CODE-KVS (DR)/2025/MA

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Pre-Board- 2 Examination - 2025-26

CLASS - XII **Subject - Biology (044)**

M.M. - 70 **Time - 3 hours**

General Instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions.
3. 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 5marks each.
4. There is no overall choice. Answer all 33 questions. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
5. Wherever necessary, neat and properly labelled diagrams should be drawn.

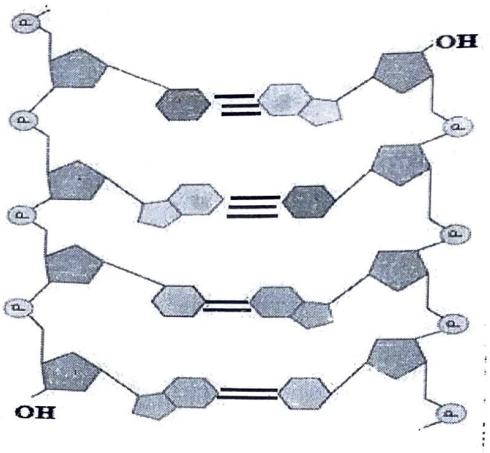
SECTION A

1. Signals for parturition in human female originate from
   A. Fully developed foetus only
   B. Both placenta as well as fully developed foetus
   C. Placenta only
   D. Oxytocin released from maternal pituitary

2. To produce 1600 seeds, the number of meiotic divisions required will be
   A. 2400
   B. 2000
   C. 1600
   D. 1800

3. A sample of normal double-stranded DNA was found to have thymine content of 27%. What will be the expected proportion of guanine in this strand?
   A. 23%
   B. 32%
   C. 36%
   D. 73%

4. Observe the schematic diagram that depicts a small section of nucleic acid. The bases in two strands are paired through hydrogen bonds that are shown by the dark lines. Identify the correct sequence of nucleotide in the 5'-3' direction.



A. GCAT
B. CGTA
C. TAGC
D. ATCG

For Visual Impaired Students

E. coli has 4.6 X 10 ^{6} base pairs and completes the process of replication in 18 minutes, then the average rate of polymerization is approximately

A. 2000 bp/s
B. 4000 bp/s
C. 3000 bp/s
D. 1000 bp/s

5. Suresh and Rajesh have defective haemoglobin due to genetic disorders. In Suresh, the problem is qualitative as he is having incorrectly functioning globin molecules while in Rajesh the problem is quantitative as he is having very few globin molecules. Identify the disorder they are suffering from.

	Suresh	Rajesh
A	Thalassemia - Autosomal Dominant blood disorder	Sickle Cell Anaemia - Autosomal linked Recessive trait
B	Sickle Cell Anaemia - Autosomal linked Dominant trait	Thalassemia - Autosomal Recessive blood disorder
C	Sickle Cell Anaemia – Autosomal linked Recessive trait	Thalassemia – Autosomal Recessive blood disorder
D	Thalassemia - Autosomal Dominant blood disorder	Sickle Cell Anaemia - Autosomal linked Dominant trait

6. In *E.coli*, the lac operon gets switched on when lactose is

A. present in the medium and it binds to the repressor.
B. not present in the medium and the repressor binds to the operator.
C. not present in the medium and RNA polymerase binds to the operator.
D. Active lactose present in the medium binds to RNA polymerase

7. Which of the following features shows the mechanism of sex determination in honey-bee?

(i) An offspring formed from the union of a sperm and egg develops as a female.
(ii) Males have half the number of chromosomes than that of female.
(iii) The males are haploid having 32 chromosomes.
(iv) All workers and males are diploid having 16 chromosomes

A. (i) and (ii)
B. (ii) and (iii)
C. (i) and (iv)
D. (ii) and (iv)

8. The following diagram shows a fragment of DNA which is going to be transcribed, the upper strand with polarity 3' to 5' is the template strand: 3′ ATTGCC 5′
5′ TAACGC 3′

After transcription the mRNA can be represented by:
A. 5′ AUUGCC 3′
B. 5′ AUUCGG 3'
C. 5′ UAACGG 3′
D. 5′ GGCAAU 3′

