CBSE EXAMINATION PAPER-2024

BIOLOGY

(Solved)

Time allowed : 3 hours | Maximum Marks : 66.5

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **48 questions.** All questions are **compulsory.**

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

iii. **Section A** – questions number **1 to 14** are case based questions

iv. **Section B** – questions number **15 to 30** are multiple choice questions

v. **Section C** – questions number **31 to 37** are very short answer

vi. **Section D** – questions number **38 to 46** are short answer

vii. **Section E** – questions number **47 to 48** 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.

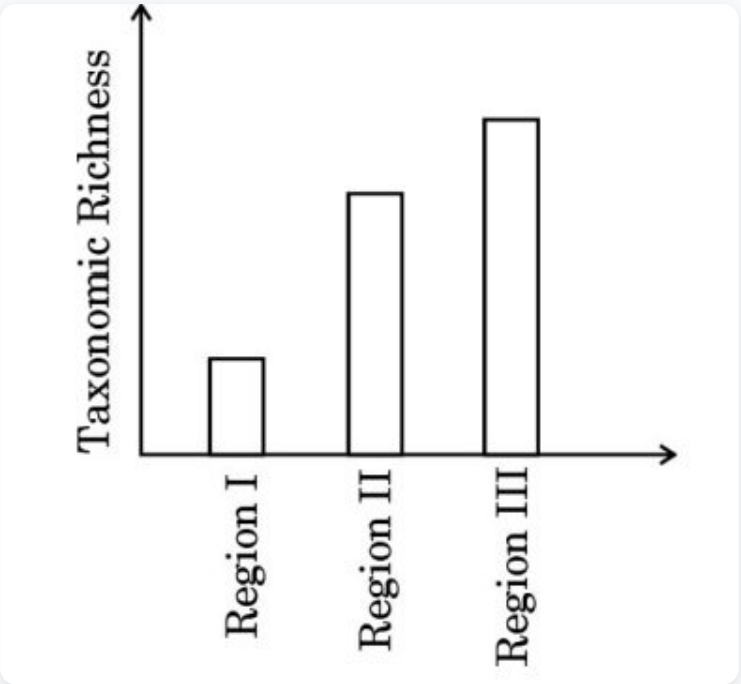
Question 2.

Read the following passage and answer the questions that follow.

Isn't it incredible that India's land area is only 2.4 per cent of the world's total land area whereas its share of the global species diversity is an impressive 8.1 per cent! However, in these estimates of species, prokaryotes do not figure anywhere.

Biologists are always keen on collecting data with respect to species diversity observed in different regions of the world. The data collected based on the survey conducted for species richness of groups of mammals in three different regions of the world is shown in the bar graph given below :

(a) Why is the species richness maximum in Region III in the bar graph ?



Question 3.

Question 4.

Question 5.

Question 6.

Study the diagram given below that shows the steps involved in the procedure of selecting transformed bacteria and answer the questions that follow :

(a) Identify the colony that has got transformed. Justify your answer.

