

CBSE Class 12 Biology 2025 - Set 57-S-3 - Compartment



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) The paper is divided into five sections: A, B, C, D and E.
- (iii) Section A: Questions 1-16 are multiple choice questions carrying 1 mark each.
- (iv) Section B: Questions 17-21 are very short answer questions carrying 2 marks each.
- (v) Section C: Questions 22-28 are short answer questions carrying 3 marks each.
- (vi) Section D: Questions 29 and 30 are case-based questions carrying 4 marks each, with internal choice in one subpart.
- (vii) Section E: Questions 31-33 are long answer questions carrying 5 marks each.
- (viii) There is no overall choice. Internal choices are provided in Sections B, D and E. Attempt only one alternative in such questions.
- (ix) There is a separate question paper for Visually Impaired candidates.
- (x) Draw neat and properly labelled diagrams wherever necessary.

Section A

1. The wings of a bird and the wings of an insect are :

- | | |
|--|---|
| (A) Homologous structures and represent convergent evolution | (B) Homologous structures and represent divergent evolution |
| (C) Analogous structures and represent convergent evolution | (D) Phylogenetic structures and represent divergent evolution |

2. What would be the genotype of parents if the F_1 offspring have the phenotypes in 1 : 1 proportion ?

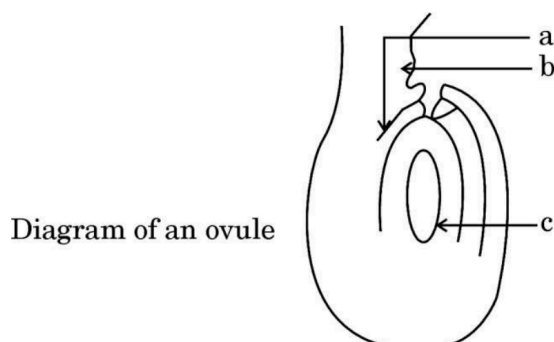
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|--------------------|--------------------|
| (A) $Aa \times Aa$ | (B) $AA \times AA$ |
| (C) $Aa \times AA$ | (D) $Aa \times aa$ |

3. With respect to insulin, choose the correct option :

- (i) C-peptide is not present in mature insulin.
 (ii) The insulin produced by rDNA technology has C-peptide.
 (iii) The pro-insulin has C-peptide.
 (iv) A-peptide and B-peptide of insulin are interconnected by disulphide bridges.

- | | |
|-------------------------|------------------------------|
| (A) (i) and (iv) only | (B) (ii) and (iv) only |
| (C) (ii) and (iii) only | (D) (i), (iii) and (iv) only |

4. Identify the various parts, 'a', 'b' and 'c', in the given diagram of ovule :



- | | |
|--|---|
| (A) a – Embryo sac, b – Inner integuments, c – Outer integuments | (B) a – Inner integuments, b – Nucellus, c – Chalazal end |
| (C) a – Hilum, b – Funicle, c – Embryo sac | (D) a – Micropylar end, b – Hilum, c – Inner integuments |

5. Which of the following animals exhibit male heterogamety ?

- (i) Fruit fly (ii) Fowl (iii) Human (iv) Honey bee
- | | |
|--------------------|-------------------|
| (A) (i) and (iii) | (B) (ii) and (iv) |
| (C) (ii) and (iii) | (D) (i) and (iv) |

6. Given below is Column A with a list of certain Assisted Reproductive Technologies (ART), and Column B, with the procedures followed during ART :

Column A (ART)	Column B (Procedures)
a. GIFT	i. Transfer of ovum from a donor into the fallopian tube of another female
b. ICSI	ii. Transfer of semen from the donor into the vagina of female
c. ZIFT	iii. Injecting sperms directly into the ovum
d. IUI	iv. Transfer of early embryos into the fallopian tube

Select the correct match :

- | | |
|----------------------------|----------------------------|
| (A) a-i, b-ii, c-iii, d-iv | (B) a-iv, b-i, c-ii, d-iii |
| (C) a-iv, b-iii, c-i, d-ii | (D) a-i, b-iii, c-iv, d-ii |

7. Match the terms in Column-I with their description in Column-II and choose the correct option :

Column-I	Column-II
a. Dominance	i. Many genes govern a single character.
b. Codominance	ii. In heterozygous organism, only one allele expresses itself.
c. Pleiotropy	iii. In heterozygous organism, both alleles express fully.
d. Polygenic inheritance	iv. A single gene influences many characters.

