



# TECHNO INDIA GROUP PUBLIC SCHOOL

## MOCK TEST-4 (2025-2026)

### CLASS-XII

Subject Code **043**

Roll No.

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Candidates must write the code on the title page of the answer-book.

## BIOLOGY

Time allowed : 3 hours

Maximum Marks : 70

### General Instruction:

Read the following instructions carefully and follow them :

1. There are 33 questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 short answer questions carrying 2 marks each
4. SECTION C consist of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. All questions are compulsory.

### SECTION A

**Section A: Question 1 to 16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to those questions**

1.	What is the correct characteristic distribution of cells within the typical embryo sac?	[1]																				
	<table border="1"><thead><tr><th></th><th>Number of cells at chalazal end</th><th>Number of cells at micropylar end</th><th>Number of nuclei left in central cell</th></tr></thead><tbody><tr><td>(A)</td><td>3</td><td>2</td><td>3</td></tr><tr><td>(B)</td><td>3</td><td>3</td><td>2</td></tr><tr><td>(C)</td><td>2</td><td>3</td><td>3</td></tr><tr><td>(D)</td><td>2</td><td>2</td><td>4</td></tr></tbody></table>		Number of cells at chalazal end	Number of cells at micropylar end	Number of nuclei left in central cell	(A)	3	2	3	(B)	3	3	2	(C)	2	3	3	(D)	2	2	4	
	Number of cells at chalazal end	Number of cells at micropylar end	Number of nuclei left in central cell																			
(A)	3	2	3																			
(B)	3	3	2																			
(C)	2	3	3																			
(D)	2	2	4																			

2.	<p>The given figure represents:</p>  <p>(A) Globular embryo                      (B) Heart-shaped embryo (C) Zygote                                      (D) Syngamy</p>	[1]
3.	<p>If the husband is found to have a sperm count of less than 20 million/mL and the wife is diagnosed with blockage in the fallopian tube, the couple should be advised for:</p> <p>(i) ZIFT                      (ii) AI                      (iii) IVF                      (iv) ICSI</p> <p>(A) (i) and (iii)                      (B) (i) and (ii)                      (C) (i) and (iv)                      (D) (iii) and (iv)</p>	[1]
4.	<p>Which of the following criteria must a molecule fulfill to act as a genetic material?</p> <p>(i) It should not be able to generate its replica. (ii) It should be chemically and structurally stable. (iii) It should not allow slow mutation. (iv) It should be able to express itself in the form of Mendelian characters.</p> <p>(A) (i) and (ii)                      (B) (ii) and (iv)                      (C) (iii) and (iv)                      (D) (ii) and (iii)</p>	[1]
5.	<p>High value of BOD indicates _____</p> <p>(A) Water is pure (B) Water is highly polluted (C) Water is less polluted (D) Consumption of organic matter in the water is higher by the microbes</p>	[1]
6.	<p>In a plant species, the yellow colour of flower is dominant over white and round shape of the fruit is dominant over elongated. When a cross was performed between yellow flower and round fruit with white flower and elongated fruit, we found that about 20 plants survived in the F1 progeny. When these plants were allowed to self-fertilize, about 960 plants survived in the F2 progeny. If the traits follow Mendelian inheritance, then the number of plants having the yellow flower and round fruit in F1 and F2 generations will be, respectively.</p> <p>(A) 10 and 600                      (B) 20 and 540                      (C) 10 and 800                      (D) 20 and 960</p>	[1]
7.	<p>Which among the following is incorrectly matched?</p> <p>(A) Cyclosporin A - <i>Trichoderma polysporum</i>                      (B) Statins - <i>Monascus purpureus</i> (C) Streptokinase - <i>Streptococcus</i>                      (D) Citric acid - <i>Acetobacter aceti</i></p>	[1]