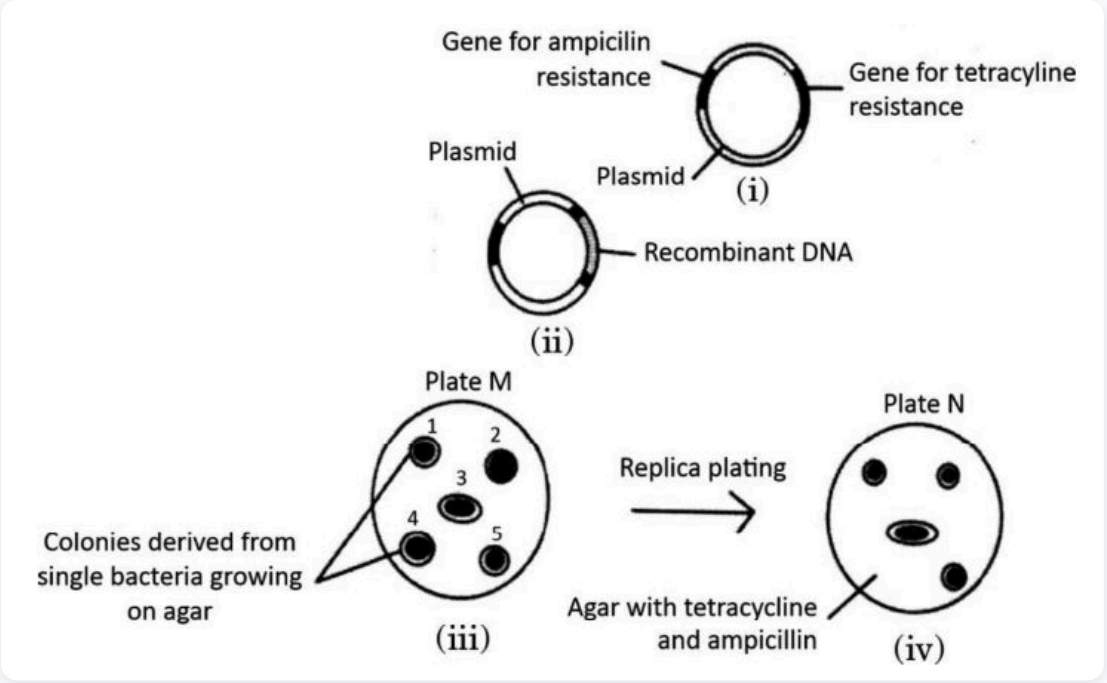
(b) What are the sites in a plasmid called where ampicillin and tetracycline resistance genes are inserted ? State their role in genetic engineering.

(c) Name two enzymes playing an important role in genetic engineering.

Question 7.

Question 8.

Study the diagram given below that shows the steps involved in the procedure of selecting transformed bacteria and answer the questions that follow :



(1)

Name two enzymes playing an important role in genetic engineering

[1 Marks]

(2)

Identify the colony that has got transformed. Justify your answer.

[1 Marks]

(3)

What are the sites in a plasmid called where ampicillin andtetracycline resistance genes are inserted ? State their role in genetic engineering.

[2 Marks]

(4)

State the role of -galactosidase in insertional inactivation.

[1 Marks]

Question 9.

Read the following passage and answer the questions that follow.

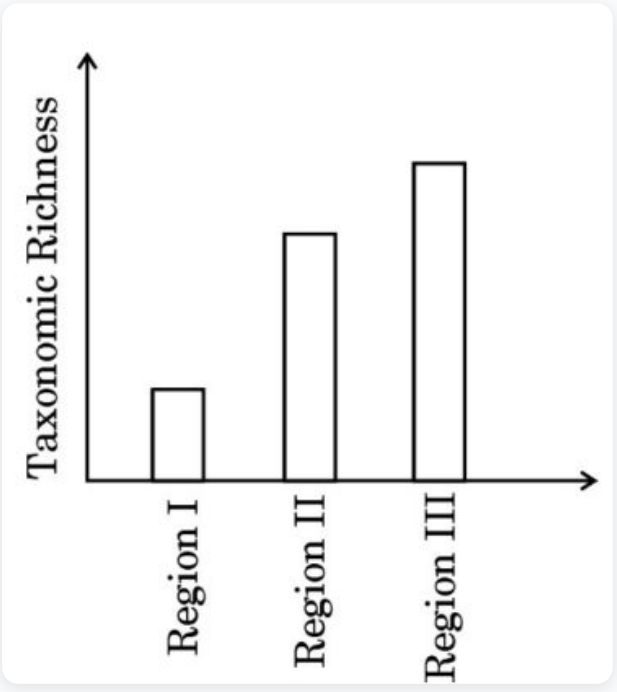
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Question 10.

Read the following passage and answer the questions that follow.

