



TAGORE INTERNATIONAL SCHOOL
EAST OF KAILASH, NEW DELHI

MID -TERM EXAMINATION (2024-2025)

CLASS XII
BIOLOGY
SET 2

AHAIL AHMAD
VII-D

Duration: 3 Hours
M. Marks: 70

Date: 20.09.24

No. of pages: 9

General Instructions:

Read the following instructions carefully.

- All questions are compulsory.
- The question paper has five sections and 33 questions.
- 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.
- 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.
- Wherever necessary, neat and properly labeled diagrams should be drawn.

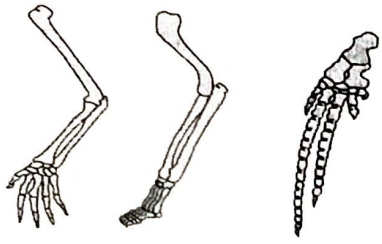
SECTION A

- The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of (1 mark)
 - insertional inactivation of alpha-galactosidase in non-recombinant bacteria.
 - insertional inactivation of alpha-galactosidase in recombinant bacteria.
 - inactivation of glycosidase enzyme in recombinant bacteria.
 - non-recombinant bacteria containing beta-galactosidase.
- The technology of biogas production was developed in India mainly due to the efforts of (1 mark)
 - Indian Agricultural Research Institute (IARI) and Khadi and Village Industries Commission (KVIC).
 - National Botanical Research Institute (NBR1).
 - Indian Council of Medical Research (ICMR).
 - Indian Council of Agricultural Research (ICAR).
- Pollen grains are well preserved as fossils because of the presence of (1 mark)
 - sporopollenin
 - cellulose
 - lignocellulose
 - pectocellulose

- (b) 2
- (c) 3
- (d) 4

(1 mark)

5. The given figure shows bones in the forelimbs of three mammals. For these mammals, the number, position, and shape of the bones most likely indicate that they may have



- (a) developed in a common environment.
- (b) developed from the same earlier species.
- (c) identical genetic makeup.
- (d) identical methods of obtaining food.

6. Which of the following is correct?

(1 mark)

- (a) Homo erectus lived in east and central Asia and used hides to protect their bodies.
- (b) Agriculture came around 18000 years back.
- (c) The skull of modern human resembles more closely to baby chimpanzee than to adult chimpanzee.
- (d) All of the above.

7. Rohit and Mohit have defective haemoglobin due to genetic disorders. Rohit has very few globin molecules while Mohit has incorrectly functioning globin molecules. Identify the disorder they are suffering from.

(1 mark)

	Rohit	Mohit
(a)	Sickle cell anaemia-an autosome linked recessive trait	Thalassemia-an autosome linked dominant trait
(b)	Thalassemia-an autosome linked recessive blood disorder	Sickle cell anaemia- an autosome linked recessive trait
(c)	Sickle cell anaemia- an autosome linked recessive trait	Thalassemia-an autosome linked recessive blood disorder
(d)	Thalassemia-an autosome linked recessive blood disorder	Sickle cell anaemia- an autosome linked dominant trait.

Select the correct sequence of events leading to the formation of a mature sperm.

(1 mark)

- (a) Spermatogonium → Secondary spermatocyte → Primary spermatocyte → Spermatids → Sperms.
- (b) Spermatogonium → Spermatids → Secondary spermatocyte → Primary spermatocyte → Sperms.
- (c) Spermatids → Primary spermatocyte → Secondary spermatocyte → Spermatogonium → Sperms.
- (d) Spermatogonium → Primary spermatocyte → Secondary spermatocyte → Spermatids → Sperms.