8.	In <i>E. coli</i> , 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	[1]
9.	Which of the following features shows the mechanism of sex determination in honey bees? (i) An offspring formed from the union of sperm and egg, develops as a female. (ii) Males have half the number of chromosomes as present in the females. (iii) The males are haploid with 32 chromosomes. (iv) All workers and moles are diploid having 16 chromosomes. (A) (i) and (ii)            (B) (ii) and (iii)            (C) (i) and (iv)            (D) (ii) and (iv)	[1]
10.	The following represents a fragment of DNA which is going to be transcribed, the upper strand with polarity 3' to 5' in the template strand: 3' - ATTGCC - 5' 5' - TAACGG - 3' After transcription, the mRNA can be represented by: (A) 5' - AUUGCC - 3'    (B) 5' - AUUCGC - 3'    (C) 5' - UAACGG - 3'    (D) 5' - GGCAAU - 3'	[1]
11.	Idli - dosa dough rises due to the production of which of the following gas? (A) CO                      (B) SO <sub>2</sub> (C) CO <sub>2</sub> (D) NO <sub>2</sub>	[1]
12.	Adaptive radiation leads to which of the following? (A) Increased competition among species (B) Decreased speciation rates (C) Limited morphological diversity among species (D) Rapid divergence of traits among populations inhabiting a given geographical area	[1]
<b>Assertion and Reason (13-16):</b> <b>Directions:</b> The following two questions consist of two statements - Assertion and Reason (R). Answer these questions by 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.	<b>Assertion:</b> Cells of tapetum have more than one nucleus. <b>Reason:</b> They undergo meiosis without cytokinesis.	[1]
14.	<b>Assertion:</b> Deoxyribonucleoside triphosphates serve dual purposes. <b>Reason:</b> They act as proof readers and provide energy.	[1]
15.	<b>Assertion:</b> A floating cover placed over the slurry in a biogas plant keeps on rising. <b>Reason:</b> This is due to the gas produced in the tank by microbial activity.	[1]

16.	<b>Assertion:</b> DNA fragments can be isolated by gel electrophoresis on the basis of their size. <b>Reason:</b> The larger the fragment size, the faster it moves.	[1]
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### SECTION B

**Question no. 17 to 21 are very short answer questions, carrying 2 marks each**

17.	<b>Attempt either option A or B</b> A. We know that poaching of tiger is a burning issue in present times. What implications would this activity have on the functioning of the ecosystem of which the tigers are an integral part?  <b>OR</b> B. (a) Explain the different trophic levels of pond ecosystem. (b) Do you agree that a pond is a self-sustained ecosystem present in a shallow water body? Justify	[2]
18.	Justify: Removal of gonads cannot be considered as a contraceptive option.	[2]
19.	Two organisms, occupying a particular geographical area, show similar adaptive strategies. Explain the phenomenon with examples.	[2]
20.	<b>Comment on the following statements:</b> (i) Organisms at a higher trophic level, have less energy available. (ii) The number of trophic levels in an ecosystem is limited.	[2]
21.	<b>Attempt either option A or B</b> A. Who was the first patient to be given gene therapy? Why was the given treatment recurrent in nature?  <b>OR</b> B. Highlight any two areas where genetic modification of plants has been useful.	[2]

### SECTION C

**Question No. 22 to 28 are short answer questions, carrying 3 marks each**

22.	Each mango fruit contains one seed. Two mango seeds, X and Y, were sown in the soil. From seed X, 3 plant samplings germinated but from seed Y, only one plant sapling germinated. (a) For seed X, which is apomictic, calculate the number of: (i) Embryo(s)      (ii) Embryo sac(s)      (iii) Ovules in this seed's ovary (b) How are multiple embryos formed in citrus fruits? (c) What advantage will plants developed from seed Y have over seed X?	[3]
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 cell involved in the process.	[3]