Isn't it incredible that India's land area is only 2.4 % of the world 's total land area whereas its share of the global species diversity is an impressive 8·1 per cent ! However, in these estimates of species, prokaryotes do not figure anywhere. Biologists are always keen on collecting data with respect to species diversity observed in different regions of the world. The data collected based on the survey conducted for species richness of groups of

mammals in three different regions of the world is shown in the bar graph given below :



Question 11.

Question 12.

Question 13.

Read the following passage and answer the questions that follow. 4

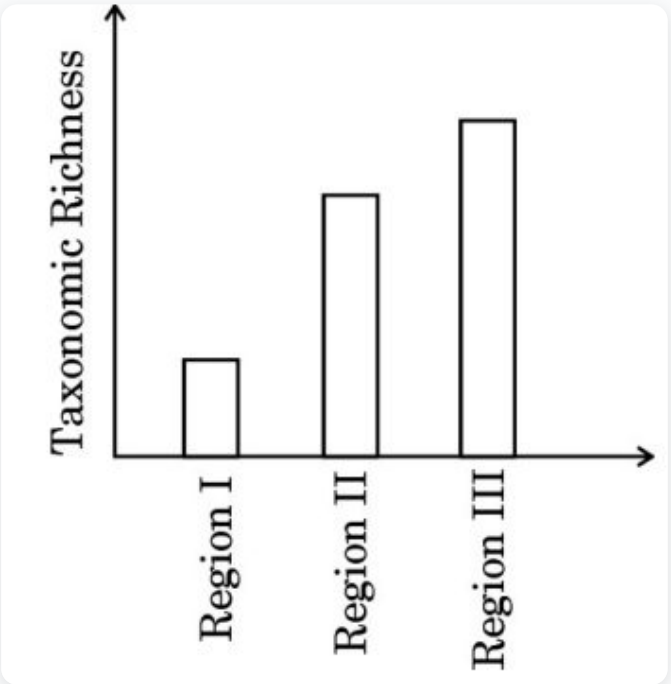
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Biologists are always keen on collecting data with respect to species diversity observed in different regions of the world. The data collected based on the survey conducted for species richness of groups of mammals in three different regions of the world is shown in the bar graph given below :

Question 14.

Read the following passage and answer the questions that follow. Isn't it incredible that India's land area is only 2-4 per cent of the world's total land area whereas its share of the global species diversity is an impressive 8.1 per cent! However, in these estimates of species, prokaryotes do not figure anywhere.

Biologists are always keen on collecting data with respect to species diversity observed in different regions of the world. The data collected based on the survey conducted for species richness of groups of mammals in three different regions of the world is shown in the bar graph given below :



(1)

Why is the species richness maximum in Region III in the bar graph ?

[1 Marks]

(2)

Why is the species richness minimum in Region I in the bar graph ?

[1 Marks]

(3)

Why is it that prokaryotes do not have an estimated number of their species diversity as seen in plants and animals ? Explain.

[2 Marks]

(4)

Plants and animals do not have uniform diversity in the world but show rather uneven distribution. Mention what this kind of diversity is referred to as.

[1 Marks]

Section B

Question 15.

In which of the following plants are both male and female flowers born on the same plant and the mode of pollination can be geitonogamy or xenogamy?

[1 Marks]

(A) Maize

(B) Date Palm

(C) Papaya

(D) Spinach

Question 16.

Which one of the following hormones is secreted by the human placenta that helps in the maintenance of pregnancy?

[1 Marks]

(A) Human Placental Lactogen

(B) Oxytocin

(C) Relaxin

(D) Human Chorionic Gonadotropin

Question 17.

The periodic abstinence by a couple for family planning should be from:

[1 Marks]

(A) Day 16 to 20 of menstrual cycle

(B) Day 10 to 17 of menstrual cycle

(C) Day 5 to 10 of menstrual cycle

(D) Day 13 to 15 of menstrual cycle

Question 18.