- (A) a-ii, b-iii, c-iv, d-i (B) a-iv, b-i, c-ii, d-iii
(C) a-iv, b-iii, c-i, d-ii (D) a-ii, b-i, c-iv, d-iii

8. DNA profiles of the child and three individuals 1, 2 and 3 who claim to be the parents of the child are given below. Select the option that shows the correct profile of the actual parent/parents of a child.

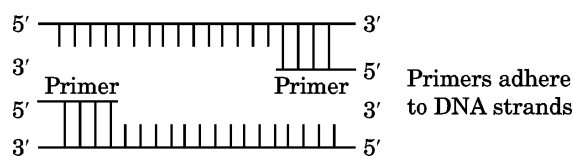
Child X	Individual 1	Individual 2	Individual 3

- (A) Individuals 1 and 3 (B) Individuals 1 and 2
(C) Individuals 2 and 3 (D) Individual 1 is the only parent of the child amongst 1, 2 and 3

9. Diseases like pneumonia and common cold are caused by pathogens. Choose the option that correctly indicates the difference between Pneumonia and Common cold :

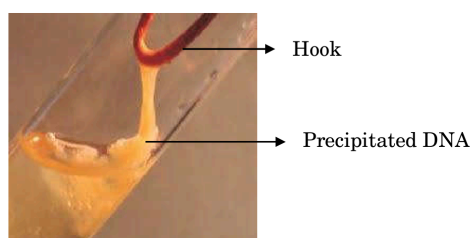
- (A) Pneumonia is a communicable disease, whereas Common cold is a non-communicable disease. (B) Pneumonia is caused by a virus, while the Common cold is caused by bacteria.
(C) Pneumonia pathogen infects alveoli of the lungs, whereas Common cold affects nose and respiratory passage but not the lungs. (D) Pneumonia cannot be prevented by vaccine, whereas Common cold can be prevented by vaccine.

10. What is the process of binding a primer to the denatured strand called ?



- (A) Denaturation (B) Annealing
(C) Renaturation (D) Polymerisation

11. Identify the material that helps in the precipitation of purified DNA during the process of isolation of DNA as shown in the given diagram.



- (A) Protease (B) Lysozyme
(C) Cellulase (D) Chilled ethanol

12. Foetal ejection reflex in human female is induced by :

- | | |
|--|---|
| (A) differentiation of mammary gland | (B) pressure exerted by amniotic fluid |
| (C) release of oxytocin from pituitary gland | (D) fully developed foetus and placenta |

13. Assertion (A) : Western Ghats are included among the hot spots of biodiversity.

Reason (R) : Western Ghats have greater amphibian diversity than Eastern Ghats.

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

14. Assertion (A) : DNA chemically is less reactive and structurally more stable when compared to RNA.

Reason (R) : DNA has 2'–OH group present at every nucleotide, which makes it more stable than RNA.

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

15. Assertion (A) : In bioreactors, raw materials are biologically converted into desired products.

Reason (R) : In bioreactors, optimum growth conditions for microbes such as temperature, pH, substrate, salts, etc. are available.

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

16. Assertion (A) : All the events starting from pollen landing on stigma till pollen tube entering the ovule are included in pollen-pistil interaction.

Reason (R) : Pollen-pistil interaction ensures that only suitable pollens germinate on the stigma.