9. Idli - dosa dough rises due to production of which of the following gas?
A. CO
B. CO_2
C. NO
D. NO_2

10. From the sexually transmitted diseases mentioned below, identify the one which does not specifically affect the sex organs.
A. Syphilis
B. AIDS
C. Gonorrhoea
D. Genital Warts

11. Eco R1 cuts the DNA between bases G and A only when the sequence of GAATTC is present. The number of nucleotides present in the resultant sticky ends that will be formed in each of the two strands of DNA after this enzyme cuts the DNA will be:

	Vector DNA	Foreign DNA
A.	1 & 5	5 &1
B.	2 & 4	4 &2

C.	2 & 5	5 & 2
D.	3 & 4	4 & 3

12. During the secondary treatment of sewage, which of the following change in the effluent occur due to flocs?

A. Reduction in BOD
B. Increase in BOD
C. Decrease in DO
D. No change in DO or BOD

Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). questions selecting the appropriate option given below:

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.

13. **Assertion** (A): Cells of tapetum have more than one nucleus.

Reason (R): They undergo meiosis without cytokinesis.

14. **Assertion** (A): Deoxyribonucleoside triphosphates serve dual purposes.

Reason (R): They act as proof readers and provide energy.

15. **Assertion** (A): A floating cover placed over the slurry in a biogas plant keeps on rising.

Reason (R): The microbial activity leads to the gas production in the tank .

16. **Assertion** (A): DNA fragments can be isolated by Gel electrophoresis on the basis of their size.

Reason (R): The larger the fragment size, the faster it moves.

SECTION- B

17. *Attempt either option A or B.*

A. (i) A blood test reported negative for hCG.

What does negative hCG imply? Name the tissue which produces hCG?

(ii) If a blood test reported positive for hCG in a person, then which other hormones would also be secreted by the tissue secreting hCG?

OR

B. (i) The human male ejaculates about 200 to 300 million sperm during a coitus, however the ovum is fertilized by only one sperm. How does the ovum block the entry of additional sperms?

(ii) All copulation will not lead to fertilization. Why ?

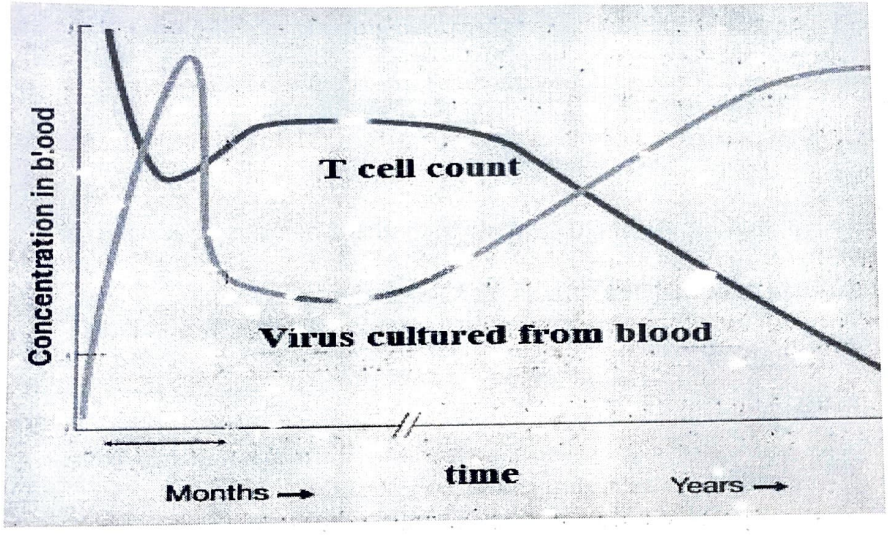
18. Given below is a schematic representation of a mRNA strand

5' mRNA 3'

AGGAGGUAUGAUCUCGUAAAAUAAA

(i) In the above sequence identify the translational unit in mRNA.
(ii) Where are UTRs found and what is their significance?

