CBSE EXAMINATION PAPER-2024

BIOLOGY

(Solved)

Time allowed : 3 hours | Maximum Marks : 78

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **35 questions.** All questions are **compulsory.**

ii. This question paper is divided into **5 sections.**

iii. **Section A** – questions number **1 to 3** are case based questions

iv. **Section B** – questions number **4 to 15** are multiple choice questions

v. **Section C** – questions number **16 to 21** are very short answer

vi. **Section D** – questions number **22 to 29** are short answer

vii. **Section E** – questions number **30 to 35** are long answer

viii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

ix. Use of calculator is NOT allowed.

Section A

Question 1.

Question 2.

Populations evolve to maximise their reproductive fitness in the habitat in which they live. Ecologists suggest, the life history of organisms have evolved in relations to the constraints imposed by the biotic and abiotic components of the habitat in which they live. This gets reflected in the population growth pattern of all organisms including

humans. Study the population growth curves shown in the given graph and answer the questions that follow :

(1)

Identify the growth curves 'A' and 'B'

[1 Marks]

(2)

Mention what does the dotted line in the graph indicate and state its importance also.

[1 Marks]

(3)

(i) Which one of the two curves is more "realistic" and why ?

(ii) Which one of the two curves is relevant in present days with respect to human population in our country and why ?

[1 Marks]

(4)

Growth curve 'B' shows a different pattern from that of growth curve 'A'.Justify giving one reason.

[2 Marks]

Question 3.

Read the following passage :

Generally, in eukaryotic cells the average length of a transcription unit along a DNA molecule is about 8,000 nucleotides, so the RNA product of the transcription is also that long. But it only takes about 1200 nucleotides from the above RNA product to translate average sized polypeptide of 400 Amino acids.

(1)

Name this RNA product transcribed from the DNA that subsequently translates into a polypeptide of 400 amino acids. Mention the enzyme responsible for transcribing this type of RNA from the DNA

[1 Marks]

(2)

Name and explain the process the RNA molecule transcribed from 8000 nucleotide long DNA undergoes to be able to translate a polypeptide of 400 amino acids.

[2 Marks]

(3)

Mention the difference in the site of transcription in a prokaryote and eukaryote cell.

[1 Marks]

(4)

Write the number of RNA polymerases involved in the transcription of DNA in a prokaryote and eukaryotes.

[1 Marks]

Section B

Question 4.

In a fertilized ovule of an angiosperm, the cells in which n, 2n and 3n conditions respectively occur are:

[1 Marks]

(A) endosperm, nucellus and zygote

(B) zygoate, nucellus and endosperm

(C) antipodals, synergids and integuments

(D) antipodal, zygote and endosperm

Question 5.

Study the table given below: Contraceptive / Contraceptive Method Mode of Action A. The pill I. Prevent sperm reaching cervix B. Condom II. Prevent implantation C. Vasectomy III. Inhibits ovulation D. Copper-T IV. Semen contains no sperm Select the option where contraceptive/contraceptive method are correctly matched with their mode of action.

[1 Marks]

(A) A – II, B – III, C – I, D – IV

(B) A – III, B – II, C – I, D – IV

(C) A – III, B – I, C – IV, D – II

(D) A – IV, B – III, C – II, D – I

Question 6.

Identify the category of genetic disorder depicted in the pedigree chart given below:

[1 Marks]

(A) X-Linked dominant

(B) Autosomal dominant

(C) X-Linked recessive

(D) Autosomal recessive

Question 7.

Turner's syndrome in humans occurs due to

[1 Marks]

(A) Autosomal abnormality

(B) Polyploidy

(C) Euploidy

(D) Aneuploidy

Question 8.

Which of the options has correct identification of 'P', 'Q' and 'R' in the illustration of 'Central Dogma' given below?

[1 Marks]

(A) P – Replication, Q – rRNA, R – Transcription

(B) P – Transcription, Q – mRNA, R – Translation

(C) P – Translation, Q – mRNA, R – Transcription

(D) P – Replication, Q – mRNA, R – Translation

Question 9.

Who proposed the mutation theory in favour of organic evolution?

[1 Marks]

(A) Hugo de Vries

(B) Louis Pasteur

(C) Darwin

(D) Weisman

Question 10.

Study the following list of bioactive substances and their action:

Select the option in which the bioactive substances are correctly matched with their action.

[1 Marks]

(A) A – III, B – IV, C – II, D – I

(B) A – II, B – III, C – I, D – IV

(C) A – IV, B – I, C – II, D – III

(D) A – IV, B – II, C – I, D – III

Question 11.

The 'molecular scissors' fall in the category of:

[1 Marks]

(A) Restriction enzymes

(B) Exonuclease

(C) Cleaving enzyme

(D) Endonuclease

Question 12.

ELISA technique is based on the principle of:

[1 Marks]

(A) pathogen – antigen interaction

(B) antigen – protein interaction

(C) antigen-antibody interaction

(D) DNA replication

Question 13.

Assertion (A) : A given fig species can be pollinated only by its partner' wasp.

