questions of 4 marks each; each has 3 sub-questions with an internal choice in one of them.

29. India has only 2.4% of the world's land area but about 8.1% of global species diversity; prokaryotes are not included in such species estimates. A survey of species richness of mammal groups in three regions of the world is shown as a bar graph of taxonomic richness: Region I has the shortest bar, Region II a taller bar and Region III the tallest bar. **4**

(a) Why is species richness highest in Region III? (1)

(b) Plants and animals are not uniformly distributed over the world but show an uneven pattern. What is this kind of diversity pattern called? (1)

(c) Why are there no estimates of species numbers for prokaryotes like those for plants and animals? Explain. (2)

OR

(a) Why is species richness lowest in Region I in the bar graph?

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30. A diagram shows how transformed bacteria are selected. (i) A plasmid carries a gene for ampicillin resistance and a gene for tetracycline resistance. (ii) Foreign DNA is inserted into the plasmid to make recombinant DNA. (iii) Plate M shows five colonies (1–5), each derived from a single bacterium growing on agar. (iv) By replica plating, the colonies are transferred to Plate N containing agar with tetracycline and ampicillin; on Plate N colonies 1, 2, 3 and 5 grow but colony 4 does not appear. **4**

(a) Which colony has been transformed with recombinant DNA? Justify. (½ + ½)

(b) What are the sites in a plasmid where the ampicillin- and tetracycline-resistance genes lie (and into which foreign DNA is inserted) called? State their role in genetic engineering. (2)

(c) Name two enzymes that play an important role in genetic engineering. (1)

OR

(c) State the role of β-galactosidase in insertional inactivation.

SECTION E

Q31–33 are long answer questions of 5 marks each.

31. (i) Explain how the male gametophyte develops in an angiosperm. (2½) **5**
(ii) Draw a labelled diagram of a three-celled male gametophyte. (2½)

OR

(i) Draw a diagrammatic sectional view of the human ovary and label: (1) blood vessels (2) primary follicle (3) tertiary follicle (4) ovum. (2)
(ii) At what stage of life are primary follicles formed in a human female? (½)
(iii) Explain the hormonal and structural events from ovulation up to the start of the next menstrual cycle. (2½)

32. One of the earliest experiments in genetics clearly showed 'stability' as a property of the genetic material. Name the scientist, describe his experiment and state the conclusion he reached. **5**

OR

You are given a tall pea plant with violet flowers whose genotype is not known. Work out the plant's genotype using only self-crosses. Write the genotypic and phenotypic ratios of each cross you show.

33. (i) Name and explain the property that normal cells have but cancer cells lose. (1½) **5**
(ii) All normal human cells carry genes that can turn cancerous under certain conditions. Name them and explain how. (1)
(iii) State the role of these techniques in detecting and diagnosing cancer: (1) biopsy and histopathology (1); (2) magnetic resonance imaging (1½).

OR

Towns and cities produce huge amounts of sewage daily, which is treated in Sewage Treatment Plants (STPs). A flow diagram of two stages is given: 'Primary effluent passed into large aeration tanks' → 'Effluent passed into settling tanks to form a sediment'.
(i) (1) Why is the primary effluent passed into large aeration tanks? (1)
(2) What is the sediment called? Give its significance. (1)
(3) Explain the final step in the settling tank before the treated effluent is released into natural water bodies. (1)
(ii) Name two organisms from different kingdoms that are commonly used as biofertilisers, and explain how each acts as a biofertiliser. (2)

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Questions restated from the CBSE Class XII Board Examination 2024 (set 57/1/1) for practice. Reading passages and map items are described, not reproduced.