BUDHA DAL PUBLIC SCHOOL, PATIALA
First Term Examination (18 September 2025)
Class XII (Science)
Subject – Biology(044)(Set - A)

Time: 3hrs. **M.M. 70**

General Instructions:

(i) **All questions are compulsory.**

(ii) **The question paper has five sections and 33 questions. All questions are compulsory**

(iii) **Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.**

(iv) **There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions**

(v) **Wherever necessary, neat and properly labelled diagrams should be drawn.**

Section - A

Q1. Choose the option that gives the correct number of pollen grains that will be formed after 325 microspore mother cells undergo microsporogenesis

a) 325 b) 650 c) 1300 d) 975

Q2. Some events of pregnancy in humans are written below in a sequence

i) complete development of foetus ii) uterine contraction

iii) diliation of cervix iv) delivery of the baby v) lactation

Between which of the following events does the shedding of the placenta happen?

a) (i) and (ii) b) (ii) and (iii) c) (iii) and (iv) d) (iv) and (v)

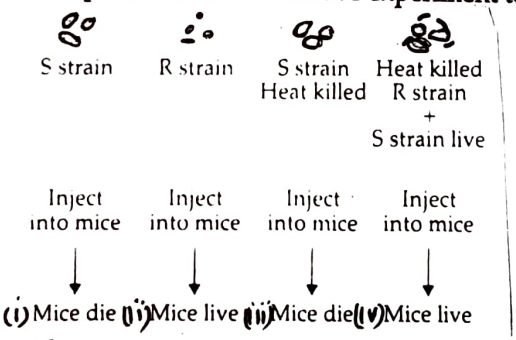
Q3. An IUD that is recommended to suppress sperm motility and the fertilising capacity of sperm is

a) Lippe's loop b) LNG - 20 c) Progestasert d) Multiload 375

Q4. If both the parents are carriers for thalassaemia, the chances of an afflicted child being to them are

a) 25% b) 50% c) 75% d) 100%

Q5. Study the given diagrammatic representation of Griffith's experiment to demonstrate transformation in bacteria



Select the option that incorrectly represents the experiment

a) (i) and (iii) b) (ii) and (iii) c) (iii) and (iv) d) (ii) and (iv)

Q6. A DNA molecule is 160 base pairs long. If it has 20% adenine, how many cytosine bases are present in this DNA molecule?

a) 48 b) 64 c) 96 d) 192

Q7. Homologous organs indicate

a) Convergent evolution b) Divergent evolution

c) Adaptive radiation d) Natural selection

Q8. The source of 'Smack' is :

a) Leaves of Cannabis sativa b) flowers of Datura

c) fruits of Erythroxylum coca d) latex of Papaversomniferum

Q9. Which of the following is not found in a female gametophyte of an angiosperm?

a) Germ pore b) Synergids c) Filiform apparatus d) Central cell

Q10. Which of the following sets consists of the parts of the external genitalia in a human female?
a) Labia minora, labia majora and vagina
b) Labia minora, labia majora and clitoris
c) Labia minora, labia majora and cervix
d) Labia minora, labia majora and oviduct

Q11. An example of human trait, where a single gene can exhibit multiple phenotypic expressions, is
a) phenylketonuria b) cystic fibrosis c) thalassemia d) haemophilia

Q12. A template strand in a bacterial DNA has the given base sequence : 5′ - AGGTTTAACG - 3′.
What would be the RNA sequence transcribed from this template strand? (e) none of these
a) 5′ - CGUUAAACCU - 3′ b) 5′ - TCCAAATTGC - 3′
c) 5′ - AGGUUUUUCG - 3′ d) 5′ - AGGTTTAACG - 3′

Two statements are given - one labelled Assertion (A) and the other labeleld Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:
a) Both assertion and reason are true, and the reason is correct explanation of the assertion.
b) Both assertion and reason are true, and the reason is not the correct explanation of the assertion.
c) Assertion is true but reason is false.
d) Assertion is false but Reason is true.

Q13. **Assertion** :Cervical caps and vaults are barrier methods or contraception used by human females.
Reason :They prevent conception by phagocytosis of sperms.

Q14. **Assertion** : The scientific theory of evolution by natural selection was given by Charles Darwin and A.R. Wallace.
Reason : Evolution refers to the changes in a population or species through time.