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

Section B

17. Differentiate between Follicular phase and Luteal phase of the menstrual cycle in human females on the basis of following criteria :

- (a) Days of their occurrence in the cycle
- (b) Hormones influencing the phases

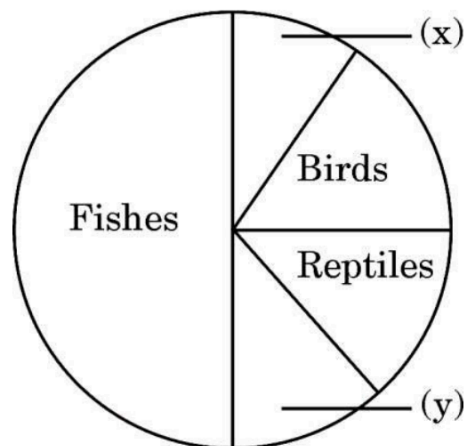
18(a)(i). Draw a pyramid of numbers where a large number of insects are feeding on the leaves of a tree. What is the shape of this pyramid ?

18(a)(ii). Will the pyramid of energy also be of the same shape in this situation ? Give reason for your response.

OR

18(b)(i). What could be the reason for the fast rate of decomposition in the tropics ?

18(b)(ii). Identify 'x' and 'y' in the figure given below representing proportionate number of major vertebrate taxa.



19(a). How many meiotic divisions will a wheat plant undergo in order to produce 100 zygotes /100 grains ? Calculate and give explanation.

OR

19(b). How many pollen grains and ovules are likely to be formed in the anther and the ovary of an angiosperm bearing 35 microspore mother cells and 35 megaspore mother cells respectively ?

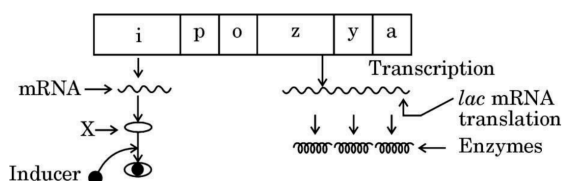
20(a). A couple believed that hospital authorities have exchanged babies and they have been given another baby by them. The wife is blood group 'A', her husband is blood group 'B' and the child is blood group 'O'.

(i) Could the baby be theirs ?

(ii) Justify your answer with the help of a cross.

OR

20(b)(i). Observe the diagram given below and answer the following questions.



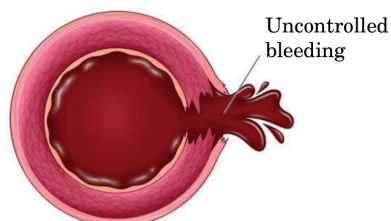
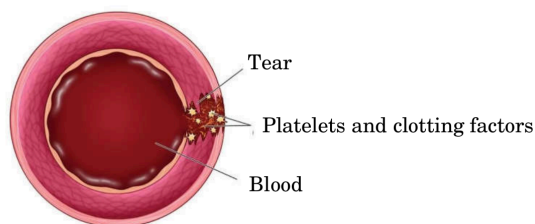
Name the molecule 'X' synthesized by 'i' gene.

20(b)(ii). Which one of the structural genes codes for β -galactosidase ?

20(b)(iii). When will the transcription of this gene stop ?

21. (a) Name the sex-linked genetic disorder shown in the diagram given below :

Normal Blood vessel



(b) Is it a recessive or a dominant disorder ?

(c) Why do only human males generally suffer from this disease ?

Section C

22. A group of youth were having a 'party' in an isolated area and were raided by police. Packets of 'smack' and syringes with needles were found littered around.

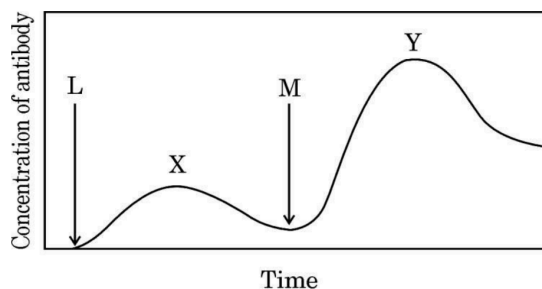
- (a) Why is taking 'smack' considered an abuse ?
- (b) Write the chemical name of 'smack' and the name of its source plant.
- (c) Syringes and needles used by the youth for taking the drug could prove to be very fatal. Why ?