Select the incorrect match from the following:

[1 Marks]

(A) 44 + XY Normal male

(B) 45 + XX Broad palm with characteristic palm crease

(C) 44 + XXY Overall feminine development

(D) 44 + XO Sterile females as ovaries are rudimentary

Question 19.

You know that there are twenty different types of naturally occurring amino acids and four different types of bases in the DNA. A combination of 3 such bases code for a specific amino acid. If instead

there are 96 different amino acids and 12 different bases in the DNA, then the minimum number of combinations of bases required to form a codon is:

[1 Marks]

(A) 4

(B) 6

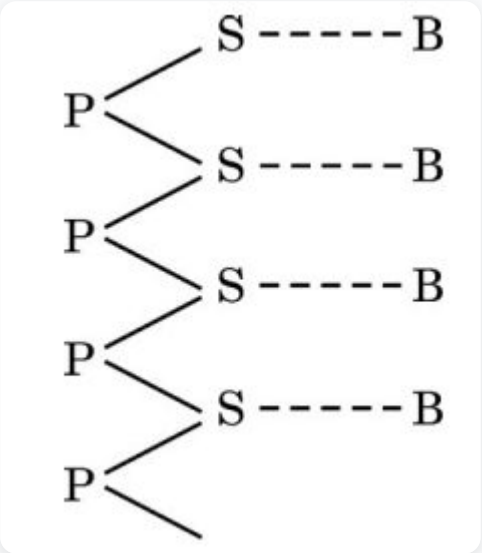
(C) 8

(D) 2

Question 20.

The type of bond represented by the dotted line in a schematic polynucleotide chain is:

[1 Marks]



(A) Hydrogen bond

(B) N-glycosidic linkage

(C) Phosphodiester bond

(D) Peptide bond

Question 21.

In which of the following conditions/diseases is there a substantial increase in the activity of mast cells observed in the human body?

[1 Marks]

(A) AIDS

(B) Typhoid

(C) Ascariasis

(D) Allergy

Question 22.

Lactobacillus that sets milk into curd is categorised as:

[1 Marks]

(A) Archaebacteria

(B) Heterotrophic bacteria

(C) Cyanobacteria

(D) Chemosynthetic bacteria

Question 23.

Which one of the following transgenic animals is being used to test the safety of the polio vaccine?

[1 Marks]

(A) Pig

(B) Goat

(C) Sheep

(D) Mice

Question 24.

Restriction Endonuclease Hind II always cuts DNA molecules at a particular point by recognising a specific sequence of:

[1 Marks]

(A) Three base pairs

(B) Six base pairs

(C) Four base pairs

(D) Seven base pairs

Question 25.

The improved trait that is found in the genetically modified transgenic crop Golden rice is:

[1 Marks]

(A) High vitamin-A content

(B) High protein content

(C) Insect resistant

(D) High lysine content

Question 26.

The rate of formation of new organic matter by consumers, and the biomass available for consumption of herbivores as well as decomposers are referred to as:

[1 Marks]

(A) Secondary productivity and Net primary productivity

(B) Secondary productivity and Gross primary productivity

(C) Gross primary productivity and Net primary productivity

(D) Net primary productivity and Secondary productivity

Question 27.

Assertion (A) : The laws of our country permit legal adoption and it is as yet, one of the best methods for childless couples looking for parenthood.

Reason (R) : Emotional, religious and social factors are no deterrents to the legal adoption of orphaned and destitute children in India.

[1 Marks]

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

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

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

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

Question 28.

Assertion (A) : Linked genes do not show dihybrid F2 ratio 9 : 3 : 3 : 1.

Reason (R) : Linked genes do not undergo independent assortment.

[1 Marks]

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

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

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

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

Question 29.

Assertion (A) : Agrobacterium tumefaciens is a pathogen of several monocot plants.