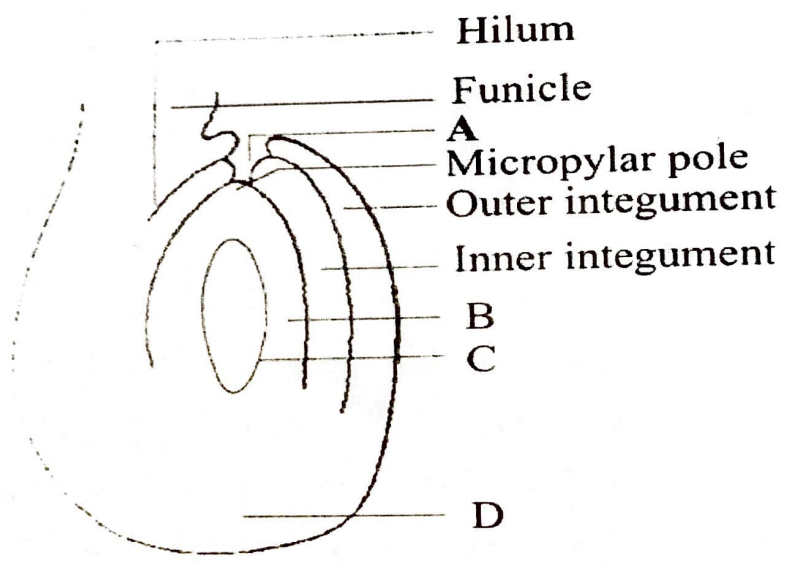
- If a double stranded DNA
 (a) 20%
 (b) 40%
 (c) 30%
 (d) 60%

10. Which of the following statements about RNA polymerase are correct? (1 mark)
- (i) RNA polymerase I transcribes rRNAs.
 - (ii) RNA polymerase II transcribes snRNAs.
 - (iii) RNA polymerase III transcribes hnRNA.
 - (iv) RNA polymerase II transcribes hnRNA.

Choose the correct option:

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

11. The given figure shows a diagrammatic view of a typical anatropous ovule, in which some parts are marked as A, B, C and D. Identify the correct labelling of A, B, C and D from the options given below. (1 mark)



- (a) A – Chalazal pole; B – Micropyle; C – Embryo sac; D – Nucellus
- (b) A – Micropyle; B – Chalazal pole; C – Embryo sac; D – Nucellus
- (c) A – Micropyle; B – Chalazal pole; C – Nucellus; D – Embryo sac
- (d) A – Micropyle; B – Nucellus; C – Embryo sac; D – Chalazal pole

12. Which of the following is the correct matching of the events occurring during menstrual cycle? (1 mark)
- (a) Follicular Phase (Proliferative Phase)-Rapid regeneration of myometrium and maturation of Graafian follicle.
 - (b) Luteal Phase (Secretory Phase)-Development of corpus luteum and increased secretion of progesterone.
 - (c) Ovulation-Sharp fall in both LH and FSH and increase in the secretion of progesterone.
 - (d) Menstruation-Breakdown of myometrium and ovum not fertilized.

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

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) Both A and R are false.

13 **Assertion (A):** The earliest organisms that appeared on the earth were non-green and presumably anaerobes. (1 mark)
Reason (R): The first autotrophic organisms were the chemoautotrophs that never released oxygen. (1 mark)

14 **Assertion (A):** Parturition is induced by neural signal in maternal pituitary. (1 mark)
Reason (R): At the end of gestation period, the maternal pituitary releases prolactin which causes uterine contractions. (1 mark)

15 **Assertion (A):** Family planning is an action plan to attain reproductive health among people. (1 mark)
Reason (R): Improved programmes covering reproduction related areas were propagated by RCH to create awareness among people. (1 mark)

16 **Assertion (A):** Haemophilia is a recessive sex-linked disease. (1 mark)
Reason (R): Haemophilia occurs due to mutation of a structural gene on chromosome 15. (1 mark)

SECTION B

17 Why does a doctor administer tetanus antitoxin and not a tetanus vaccine to a child injured in a roadside accident having a bleeding wound? (2 marks)

OR

A student on a school trip started sneezing and wheezing soon after reaching the hill station for no explained reasons. But, on return to the plains, the symptoms disappeared. What is such a response called? How does the body produce it?

8 Given below are the sequence of nucleotides in a particular mRNA and amino acids coded by it. (2 marks)

UUUAUGUUCGAGUUAGUGUAA
 Phe- Met- Phe- Glu- Leu- Val

Interpret any two properties of the genetic code that can be correlated from the above given data.

