

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)



Time Allowed: 3 Hours

Maximum Marks: 70

General Instructions

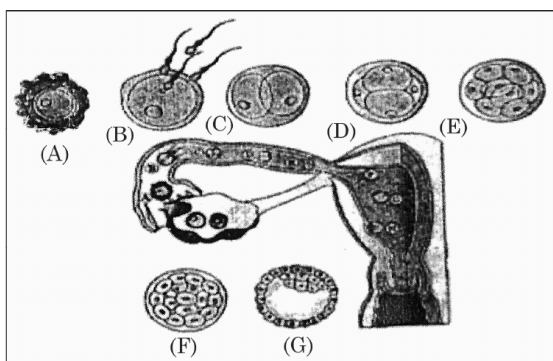
- (i) This question paper contains **33 questions**. All questions are compulsory.
- (ii) Section A: Questions 1 to 16 carry 1 mark each.
- (iii) Section B: Questions 17 to 21 carry 2 marks each.
- (iv) Section C: Questions 22 to 28 carry 3 marks each.
- (v) Section D: Questions 29 to 30 carry 4 marks each.
- (vi) Section E: Questions 31 to 33 carry 5 marks each.
- (vii) Attempt one alternative where an internal choice is provided. Follow the instructions within each question.
- (viii) Draw neat, properly labelled diagrams wherever necessary.

Section A

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

- | | |
|-------------------------------------|---|
| (A) antipodal, zygote and endosperm | (B) zygote, nucellus and endosperm |
| (C) endosperm, nucellus and zygote | (D) antipodals, synergids and integuments |

2. Select the option that gives the correct identification of ovum, morula and blastocyst in a human female reproduction system as shown in the following diagram:



- | | |
|--|--|
| (A) Ovum - B, Morula - D, Blastocyst - F | (B) Ovum - A, Morula - B, Blastocyst - G |
| (C) Ovum - A, Morula - E, Blastocyst - G | (D) Ovum - B, Morula - D, Blastocyst - G |

3. Study the table given below:

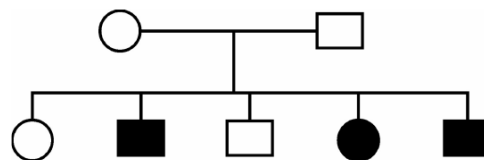
Contraceptive / Contraceptive Method	Mode of Action
--------------------------------------	----------------

- | | |
|---------------------|-------------------------------|
| 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.

- | | |
|----------------------------|----------------------------|
| (A) A-III, B-I, C-IV, D-II | (B) A-III, B-II, C-I, D-IV |
| (C) A-II, B-III, C-I, D-IV | (D) A-IV, B-III, C-II, D-I |

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

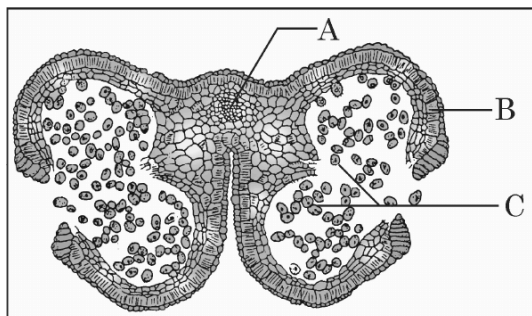


- | | |
|-------------------------|------------------------|
| (A) X-Linked recessive | (B) X-Linked dominant |
| (C) Autosomal recessive | (D) Autosomal dominant |

5. Which was the last of the 24 human chromosome to be completely sequenced?

- (A) Chromosome - 1 (B) Chromosome - 11
(C) Chromosome - 21 (D) Chromosome - X

6. Study the following diagram of Transverse Section of a young anther of an angiosperm:



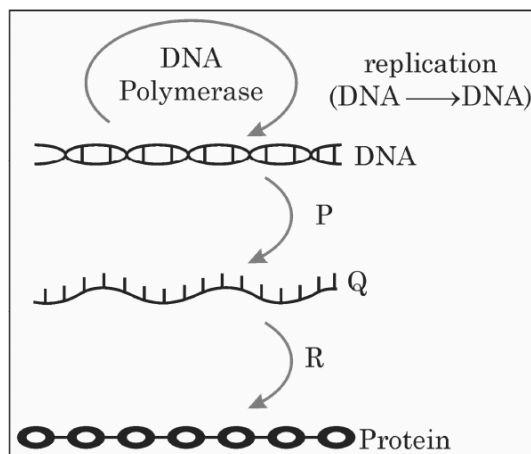
Select the option where parts 'A', 'B' and 'C' are correctly identified.