19. 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 follow.



A. What kind of relationship is observed in the virus levels and the immune response after some days of the initial infection?
B. Does it eliminate the virus from the body permanently? Give reason for your answer.

For visually impaired students.

Write the sequence of events that occur when a retrovirus enters a human being, causing reduction in helper T-cells.

20. A culture plate of *Lactobacillus* shows blue-coloured colonies and colourless colonies. Explain the principle involved in the formation of such variance in the colour of colonies.

21.(i) It was estimated that if an evergreen forest has a GPP of 400 J/m²/day and 150 J/m²/day worth of carbon dioxide flows out of that forest, what is the NPP in that forest?

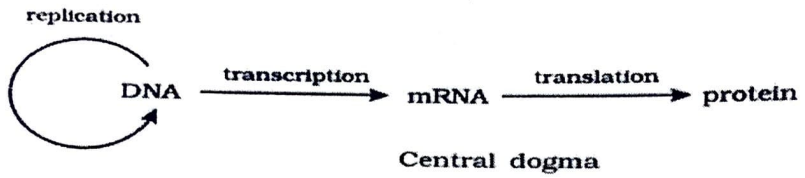
(ii) Explain why pyramids of energy must always be upright.

SECTION -C

22. Explain the hormonal control of spermatogenesis in humans

23. Name the place in human ovary where the first meiotic division is completed during oogenesis. What are the products of this division? Give the chromosome number of each type of cells involved in the process.

24. The schematic representation given below shows the concept of Central Dogma.



Central dogma

A. During the process of replication and transcription the pairing of nitrogenous bases is not similar. Explain.
B. How is the above process modified in a retrovirus? Name the process.
C. Justify why during the process of transcription only a segment of DNA is copied into RNA.

For visually impaired students

Central Dogma explains the process of DNA transcription and translation. From DNA mRNA is transcribed and then mRNA is translated into a polypeptide.

A. During the process of replication and transcription the pairing of nitrogen bases is not similar. Explain.
B. How is the above process modified in viruses? Name the process.
C. Justify why during the process of transcription only a segment of DNA is copied into RNA.

25. Describe the steps involved in Southern blot hybridization using radiolabeled VNTR as a probe

26. Bio-fertilisers are organisms that enrich the nutrient quality in the soil. Explain the role of three main sources of bio-fertilisers.

27. Explain how PCR technique can be used for amplification of a small amount of DNA template.

28. A. Diagram given below depicts different species of Warbler birds feeding on different regions on a Spruce tree. Explain the mechanism which helps them to co-exist.

C. What does Gause's exclusion principle state? Does it apply in the case shown above? Explain.

For visually impaired students

A. Name and explain the mechanism where two species competing for the same resource co-exist.

B. What does Gause's exclusion principle state? Does it apply in the above situation?

OR

(i) Assume that, GPP Forest A = GPP Forest B = GPP Forest C,
If Forest A has NPP = 1254 J/m²/day; Forest B, NPP =2157 J/m²/day; and Forest C, NPP = 779 J/m²/day, which one of these forests has maximum energy loss by respiration? Give reason.