Q15. **Assertion** : Smoking can raise blood pressure and increase heart rate.
Reason : Nicotine stimulates adrenal glands to release adrenaline and noradrenaline into the blood circulation, both of which raise blood pressure and increase heart rate.

Q16. **Assertion** :In the process of transcription, template strand with polarity 3′ – 5′ plays a major role.
Reason :DNA-dependent RNA polymerase catalyses the polymerization in only one direction, that is, 5′ – 3′.

Section - B

Q17. Emasculation is the process of removal of anthers from a flower and is practiced in artificial hybridization techniques.
a) Mention ONE case where emasculation is compulsory and ONE where it is not required during such hybridization processes.
b) Why is bagging a compulsory technique even when emasculation is not required.

Q18. Correct the following statements
a) Surgical methods of contraception prevent gamete formation.
b) Oral pills are very popular contraceptives among the rural women

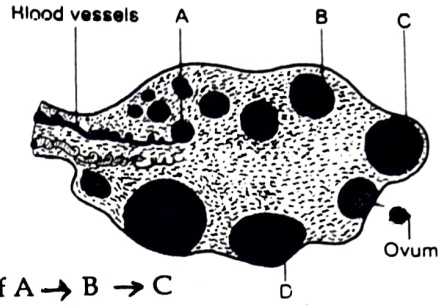
Q19. A colour blind father will not have a colour-blind son. State if the above statement is true and justify your answer if the mother is homozygous for the
a) Colour-blind trait b) Normal vision trait

Q20. A population of 100 individuals has a frequency of allele A of 0.3 and a frequency of allele a of 0.7. The frequency of the heterozygous genotype (Aa) is 0.49. Is this population in Hardy-Weinberg equilibrium? Justify.

Q21. Explain giving two reasons, how immune response by 'vaccine' is different from that by 'antitoxin' in humans.

Section - C

Q22. Study the transverse section of human ovary given below and answer the questions that follow:



a) Name the hormone that helps in the growth of A → B → C
b) Name the hormone secreted by A and B.
c) State the role of the hormone produced by D.

Q23. As part of assisted reproductive technologies (ART).

a) What is the destination for blastomeres with a count of less than 8 cells and more than 8 cells?
b) What could be the reason behind transferring to the destinations identified in (a)?
c) What techniques are used to transfer the blastomeres to the destinations identified in (a)?

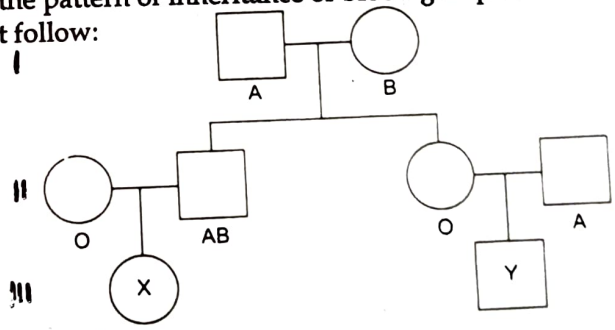
Q24. For a layman, both apple and banana are fruits. But a biology student categorises fruits as true fruits, false fruits and parthenocarpic fruits. Justify.

Q25. a) ABO blood group in human is an example of multiple allelism and Co-dominance. Justify.

b) A couple who has blood groups A and B have four children. Each child has a different blood group. Explain with the help of crosses to show how this is possible.

OR

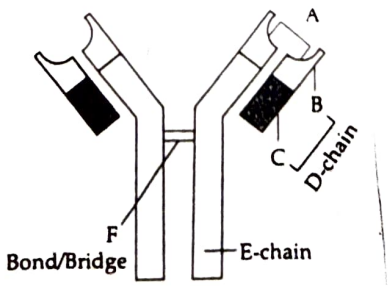
Study the given pedigree chart showing the pattern of inheritance of blood group character in a family and answer the questions that follow:



a) Give the genotypes of the parents in generation I.
b) Write the possible genotypes and phenotypes of the individuals X and Y in generation III. Justify your answer.