- (A) A - Connective, B - Endothecium, C - Pollen grain (B) A - Endothecium, B - Connective, C - Pollen grain
(C) A - Pollen grain, B - Connective, C - Endothecium (D) A - Endothecium, B - Pollen grain, C - Connective

7. Turner's syndrome in humans occurs due to:

- (A) Aneuploidy (B) Euploidy
(C) Polyploidy (D) Autosomal abnormality

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



- (A) P - Replication, Q - rRNA, R - Transcription (B) P - Translation, Q - mRNA, R - Transcription
(C) P - Replication, Q - mRNA, R - Translation (D) P - Transcription, Q - mRNA, R - Translation

9. Who proposed the mutation theory in favour of organic evolution?

- (A) Weisman (B) Louis Pasteur
(C) Darwin (D) Hugo de Vries

10. Study the following list of bioactive substances and their action:

Bioactive Substance Role

A. Statin - I. Removal of oil stains

B. Cyclosporin A - II. Removal of clots from blood vessels

C. Streptokinase - III. Lowering of blood cholesterol

D. Lipase - IV. Immuno-suppressive agent

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

(A) A-II, B-III, C-I, D-IV (B) A-III, B-IV, C-II, D-I

(C) A-IV, B-I, C-II, D-III (D) A-IV, B-II, C-I, D-III

11. The 'molecular scissors' fall in the category of:

(A) Cleaving enzyme (B) Endonuclease

(C) Exonuclease (D) Restriction enzymes

12. ELISA technique is based on the principle of:

(A) DNA replication (B) antigen-antibody interaction

(C) pathogen - antigen interaction (D) antigen - protein interaction

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.

(A) Both (A) and (R) are true and (R) is the correct explanation of (A). (B) Both (A) and (R) are true and (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):** Plasmids are autonomously replicating circular extra-chromosomal DNA.

Reason (R): Plasmids are usually present in Eukaryotic cells.

(A) Both (A) and (R) are true and (R) is the correct explanation of (A). (B) Both (A) and (R) are true and (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):** Patents are granted by government to an inventor.

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

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

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

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

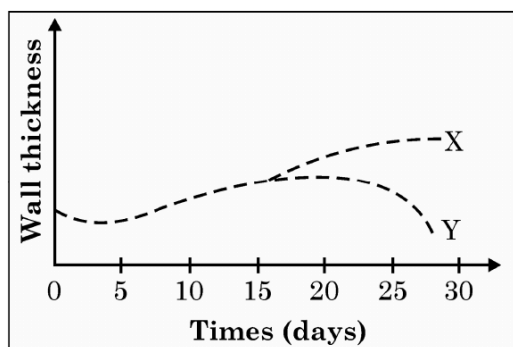
Reason (R): More energy is required by the organisms occupying higher trophic levels.

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

17. 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.

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

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

19. (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.

20(a). Differentiate between grazing food chain and detritus food chain.

OR

20(b). Explain Brood parasitism with the help of a suitable example.

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.

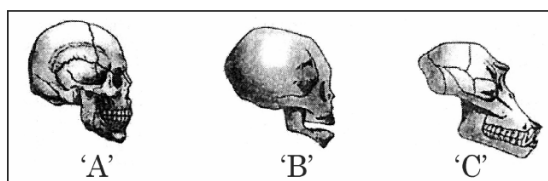
Section C

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).

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).