(ii) Draw an ecological pyramid of number of the following food chains

a. Grass — Animal —Fleas on the host animal

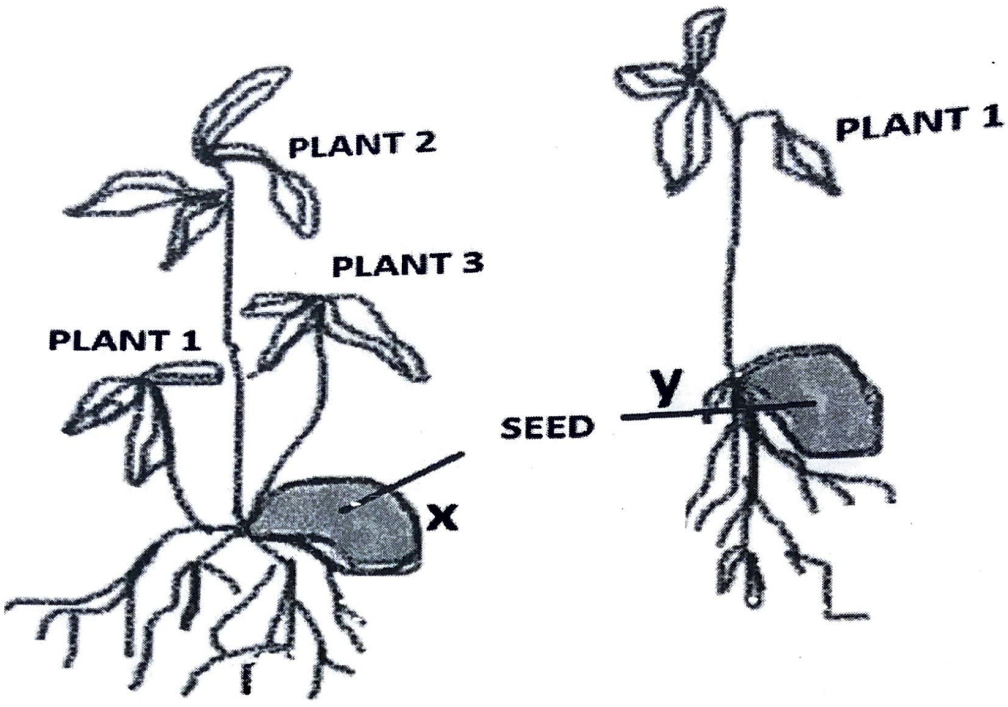
b. Tree — Insects — Woodpecker

For visually impaired students in lieu of part (ii)

What will be the shape of the pyramid of biomass in sea? Justify your answer.

SECTION - D

29. The image below shows two germinated seeds X and Y which belong to the same species. Seed X is produced by apomixis whereas seed Y is a product of sexual reproduction.



A. Write the number of embryo(s) and ovules in the ovary of seed X.
B. How many embryo sac(s) are present in plant X and Y?
C. How multiples embryos are formed in citrus fruits?

OR

C. What advantage will plants developed from seed Y have over seed X?

For visually impaired students

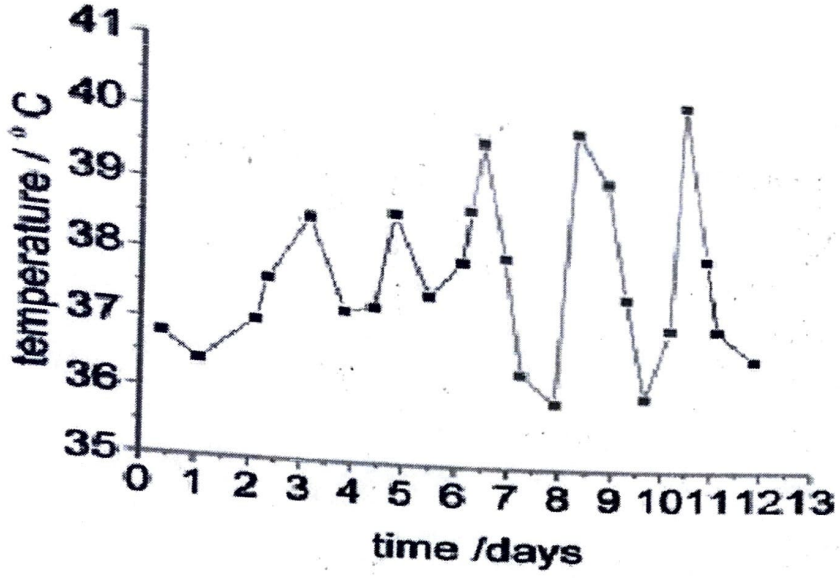
Each Mango fruit contains one seed. Two mango seeds, X and Y were sown in the soil. From Seed X, 3 plant saplings germinated but from seed Y only 1 plant sapling germinated.

A. For seed X which is apomictic, calculate the number of:
   i) Embryo(s)
   ii) Ovules in this seed's ovary
B. How many embryo sac(s) are present in plant X and Y?
C. How multiples embryos are formed in citrus fruits?