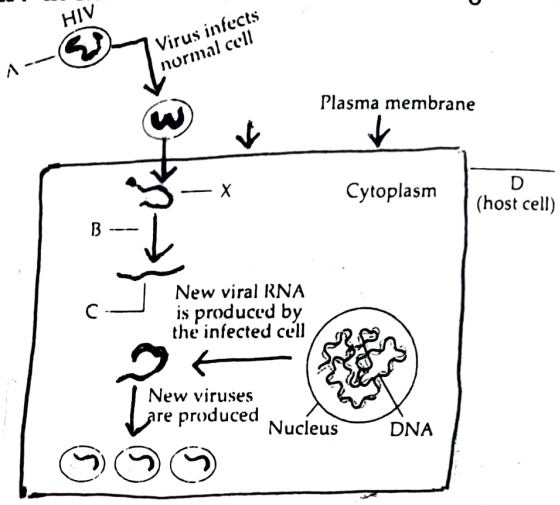
Q26. a) Why did Hershey and Chase use '^{35}S' and '^{32}P' in their experiment? Explain.
b) State the importance of (1) blending and (2) centrifugation in their experiment.
c) Write the conclusion they arrived at the end of their experiment.

Q27. a) Identify A, D, E, and F in the diagram of an antibody molecule given below:



b) During a field trip, one of your friends in the group suddenly became unwell. She started sneezing and had trouble breathing.
Name and explain the term associated with such sudden responses.

Q28. a) Study the diagram showing replication of HIV in humans and answer the following questions accordingly.

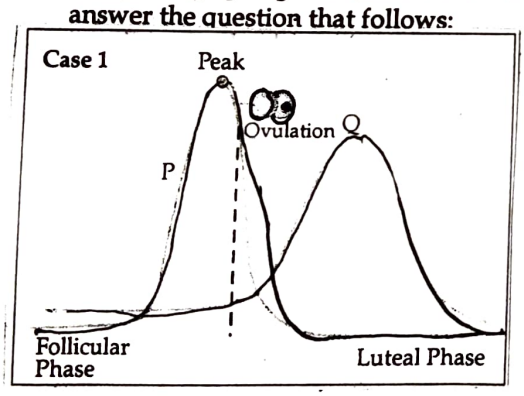


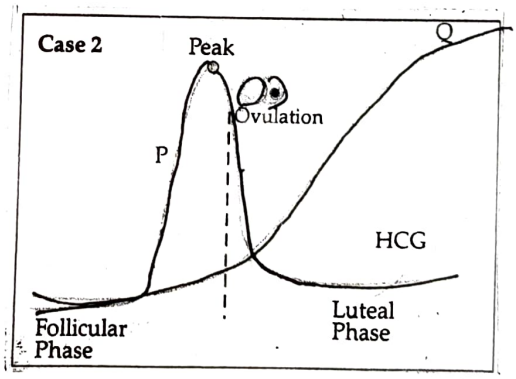
i) Write the chemical nature of the coat 'A'.
ii) Name the enzyme 'B' acting on 'X' to produce molecule 'C'. Name 'C'.
iii) Mention the name of the host cell 'D' the HIV attacks first when it enters into the human body.
iv) Name the two different cells the new viruses 'E' subsequently attack.

b) Name the immune response that is responsible for the rejection of tissues/organs in the patient's body post transplantation.

Section - D

Q29. Study the graphs given below for Case 1 and Case 2 showing levels of certain hormones and answer the question that follows:





a) Which hormone is responsible for the peak observed in Case 1 and Case 2 ? Write one function of that hormone.
b) Write changes that take place in the ovary and uterus during follicular phase.
c) Name the hormone Q of Case 2. Write one function of hormone Q.

OR

d) Which structure in the ovary will remain functional in Case 2 ? How is it formed?

Q30. Gene expresses itself in a cell system as a protein/enzyme. How does an expression of gene occur in a cell system and when does it need to occur and how the gene expression is regulated in a prokaryote cell system by the combined efforts of Jacque Monod, the biochemist and Francois Jacob, the geneticist. For their work on lactose metabolism in E-coli, and introducing the concept of 'lac operon', they were awarded Nobel Prize in 1965.

A-4

Answer the following questions:

a) Why is lac operon said to be a transcriptionally regulated system?
b) It is said that 'lac operon has to be operational at a very low level in the bacterial cell all the time'. Justify
c) Why is the regulator gene in lac operon marked as (i) gene?

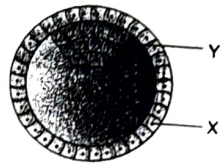
OR

c) Draw a schematic diagram of the lac operon in the presence of inducer in the culture medium of the bacteria.