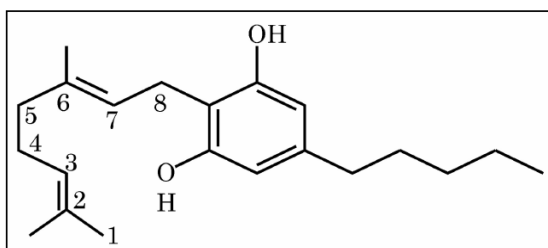
(b) State the basis of 'ABO' blood grouping in humans.

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



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

25(a). (i) Name the group of drugs whose skeletal molecule is shown below:



(ii) How are such drugs consumed?

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

OR

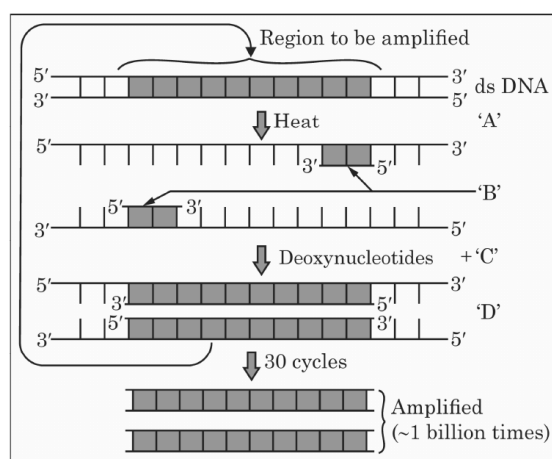
25(b). Draw a schematic diagram of an antibody molecule and label any 4 parts. Mention their chemical nature. Name the cells which produce them.

26. Explain the role of the following during the sewage treatment:

(a) flocs

(b) anaerobic sludge digester

27. 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.

28. Explain the role of transgenic animals in:

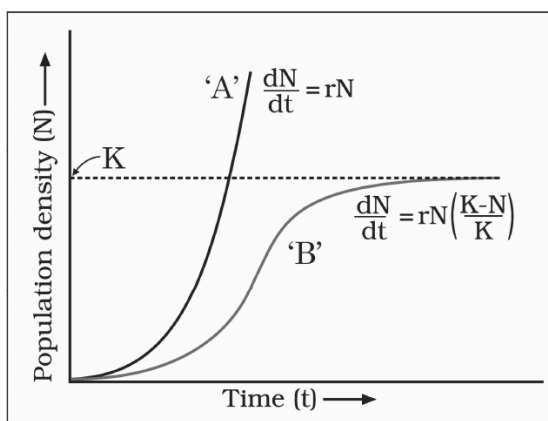
(a) Production of Biological products

(b) Studying diseases

(c) Chemical safety testing

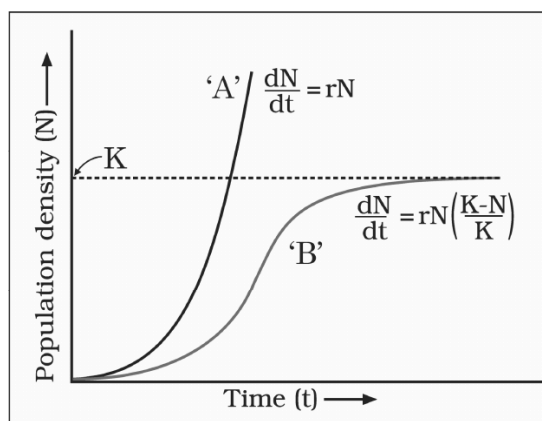
Section D

29(a). 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:
Identify the growth curves 'A' and 'B'.

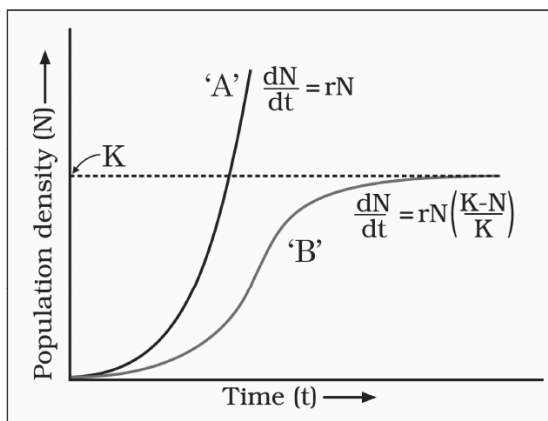
29(b). Populations evolve to maximise their reproductive fitness in the habitat in which they live. Ecologists suggest, the life history of organisms have evolved in relations to the constraints imposed by the biotic and abiotic components of the habitat in which they live. This gets reflected in the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



Study the population growth curves shown in the given graph and answer the questions that follow:
Mention what does the dotted line in the graph indicate and state its importance also.