9 Identify A, B, C and D in the following table: (2 marks)

Type of microbe	Name	Commercial Product
Bacterium	A	Lactic acid
Fungus	B	Cyclosporin A
C	<i>Monascus purpureus</i>	Statin
Fungus	<i>Penicillium notatum</i>	D

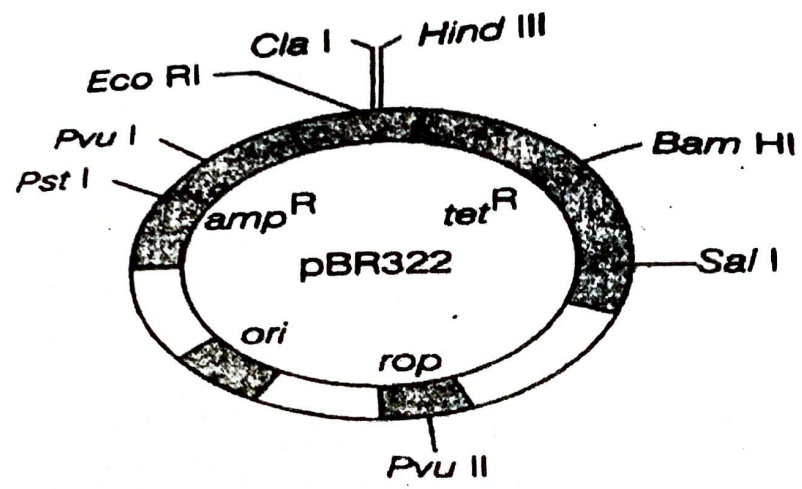
A template that can be formed, along with...

3' ATGCATGCATGCATGCATGCATGC 5'

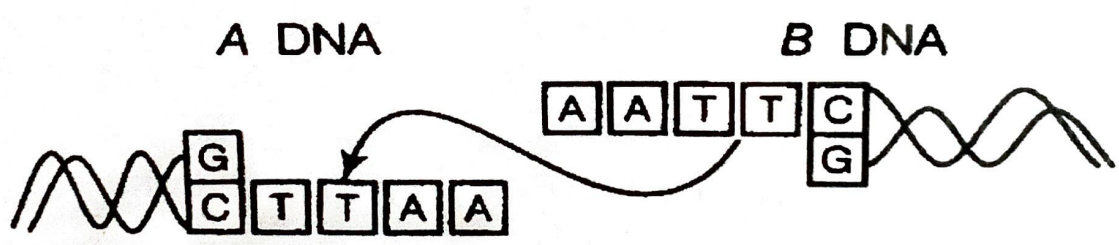
21. A man with AB blood group marries a woman with O blood group. Work out all the possible phenotypes and genotypes of the progeny. (2 marks)

SECTION C

22. Explain the importance of (a) ori (b) amp^R and (c) rop in the E. coli vector shown below. (3 marks)



23. Study the linking of DNA fragments shown below: (1+1/2+1/2+1=3 marks)



- (a) Name A DNA and B DNA.
- (b) Name the restriction enzyme that recognises this palindrome.
- (c) Name the enzyme that can link these two DNA fragments.
- (d) Complete the palindrome, which is recognised by Eco RI.