Section - E

Q31. i) The diagram given below shows a developmental stage of human embryo. Answer the following questions reference to it:

a) Identify and name the human embryonic stage shown.
b) Mention its exact location in the normal pregnancy of a woman.
c) Write one function of each of the two parts labelled 'X' and 'Y'.



ii) Explain the process of hormonal regulation of spermatogenesis.

OR

a) Describe the process of megasporogenesis in an angiosperm.
b) Draw a diagram of a mature embryo sac of angiosperm, label its any six parts.

Q32. a) You are asked to find the genotypes of a tall pea plant growing in your school garden. Name the cross and explain how would you confirm the genotypes.
b) Differentiate between aneuploidy and polyploidy.

OR

Explain the process of transcription in prokaryotes. How is it different from transcription in eukaryotes?

Q33. Consider a hypothetical situation:
A species of butterflies exhibit a range of wing colours Butterflies with extremely bright wing colours attract predators easily as compared to the ones with very dull wing colors. Butterflies with very dull wing colour fails to attract males as compared to the ones with bright wing colours. Butterflies with intermediate wing colours have the best chance of both avoiding predators and finding mates.

a) Which type of natural selection does this phenomenon exemplify? Justify your answer.
b) A few years later, the rise in industries and pollution, causes the habitat to become darker. How would it affect the survival of the different kinds of butterflies belonging to this species? Which type of natural selection does this phenomenon exemplify?
c) In a specific region where this species is prevalent, a mutation in its population leads to butterflies with a shade of wing colours brighter than the existing shades. How would the long-term survivability of this variant be?

OR

a) Explain the process of amino acylation of tRNA and its role in the process of translation.
b) How does initiation of the translation process occur in prokaryotes? Explain.
c) State the functions of Ribozyme and Release factor in protein synthesis, respectively.

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(iv) **There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions**

(v) **Wherever necessary, neat and properly labelled diagrams should be drawn.**

Section - A

Q1. To produce 400 seeds, the number of meiotic divisions required will be
a) 400 b) 200 c) 500 d) 800

Q2. Which of the following options correctly matches the name of the hormone to its site of production in the human body?

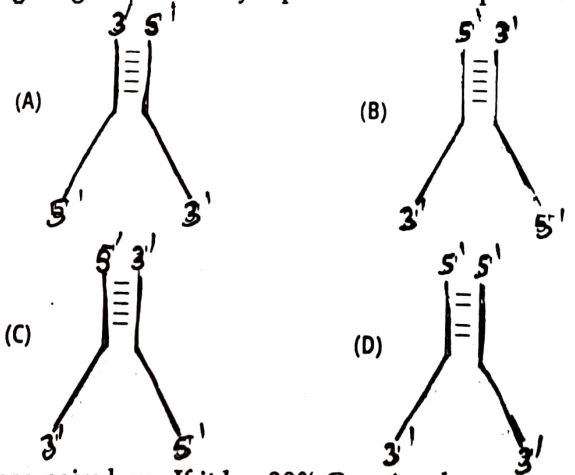
Name of the Hormone	Site of Production
(P) Oxytocin	(i) Placenta
(Q) Relaxin	(ii) Corpus Luteum
(R) hCG	(iii) Pituitary Gland
(S) Progesterone	(iv) Ovaries

a) P-(i), Q-(iii), R-(ii), S-(iv) b) P-(i), Q-(iv), R-(iii), S-(ii)
c) P-(iii), Q-(iv), R-(i), S-(ii) d) P-(ii), Q-(iii), R-(i), S-(iv)

Q3. Intense lactation in mothers acts as a natural contraceptive due to
a) Suppression of gonadotropins
b) Hypersecretion of gonadotropins
c) Suppression of gamete transport
d) Suppression of fertilisation

Q4. What is the MINIMUM possibility of a dominant trait being expressed in the offspring after a test cross?
a) 25% b) 50% c) 75% d) 100%

Q5. Which one of the following diagrams correctly represents DNA replication in eukaryotes?