Reason (R) : It is able to deliver a piece of DNA known as T-DNA to transform normal plant cells into a tumor.

[1 Marks]

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

(B) Assertion (A) is false, but Reason (R) is true.

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

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

Question 30.

Assertion (A) : Indian Government has set up an organisation known as GEAC to decide the validity of GM research.

Reason (R) : Genetic modification of organisms has no effect when such organisms are introduced in the ecosystem.

[1 Marks]

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

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

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

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

Section C

Question 31.

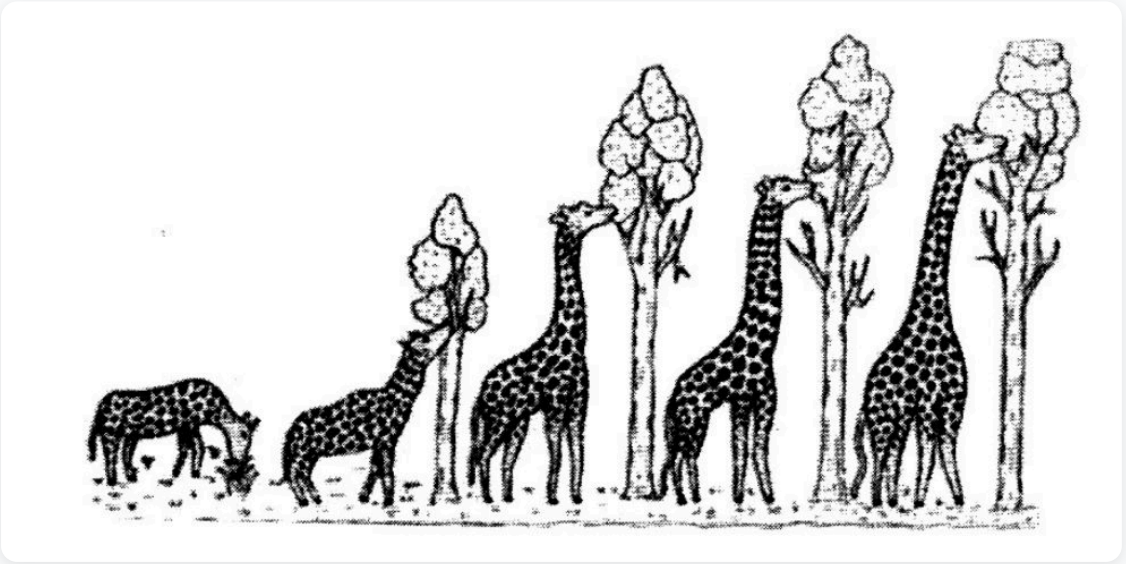
Identify A, B, C and D in the table given below:

[2 Marks]

Terms	*Part of the plant it represents*
Pericarp	'A'
'B'	Cotyledon in seed of grass family
Embryonal axis	'C'
'D'	Remains of nucellus in a seed

Question 32. Observe the picture given below. Name the naturalist and write the explanation given by him that the evolution of life forms had occurred on the basis of this example.

[2 Marks]