23. A vector is genetically engineered with three features which facilitate gene-cloning within the host cell. List the three features and explain each one of them.

24. A woman has certain queries as listed below, before starting with contraceptive pills. Answer them.

- (a) What do contraceptive pills contain ? Why are they considered as contraceptives ?
- (b) What schedule should be followed for taking these pills ?

25. The graph given below indicates the administration of the first (L) and second dose (M) of a vaccine. The corresponding response of the body is indicated by X and Y. Interpret the graph and explain the reason for such a response shown by the body.



26. Draw a labelled schematic sketch of replication fork of DNA. Explain the role of any two enzymes involved in DNA replication.

27. (a) Why do Lepidopterans die when they feed on Bt cotton plant ? Explain how does it happen.

(b) Write two important applications of tissue culture in Agriculture.

28. (a) How does the Mediterranean orchid 'Ophrys' ensure its pollination by bees without offering any floral rewards ?

(b) Name the type of interaction seen in each of the following examples :

(i) *Ascaris* worms living in the intestine of humans.

(ii) Clown fish living amongst the tentacles of sea anemone.

Section D

29(a). Read the following passage and answer the questions that follow.

The chromosome number is fixed for all normal organisms leading to species specification, whereas any abnormality in the chromosome number of an organism results into abnormal individuals. Sometimes an error may occur during meiosis of cell cycle, where the sister chromatids fail to segregate, called non-disjunction, leading to the production of abnormal gametes with altered chromosome number. On fertilization, such gametes develop into abnormal individuals.

State what is aneuploidy.

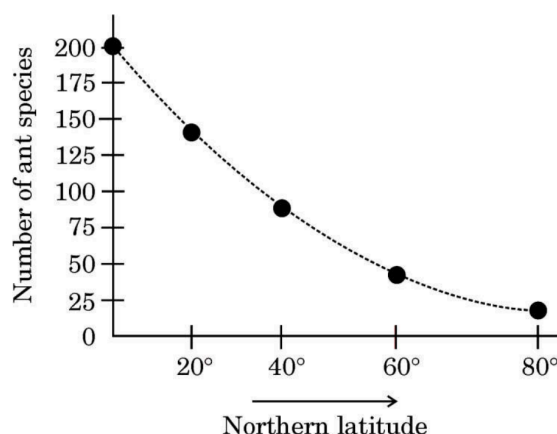
29(b). A normal human sperm ($22 + Y$) fertilizes an ovum with karyotype ($22 + XX$). Name the disorder of the offspring thus produced and write any two symptoms of the disorder.

29(c)(i). What is meant by trisomy? Mention the chromosome number that shows trisomy in Down's syndrome.

OR

29(c)(ii). Write any two symptoms of Down's syndrome.

30(a). Biodiversity shows latitudinal and altitudinal gradients. There is little biodiversity at poles. It increases in temperate areas but reaches the maximum in tropics (latitudinal range of 23.5° N to 23.5° S). It is because the tropical rainforests have favourable environmental conditions not only for speciation, but also for supporting both variety and number of organisms. Harsh conditions exist in temperate areas during the cold season only. Number of vascular species is $118 - 236/0.1 \text{ ha}$ in tropical forests and $21 - 48 \text{ species}/0.1 \text{ ha}$ in temperate forests. Their number would be $0.0 - 10.0 \text{ species}/0.1 \text{ ha}$ in arctic regions. Such a correlation occurs also in case of other taxonomic groups like ants, butterflies, birds, etc.



Based on the above information and graph, answer the following questions :

What does the graph depict?

30(b). With the help of graph, show the species-area relationship for a wide variety of taxa in a forest. Write an equation that shows this relationship on a logarithm scale.