Q6. A DNA molecule is 160 base pairs long. If it has 30% Guanine, how many adenine bases are present in this DNA molecule?
a) 48 b) 64 c) 96 d) 192

Q7. The process by which organisms with different evolutionary history evolve similar phenotypic adaptation in response to a common environmental challenge is called
a) Natural selection b) Convergent evolution
c) Non-random evolution d) Adaptive radiation

B-1

a) depressants b) pain killer c) euphoria provider d) stimulants

Q9. Filiform apparatus in the embryo sac of an angiosperm is present at the micropylar tip of
a) central cell b) egg cell c) synergids d) antipodals

Q10. Signals for parturition in human female originate from
a) Fully developed foetus only
b) Both placenta as well as fully developed foetus
c) Plancenta only
d) Oxytocin released from maternal pituitary

Q11. In which of the following processes would genetic variation occur?
(P)Mutation in liver cells (Q) Development of a zygote to an embryo
(R) Gene flow from one population to another
a) Only P b) Only Q c) Only P and Q d) Only P and R

Q12. If the sequence of nitrogen bases of the coding strand in a transcription unit is 5′ - ATGAATG - 3′, the sequence of bases in its RNA transcript would be:
a) 5′ - AUGAAUG - 3′ b) 5′ - UACUUAC - 3′ (e) none of these
c) 5′ - CAUUCAU - 3′ d) 5′ - GUAAGUA - 3′

Two statements are given - one labelled Assertion (A) and the other labeleld Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:
a) **Both assertion and reason are true, and the reason is correct explanation of the assertion.**
b) **Both assertion and reason are true, and the reason is not the correct explanation of the assertion.**
c) **Assertion is true but reason is false.**
d) **Assertion is false but Reason is true.**

Q13. **Assertion :** Determining the sex of an unborn child followed by MTP is an illegal practice.
Reason : Amniocentesis is a practice to test the presence of genetic disorders also.

Q14. **Assertion :** The number of white-winged moths decreased drastically after industrialization in England.
Reason : Effects of industrialization were more marked in rural areas of England.

Q15. **Assertion :** The colostrum provides passive immunity of the newborn baby.
Reason : In this, the ready-made antibodies are directly given to protect the body.

Q16. **Assertion :** Ribosomal RNA is synthesized in the nucleus of the cell.
Reason : It is translated with the enzyme RNA polymerase III.

Section - B

Q17. In angiosperms, the male gametophyte has a simple structure, while the female gametophyte has a much more complex structure with multiple supporting cells in it. How does such a structural difference help each gametophyte perform their functions better?

Q18. Correct the following statements
a) All sexually transmitted diseases are completely curable.
b) In E.T. techniques, embryos are always transferred into the uterus.

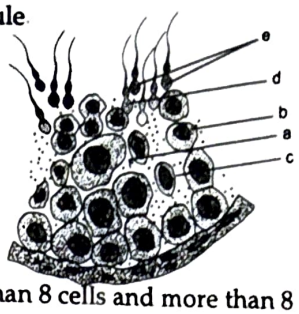
Q19. A colour blind father will not have a colour-blind son. State if the above statement is true and justify your answer if the mother is homozygous for the
a) Colour-blind trait b) Normal vision trait

Q20. a) Name one primary and one secondary lymphoid organ in the human body.
b) How do they differ in their functions?

Q21. A population of 100 individuals has a frequency of allele A of 0.3 and a frequency of allele a of 0.7. The frequency of the heterozygous genotype (Aa) is 0.49. Is this population in Hardy-Weinberg equilibrium? Justify.

Section - C

Q22. Given below is a diagrammatic sectional view of a sominiferous tubule

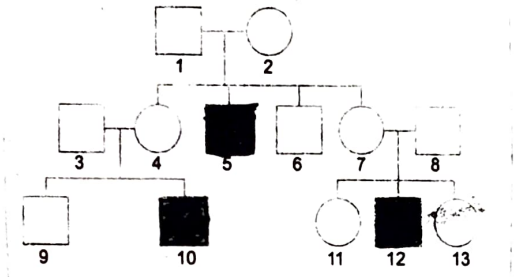


a) State the developmental process of
   i) 'b' from 'a'
   ii) 'e' from 'd'
   iii) 'd' from 'b'
b) Identify 'a', 'b' and 'c'

Q23. As part of assisted reproductive technologies (ART).
a) What is the destination for blastomeres with a count of less than 8 cells and more than 8 cells?
b) What could be the reason behind transferring to the destinations identified in (a)?
c) What techniques are used to transfer the blastomeres to the destinations identified in (a)?