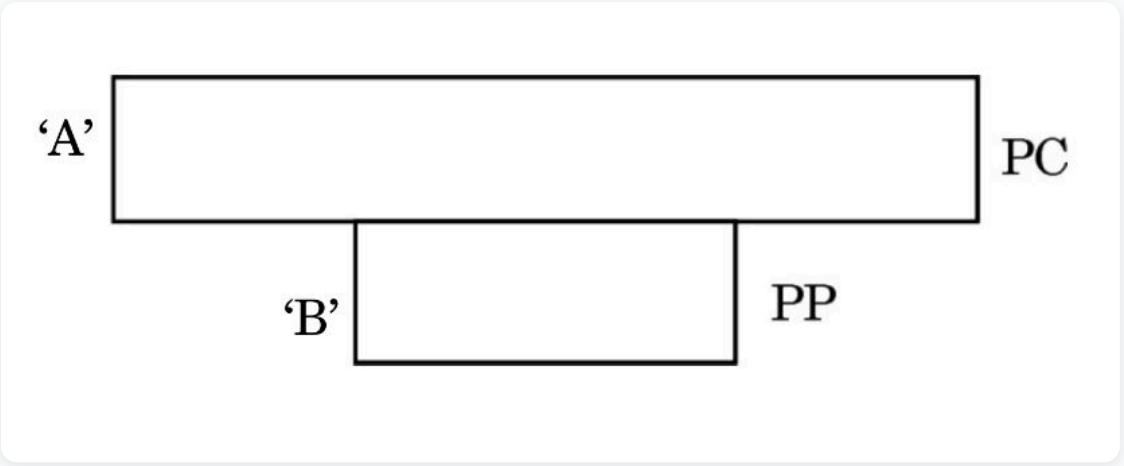


Question 33. Write the basic steps followed in the Assisted Reproductive Technologies (ART) programme to help childless couples. Why is it also known as the test tube baby programme?

[2 Marks]

Question 34. Study the diagram of a pyramid of biomass given below. Name this type of pyramid and the ecosystem in which it is found.

[2 Marks]



Question 35.

Name and explain the property present in normal cells but is lost in cancer cells.

[2 Marks]

Question 36.

All normal human cells have genes that may become cancerous under certain conditions. Name them and explain how.

[2 Marks]

Question 37.

State the role of the following techniques in detection and diagnosis of cancer :

(1) Biopsy and Histopathology 1

(2) Magnetic Resonance Imaging

[2 Marks]

Section D

Question 38.

Explain the mode of action of contraceptive pills taken by human females. Mention the schedule to be followed for effective outcome.

[3 Marks]

Question 39.

(a) Name and write two characteristics of the type of DNA that forms the basis of DNA fingerprinting technique.

(b) Mention any two applications of this technique.

[3 Marks]

Question 40.

(a) Explain the significance of the experiment carried out by S.L. Miller. Name the scientists whose hypothesis prompted him to carry out this experiment.

(b) How does meteorite analysis favour this hypothesis ?

[3 Marks]

Question 41.

Identify A, B, C, D, E and F in the table given below :

[3 Marks]

Name of Human Disease	*Causative Organism*	*Symptoms*
Pneumonia	*Streptococcus*	'A'
Typhoid	'B'	High fever, weakness, headache, stomach pain
Common Cold	Rhino virus	'C'
Ringworm	'D'	Dry scaly lesions on body parts, redness, itching
Ascariasis	*Ascaris*	'E'
'F'	*Entamoeba histolytica*	Constipation, cramps, stools with mucous and blood clots

Question 42.

In a family, the father, the daughter and the son are colour blind, whereas the mother has normal vision. Do you think the son and the daughter have inherited the disease from their father ? Work out a cross to justify your answer.

[3 Marks]

Question 43.

(i) What are transgenic animals ?

(ii) Name the first transgenic cow and state its importance.

[3 Marks]

Question 44.

(a) Explain how it is ensured that the orchid Ophrys is pollinated by a specific species of bee.

(b) Describe co-evolution with the help of this example.

[3 Marks]

Question 45.

(i) Explain the convention for naming EcoRI. 2

(ii) With the help of an illustration only, show the action of EcoRI on a DNA Polynucleotide.

[3 Marks]

Question 46.

Explain the development of male gametophyte in an angiosperm.

[2.5 Marks]

Section E

Question 47. Stability, as one of the properties of genetic material, was very evident in one of the very early experiments in genetics. Name the scientist and describe his experiment. State the conclusion he arrived at.

[5 Marks]

Question 48. A tall pea plant bearing violet flowers with unknown genotype is given. Find the genotype by working out different crosses only by selfing the plants. Write the genotypic and phenotypic ratios of each cross shown by you.

[5 Marks]