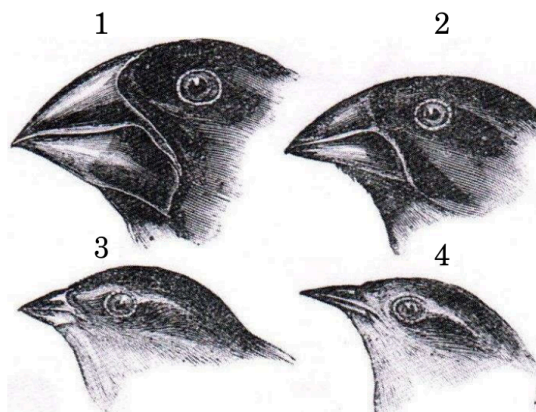
30(c)(i). Explain the correlation between latitudinal gradient and number of plant species.

OR

30(c)(ii). Tropics are considered to be more stable where species continue to flourish and evolve undisturbed for millions of years. Give any two reasons.

Section E

31(a). Study the diagram given below showing the variety of beaks of finches in Galapagos Islands and answer the questions that follow.

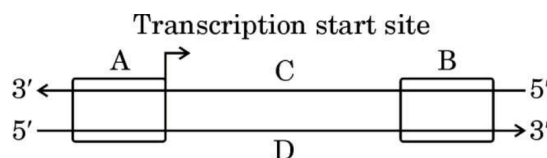


(i) Explain the interpretation of Charles Darwin when he observed a variety of small black birds on Galapagos Islands.

(ii) State Hardy-Weinberg principle of equilibrium. Explain any two factors affecting the equilibrium.

OR

31(b). Study the schematic structure of a transcription unit given below and answer the questions that follow.

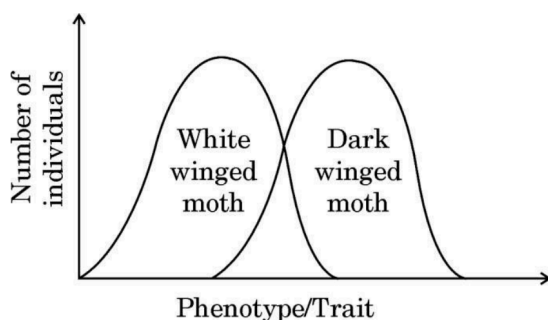


(i) Identify strand 'C' and 'D' in the diagram of transcription unit given above and write the basis on which you identify them.

(ii) Why can both the strands of DNA not be copied during transcription ? Explain.

(iii) Write the function of RNA polymerase in Eukaryotes.

32(a).



(i) Natural selection operates in different ways in nature.

(I) In England after industrialisation, the population of dark winged moths were more favoured than white winged moths. Explain.

(II) Identify the type of natural selection depicted in the graph above.

(ii) State Hugo de Vries' theory of mutation. How is it different from Darwin's theory of natural selection ?

OR

32(b). (i) (I) Why did Hershey and Chase use ^{35}S and ^{32}P in their experiments ? Explain.

(II) Write the conclusion they reached at the end of the experiment.

(ii) Draw a clover leaf-like structure of tRNA showing the following :

(I) Tyrosine attached to the amino acid site.

(II) Anticodon for this amino acid in its correct site (codon for tyrosine is UAC).

33(a). (i) Draw a diagram of an enlarged view of transverse section (T.S.) of one microsporangium of an angiosperm and label the following parts :

(I) Tapetum

(II) Middle layers

(III) Endothecium

(IV) Microspore mother cell

(ii) Write the function of Tapetum.

(iii) Explain the following giving reasons :

(I) Pollen grains are well-preserved as fossils.

(II) Pollen tablets are in use by people these days.

OR

33(b)(i). Where does spermatogenesis occur in human testes ? Describe the process of spermatogenesis up to the formation of spermatozoa.

33(b)(ii). Trace the path of movement of spermatozoa from the testes upto the ejaculatory duct.

- End of Question Paper -