Q24. Parthenocarpy and apomixes have been observed in some plants. Give an example of each. State a similarity and a difference observed between the two processes.

Q25. Haemophilia is a sex-linked recessive disease. Study the pedigree analysis given below showing the inheritance of the disease in a family and answer the questions that follow:



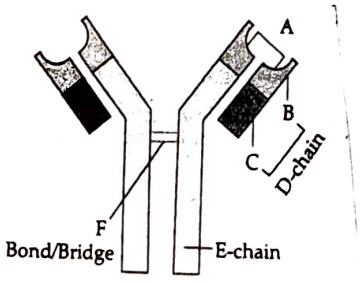
a) Give the evidence from the above analysis, which suggests that the disease is sex-linked and caused by a recessive allele.
b) Write the possible genotypes of the individuals 2, 4, 5 and 7

OR

Both Haemophilia and Thalassemia are blood related disorders in humans. Write their causes and the differences between the two. Name the category of the genetic disroders, they both come under.

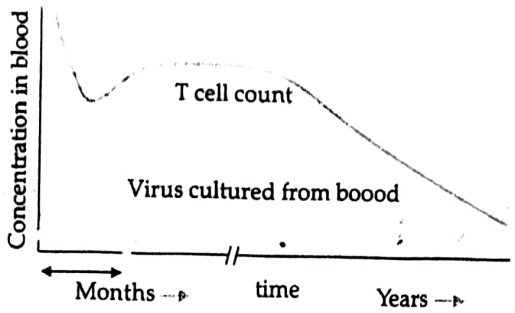
Q26.
a) Why did Hershey and Chase use '^{35}S' and '^{32}P' in their experiment? Explain.
b) State the importance of (1) blending and (2) centrifugation in their experiment.
c) Write the conclusion they arrived at the end of their experiment.

Q27.
a) Identify A, D, E, and F in the diagram of an antibody molecule given below:



b) During a field trip, one of your friends in the group suddenly became unwell. She started sneezing and had trouble breathing.
Name and explain the term associated with such sudden responses.

Q28. Given below is the relationship between the HIV levels in the blood and helper T cell count in a person detected with AIDS. Study the relationship and answer the questions that follows:



i) What kind of relationship is observed in the virus levels and the immune response after some days of the initial infection?

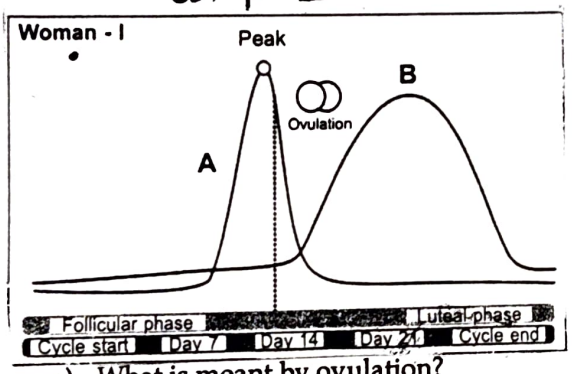
ii) Does it completely clear the virus from the body permanently? Give reason for your answer.

b) Principle of vaccination is based on the property of 'memory' of immune system. Give one example to justify this statement.

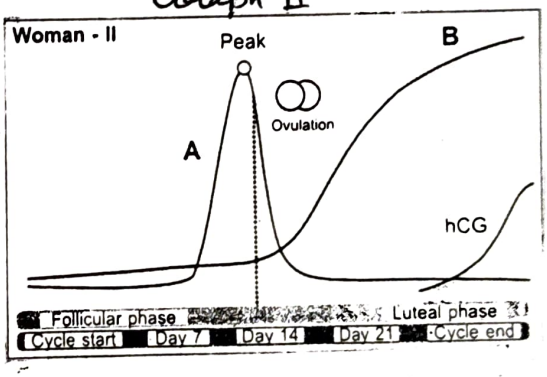
Section - D

Q29. Study the graphs given below for two women, I and II that show the different levels of certain hormones and answer the questions that follow:

Graph I



Graph II



a) What is meant by ovulation?