OR

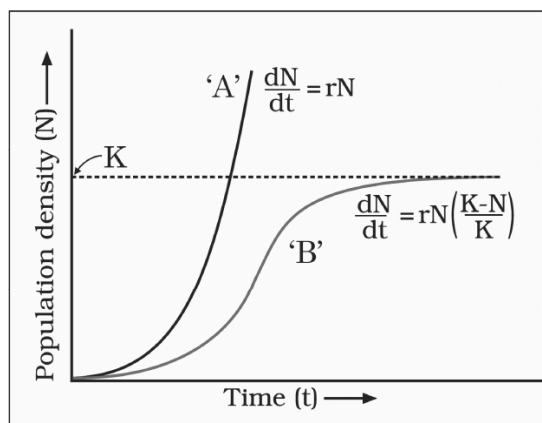
29(b). Populations evolve to maximise their reproductive fitness in the habitat in which they live. Ecologists suggest, the life history of organisms have evolved in relations to the constraints imposed by the biotic and abiotic components of the habitat in which they live. This gets reflected in the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



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

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

29(c). 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:

(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?

30(a). 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.

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.

30(b). 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.

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.

30(c). 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.

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

OR

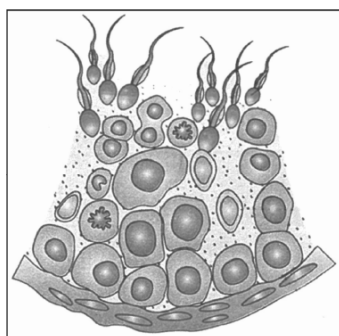
30(c). Read the following passage:

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.

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

Section E

31(a). The given diagram shows the sectional view of a seminiferous tubule of Human testis:

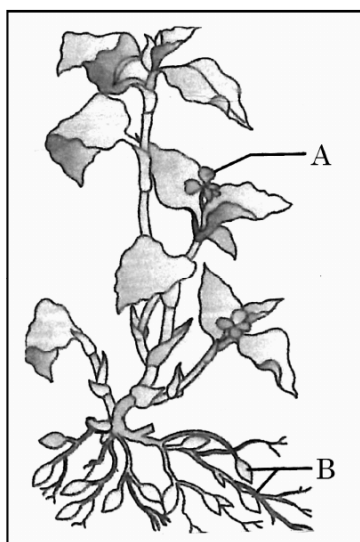


(i) Name and describe the process depicted in the diagram which results in the development of spermatozoa.

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

OR

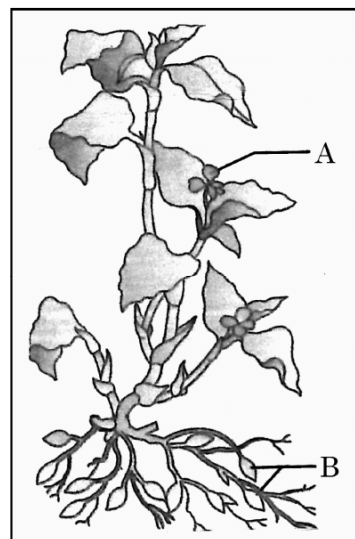
31(b)(i). Observe the picture of Commelina plant bearing two types of flowers given above.



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

OR

31(b)(ii). Observe the picture of Commelina plant bearing two types of flowers given above.