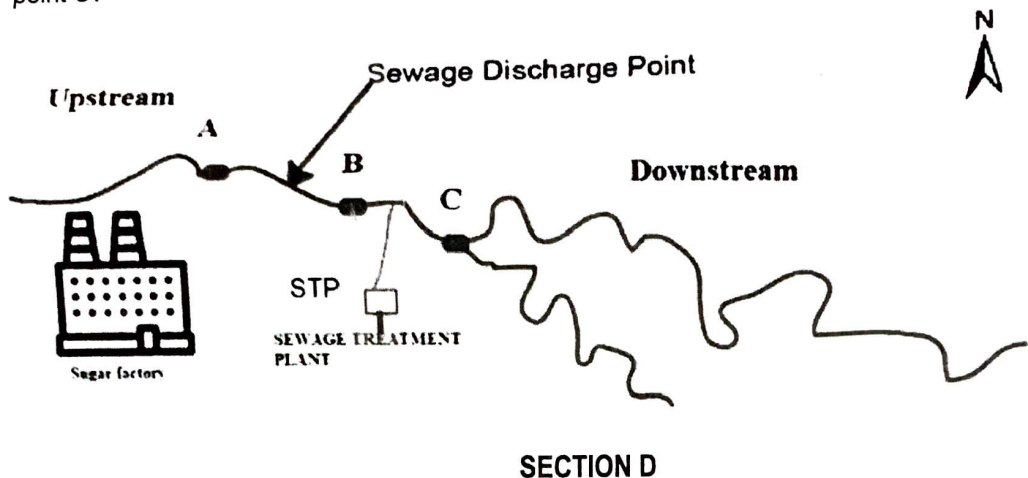
24. List any three outbreeding devices that flowering plants have developed and explain how they help to encourage cross pollination. (3 marks)

25. Describe the three different ways by which natural selection can affect the frequency of a heritable trait in a population. (3 marks)

OR

Giving three reasons, explain as to how Hardy-Weinberg equilibrium can be affected.

26. Differentiate between wind pollinated flowers and insect pollinated flowers. (Give three points) (3 marks)
27. Following a severe accident, many charred-disfigured bodies were recovered from the site making the identification of the dead very difficult. Name and explain the technique that would help the authorities to establish the identity of the dead to be able to handover the dead to their respective relatives. (3 marks)
28. Water samples were collected at points A, B and C in a segment of a river near a sugar factory and tested for BOD level. The BOD levels of samples A, B and C were 400 mg/L, 480 mg/L and 8 mg/L respectively. What is this indicative of? Why the BOD level gets reduced considerably at the collection point C?

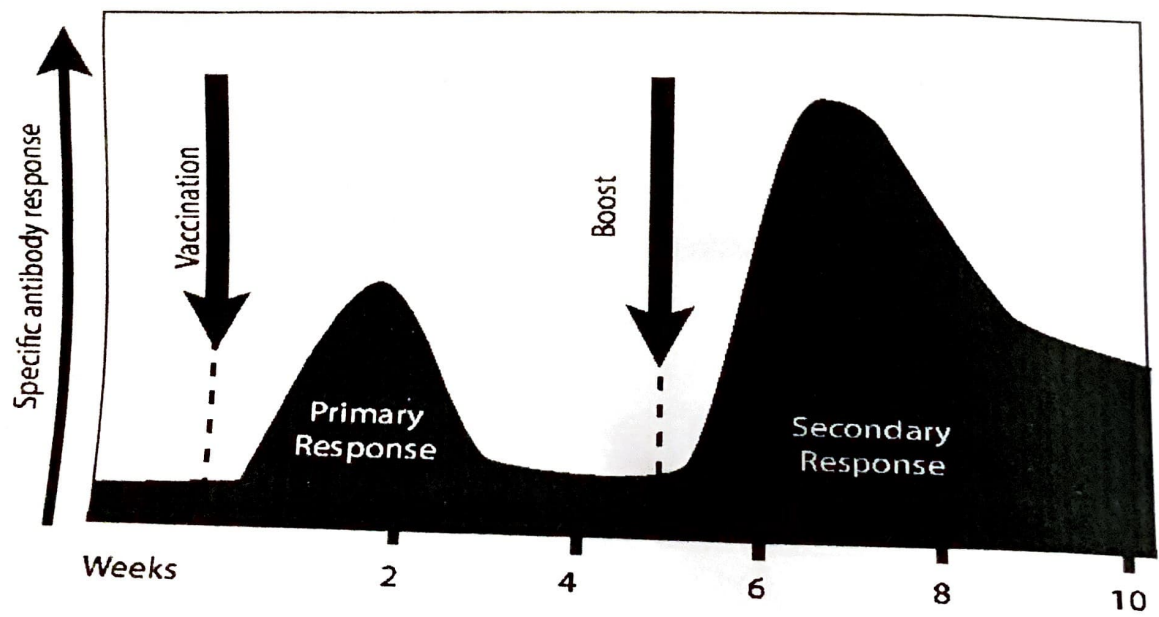


Q. No. 29 and 30 are case-based questions. Each question has 3 subparts with internal choice in one subpart.

29. Read the given passage and study the graph shown below. (1+1+2= 4 marks)

In a study to test a new vaccine against a viral disease, mouse model testing was done. In this process, mice were vaccinated and their blood samples were tested. Mice developed mild disease symptoms. After a few days those mice were again infected with the virus and their blood samples were tested. This time they did not show any symptoms of the disease.