OR

C. What advantage will plants developed from seed Y have over seed X?

30. Given below is the pattern of temperature in a person suffering from a non-viral disease transmitted by mosquitoes. Study the graph and answer the questions that follow:



A. Which stages of the life cycle of the pathogen of above disease are completed in the mosquito's gut? (1)

B. How is this infection transmitted to humans? (1)

C. How does this pathogen multiply in the human body? (2)

OR

c. Explain the factor(s) responsible for the pattern of temperature shown in the graph. (2)

For visually impaired students

A. A non-viral disease that is transmitted by mosquitoes causes recurring fever in an infected person. Explain giving reason(s). (1)

B. How does this pathogen multiply in the human body? (2)

C. How is this infection transmitted to humans? (1)

OR

C. Which stages of the life cycle of this pathogen are completed in the mosquito's gut? (1)

SECTION - E

31. *Attempt either option A or B.*

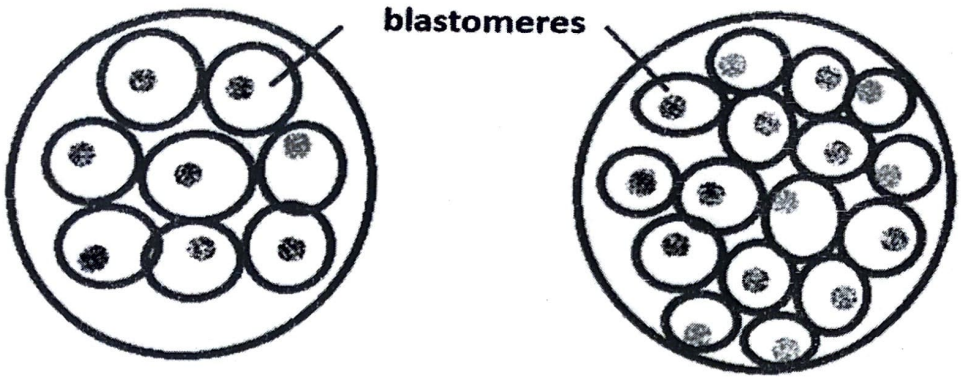
A. Cryptorchidism is a condition in which the testes fail to descend into the scrotum. It can also lead to compromised Sertoli cell function and has an impact on Leydig cell function.

(i) Identify at least 3 parameters of male fertility which get affected due to cryptorchidism.

(ii) Which process will be affected if mature spermatids are not released from Sertoli cells?

(iii) Name and explain one assisted reproductive technology (ART process) in which the sperm/semen is used to assist fertilization.

Name and explain the assisted reproductive technology that should be used to complete the development of embryos I and II shown in the figure given below:



EMBRYO I EMBRYO II

For visually impaired students

(iv) An infertile couple decided to use ART to conceive. After IVF they decided for Embryo transfer of the following 2 embryos. Embryo 1 consisted of 8 blastomeres and Embryo 2 consisted of 16 blastomeres. Name and explain the techniques they should deploy to complete further development of the given embryos.

OR

B.

(i) Explain the significance of each of the following features present in plants given below:

a) In rose-bay plant the stamens ripen before the stigma.
b) In certain species of primrose, the flowers have short stamen and long style.
c) The bisexual flower of mustard exhibits rejection of self-pollen grain.

(ii) Explain how autogamy is prevented in castor and papaya plant respectively

32. *Attempt either option A or B.*

A. Explain how advent of biotechnology has helped in preventing infestation by nematodes and thereby increasing crop yield.

OR

B. In the future, genetic therapies may be used to prevent, treat, or cure certain inherited disorders in humans. Justify the statement with a suitable example.

33. *Attempt either option A or B.*

A. (i)Why is there a need to conserve biodiversity?
(ii)Name and explain any two causes that are responsible for the loss of biodiversity.

OR

B. (i)Name the two types of desirable approaches to conserve biodiversity? Explain with examples bringing out the difference between the two types.
(ii)State the features of a stable biological community?