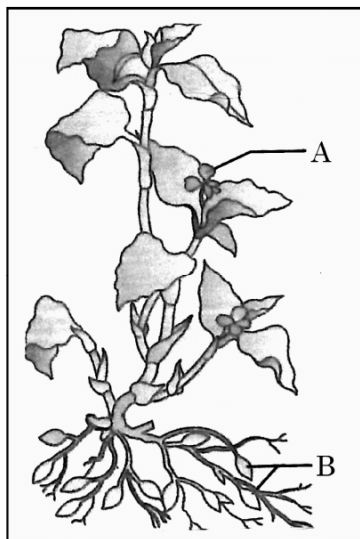


Compare the two types of flowers with reference to:

- (1) Characteristic feature
- (2) modes of pollination

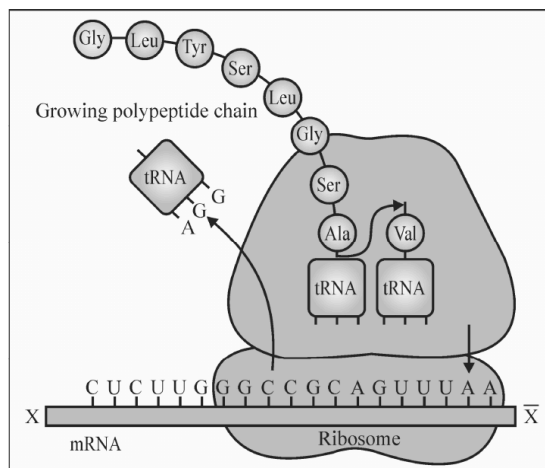
OR

31(b)(iii). Observe the picture of Commelina plant bearing two types of flowers given above.



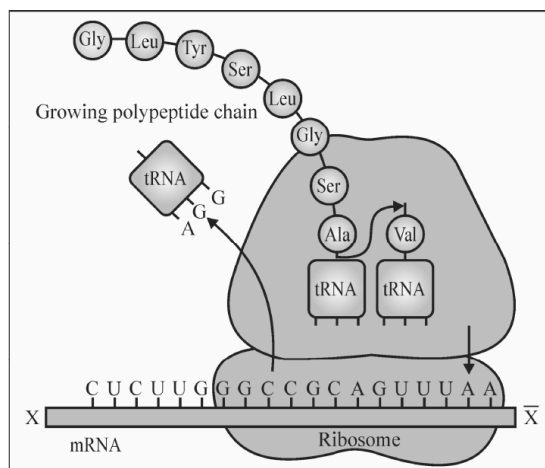
List any two 'out breeding devices' in flowering plants. Explain why do plants develop such devices.

32(a)(i). Study the schematic diagram given below and answer the questions that follow:



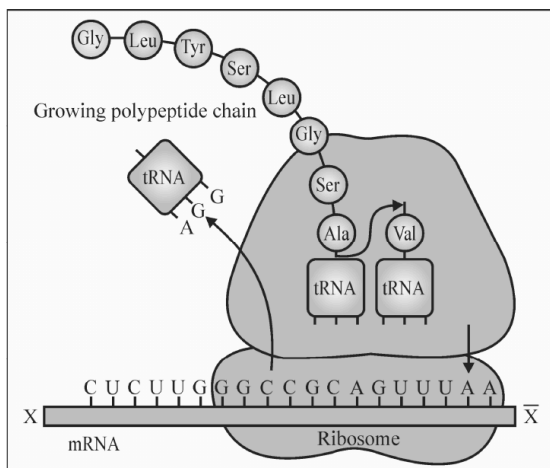
Identify the polarity from 'X' to 'X' in the mRNA segment shown. Mention how many more amino acids can be added to the polypeptide that is being translated and why.

32(a)(ii). Study the schematic diagram given below and answer the questions that follow:



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

32(a)(iii). Study the schematic diagram given below and answer the questions that follow:



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

OR

32(b)(i). Why is sickle-cell anaemia, a human blood disorder so named?

OR

32(b)(ii). Explain the genetic basis that results in the expression of this disorder.

OR

32(b)(iii). Work out a cross to explain how normal parents may have a sickle-cell anaemic child.

33(a). Describe the life cycle of HIV from the time of its entry into the human body till full blown AIDS sets in.

OR

33(b)(i). Write the symptoms of malaria in human and explain what causes these symptoms.

OR

33(b)(ii). 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.

- End of Question Paper -