The graph given below shows the specific antibody response. Answer the questions that follow:



- (a) Which form of pathogen is used in vaccination?
 (b) How does vaccination work?
 (c) Why were no symptoms of the disease observed in mice after the second exposure to virus?

OR

- (c) On child birth, colostrum from mother supplies some antibodies to the baby, does it build passive or active immunity in the new born? Explain.

30. Read the passage given below and answer the questions that follow.

(1+1+2=4 marks)

Gametogenesis is a biological process that produces specialized cells called gametes (sperm and eggs) from precursor cells. It's a crucial part of sexual reproduction, genetic diversity, and the continuation of species. Gametogenesis can occur through either mitosis or meiotic division, depending on the organism's life cycle. In animals, gametogenesis usually involves meiosis, which produces haploid gametes from diploid cells. In plants, gametogenesis can occur through meiosis or mitosis. In males, gametogenesis is called spermatogenesis while in females it is called oogenesis.

- (a) When do the oogenesis and the spermatogenesis initiate in human females and males, respectively?
 (b) List two changes the primary oocyte undergoes in the tertiary follicular stage in human embryo.
 (c) Differentiate between oogenesis and spermatogenesis. (Give two points)

OR

- (c) Mention the sites of action of the hormones GnRH and FSH during spermatogenesis in human males. Give one function of each of the hormones.

SECTION E

31. Placed below are case studies of some couples who were not able to have kids. These couples are not ready for adoption or taking gametes from donors. After thoroughly examining the cases, which Assisted Reproductive Technology will you suggest to these couples as a medical expert? Explain briefly with justification of each case. (5 x 1= 5 marks)

Couple	Test reports of female partner	Test reports of male partner
Couple 1	Normal reports	Normal sperms in testes, missing connection in epididymis and vas deferens
Couple 2	Blockage in the fallopian tube	Normal reports
Couple 3	Normal reports	Poor semen parameters in terms of count, motility and morphology
Couple 4	Low ovarian reserve	Normal reports
Couple 5	Poor ovarian reserve	Morphologically abnormal sperms

OR

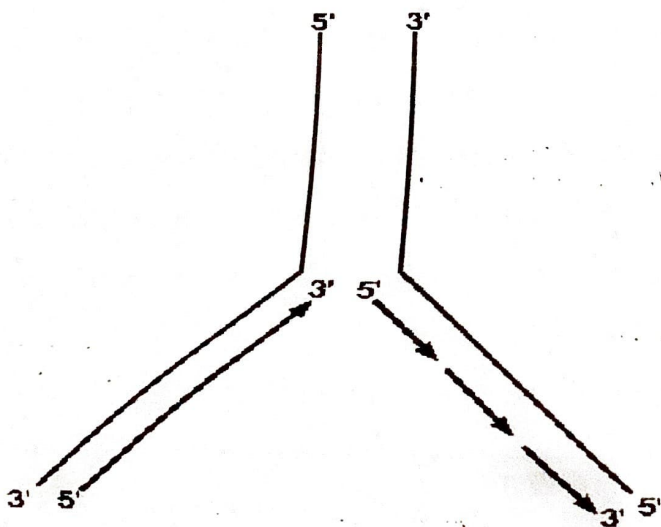
Given below are certain situations. Analyse the situation and suggest the name of suitable contraceptive device/ method along with its mode of action.