Reason (R) : The wasp pollinates the fig inflorescence while searching for suitable egg laying sites.

[1 Marks]

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

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

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

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

Question 14.

Assertion (A) : Patents are granted by government to an inventor.

Reason (R) : Patents prevents others from commercial use of an invention.

[1 Marks]

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

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

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

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

Question 15.

Assertion (A) : Some aquatic ecosystems have inverted biomass pyramids.

Reason (R) : More energy is required by the organisms occupying higher trophic levels.

[1 Marks]

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

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

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

(D) Both (A) and (R) are true and (R) is not the correct explanation of (A).

Section C

Question 16. Study the graph given below that represents the changes in the thickening of the uterine wall in women 'X' and women 'Y' over a period of one month. What does the graph with respect to woman 'X' and woman 'Y' indicate? Give suitable reason.

[2 Marks]

Question 17.

(a) Intensely lactating mothers generally do not conceive. Why ?

(b) Our government has intentionally imposed strict conditions for MTP. Why ?

[2 Marks]

Question 18.

(a) Name the source from which insulin was extracted in earlier times. Why is this insulin no more in use by the diabetic patients ?

(b) Why does the insulin synthesised in the human body undergo processing whereas the insulin produced by Eli Lilly company does not need to undergo any processing ? Explain.

[2 Marks]

Question 19.

Differentiate between grazing food chain and detritus food chain.

[2 Marks]

Question 20.

Explain Brood parasitism with the help of a suitable example.

[2 Marks]

Question 21.

(a) Biodiversity hotspots cover less than 2% of Earth's land area. Strict protection of these areas can reduce the rate of ongoing extinctions. Explain.

(b) Name any two hotspots in India.

[2 Marks]

Section D

Question 22.

Draw a well labelled diagram of sectional view of male gametophyte/microspore of an angiosperm and write the functions of any two parts labelled. (Any four labels).

[3 Marks]

Question 23.

(a) A man with blood group 'A' marries a woman with blood group 'AB'. The first child born to them has blood group 'B'. Work out a cross to find the genotype of the father. Give the possible blood groups and their genotypes of the children that could be born to this couple. (Use a Punnet square).

(b) State the basis of 'ABO' blood grouping in humans.

[3 Marks]

Question 24.

(a) Whose skulls 'A', 'B', and 'C' are shown below ? Which of the two are more similar to each other ?

(b) Name the (i) ape like (ii) man like primates that existed 1.5 million years ago.

[3 Marks]

Question 25.

(a) Name the group of drugs whose skeletal molecule is shown below

(b) How are such drugs consumed ?

(c) Name the human body organ affected by the consumption of these drugs.

[3 Marks]

Question 26.

Draw a schematic diagram of an antibody molecule and label any 4 parts. Mention their chemical nature. Name the cells which produce them.

[3 Marks]

Question 27.

Explain the role of the following during the sewage treatment :

(a) flocs

(b) anaerobic sludge digester

[3 Marks]

Question 28.

Study the steps shown below, that are carried during a specific technique :

(a) Identify the steps 'A' and 'D' in the diagram.

(b) What does 'B' represent ?

(c) Write what is 'C' ? Name its source organism.

(d) Mention the use of this technique in molecular diagnostics.

[3 Marks]

Question 29.

Explain the role of transgenic animals in :

(a) Production of Biological products

(b) Studying diseases

(c) Chemical safety testing

[3 Marks]

Section E

Question 30. Describe the life cycle of HIV from the time of its entry into the human body till full blown AIDS sets in.

[5 Marks]

Question 31.

The given diagram shows the sectional view of a seminiferous tubule of Human testis :

(i) Name and describe the process depicted in the diagram which results in the development of spermatozoa.

(ii) dentify the cell where you are seeing a cluster of spermatozoa attached in the diagram. Write the function of the cell.

[5 Marks]

Question 32.

Observe the picture of Commelina plant bearing two types of flowers given above.

(i) Identify the two types of flowers labelled 'A' and 'B' in the picture.

(ii) Compare the two types of flowers with reference to :

- Characteristic feature
- modes of pollination

(ii) List any two 'out breeding devices' in flowering plants. Explain why do plants develop such devices.

[5 Marks]

Question 33.

Study the schematic diagram given below and answer the questions that follow :

(i) Identify the polarity from 'X' to ' X ' in the mRNA segment shown. Mention how many more amino acids can be added to the polypeptide that is being translated and why.

(ii) Write the initiating codon for translation, its anticodon and the amino acid it codes for.

(iii) Explain the charging of an adaptor molecule. Why this molecule needs to be charged ?

[5 Marks]

Question 34.

1. Why is sickle-cell anaemia, a human blood disorder so named ?
2. Explain the genetic basis that results in the expression of this disorder.
3. Work out a cross to explain how normal parents may have a sicklecell anaemic child.

[5 Marks]

Question 35.

1. Write the symptoms of malaria in human and explain what causes these symptoms.
2. Describe the different steps in the sexual mode of reproduction in the life cycle of a malarial parasite from the time of its initiation till where it is completed and ready to start a fresh cycle.

[5 Marks]