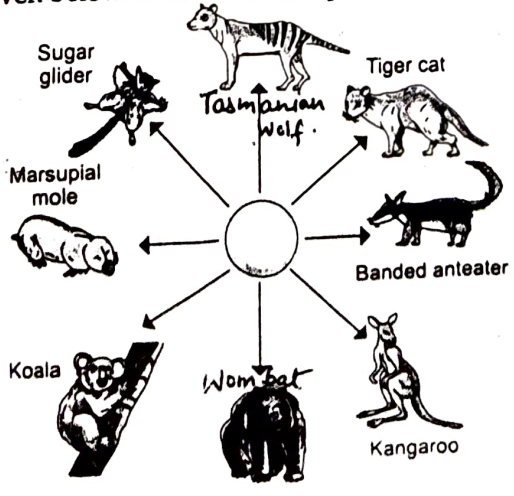
b) Name the hormone A that has reached its peak level in both woman I and II and mention its source.

c) Name the hormone B and mention its source. Give reason, why its curve in woman 1 differs from that in woman II.

OR

a) Write the full form of hCG shown in graph 2, and name its source tissue/organ. Mention two other hormones secreted by the same source.

Q30. Observe the diagram given below and answer the questions that follow:



B-4

Answer the following questions:

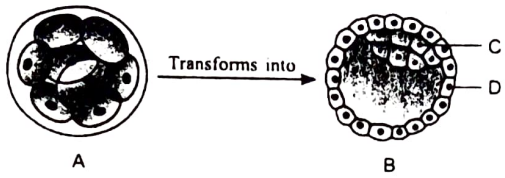
a) Mention the specific geographical region where these organisms are found.
b) Name and define the phenomenon that has resulted in the evolution of such diverse species in the given region.
c) Name an equivalent placental mammal for each of the following marsupial mammals, which share the same habitat:
(i) Numbat (ii) Tasmanian tiger cat (iii) Spotted cuscus (iv) Flying phalanger

OR

c) Give another example of animals which also exhibit this phenomenon. How did Darwin explain it with reference to them?

Section - E

Q31. i) Study the given diagram



A is an embryonic stage that gets transformed into B, which in turn gets implanted in the endometrium in human females.

a) Identify A, B and its parts C and D.
b) State the fate of C and D in the course of embryonic development in humans.

ii) The first meiotic division is completed in the primary oocyte during oogenesis. What are the products of this division? Give chromosome number of each type of cells involved in this process.

OR

a) Show the development of megaspore mother cell upto the formation of mature embryo sac in flowering plants with the help of labelled diagrams only.
b) How does geitonogamy differ from xenogamy?
c) Name the type of flowers that are invariably autogamous.

Q32. During a fire in an auditorium, a large number of assembled guests got burnt beyond recognition. Suggest and describe a modern technique that can help to hand over the dead of their relatives.

a) Name the type of DNA that forms the basis of DNA fingerprinting and mention two features of this DNA.
b) Write the steps carried out in the process of DNA fingerprinting technique and mention its application.

OR

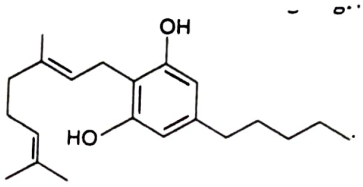
a) Expression of different genes for different traits may show dominance, incomplete dominance or co-dominance. Write about expression of such genes with the help of one example each.
b) A relevant portion of β –chain ofhaemoglobin of a normal human is given below:

The codon for the sixth amino acid is GAG. The sixth codon GAG mutates to GAA as a result of mutation 'A' and to GUG as a result of mutation 'B'. Haemoglobin structure did not change as a result of mutation 'A', whereas haemoglobin structure changed because of mutation 'B', leading to sickle-shaped RBCs. Explain giving reasons how could mutation 'B' change the haemoglobin structure or bring down mutation and not mutation 'A'.

Q33. a) Explain the process of amino acylation of tRNA and its role in the process of translation.
b) How does initiation of the translation process occur in prokaryotes? Explain.
c) State the functions of Ribozyme and Release factor in protein synthesis, respectively.

OR

i) The outline structure of a drug is given below:



a) Which group of drugs does this represent?
b) What are the modes of consumption of these drugs?
c) Name the organ of the body which is affected by consumption of these drugs?

ii) Regulation of lac operon can be visualized as regulation of enzyme synthesis by its substate. Explain the statement.