(10 x ½ = 5 marks)

Situation	Requirement of contraceptive for	Name of contraceptive device/ method	Mode of action
1	Blocking of entry of sperms through cervix		
2	Spacing between children		
3	Effective emergency contraceptive		
4	Terminal method to prevent any more pregnancy in female		
5	Sterilization in male		

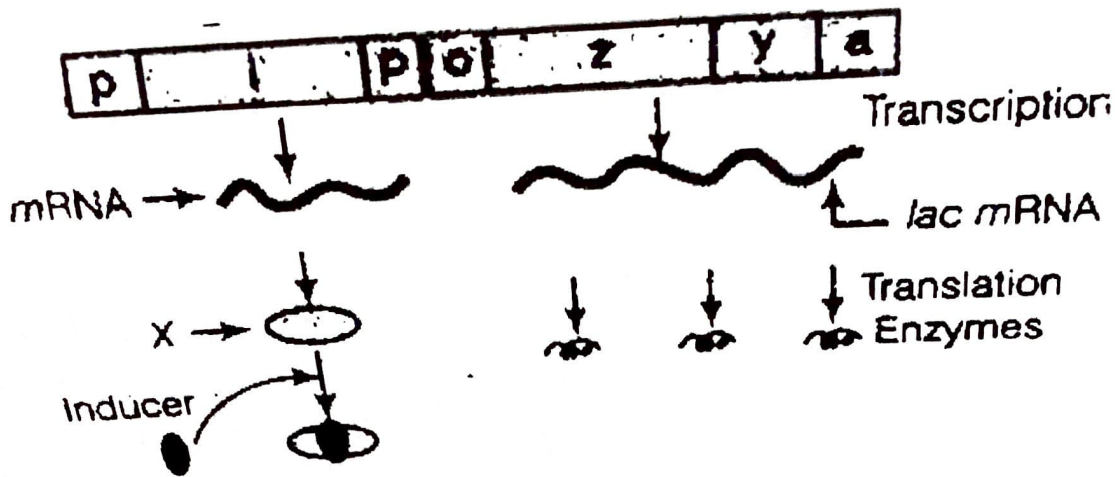
32. In the figure given below, DNA replication fork is seen. Study the figure and answer the questions that follow:

(1+2+1+1 =5 marks)



- Name these replicating strands.
- Why do you see two different types of replicating strands in the given replication fork? Explain.
- DNA replication occurs in small replication fork and not in its entire length. Give reason.
- State the role of deoxyribonucleoside triphosphates during DNA replication.

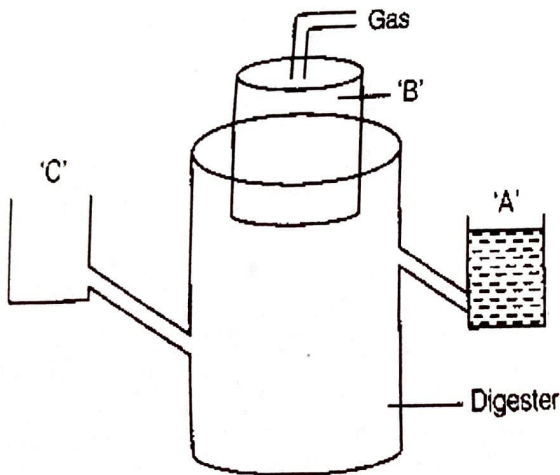
OR



- Name the molecule X synthesised by i gene. How does this molecule get inactivated?
- When does the transcription of lac mRNA stop?
- Name the enzymes transcribed by the genes z and a.
- Why is the regulation of the lac operon referred to as negative regulation?

(2+1½+1½=5 marks)

33 The diagram shown below is that of a typical biogas plant.



- Explain the sequence of events that occur in a biogas plant.
- Identify A, B and C.
- Why are biogas plants often built in rural areas? Mention any one use of biogas.

OR

- Cancer is one of the most dreaded diseases. Explain 'contact inhibition' and 'metastasis' with respect to this disease.
- Name the group of genes that have been identified in normal cells that could lead to cancer. How do these genes cause cancer?
- Name any two techniques that are useful in detecting cancers of internal organs.
- Why are cancer patients often given α -interferon as part of their treatment?

(2+1+1+1=5 marks)

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