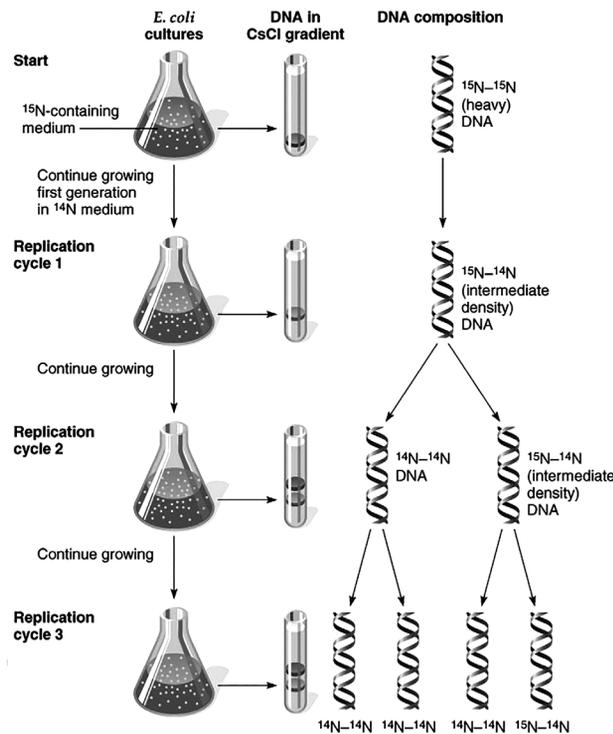
24.	<p>The schematic representation given below shows the concept of central Dogma.</p>  <p>(a) During the process of replication and transcription, the pairing of nitrogenous bases is not similar. Explain.</p> <p>(b) How is the above process modified in a retrovirus?</p> <p>(c) Justify why during the process of transcription, only a segment of DNA is copied into RNA.</p>	[3]
25.	Describe the steps involved in southern blot hybridization, using radiolabelled VNTR as probe.	[3]
26.	<p>What will happen to an ecosystem if:</p> <p>(a) All producers are removed.</p> <p>(b) All organisms of herbivore level are eliminated.</p> <p>(c) All top carnivore population is removed.</p>	[3]
27.	Define ecological pyramids and describe with examples, pyramid of number and pyramid of biomass.	[3]
28.	<p>Differentiate between the following:</p> <p>(a) Repetitive DNA and Satellite DNA</p> <p>(b) mRNA and tRNA</p> <p>(c) Template strand and coding strand</p>	[3]

**SECTION D**

**Question no. 29 and 30 are case based questions carrying 4 marks each**

29. In 1958, Mathew Meselson and Franklin Stahl provided a strong experimental evidence to prove the template mechanism of DNA replication given by Watson and Crick. They used heavy ( $^{15}\text{N}$ ) and light ( $^{14}\text{N}$ ) isotopes of nitrogen to differentiate between parental and newly synthesised DNA strands. The experiment is diagrammatically shown below.

[4]

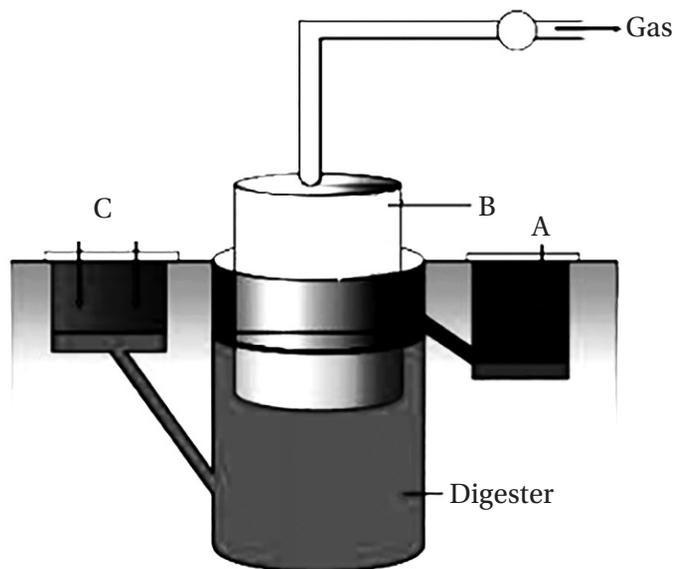


- A. What is the observation of the given experiment show?  
 B. Which bacteria are used in the above experiment?  
 C. What would be the ratio of  $^{15}\text{N} : ^{14}\text{N}$  DNA strands in the bacteria extracted DNA after generation 'Z'?

OR

- D. If the bacteria is allowed to grow in the  $^{15}\text{N}$  medium for 20 minutes and in  $^{14}\text{N}$  medium for next 40 minutes, what will be the number of hybrid and light double stranded DNA molecules, respectively?

30.



[4]

The above diagram shows a biogas plant.

A. Identify (A), (B) and (C)

B. Name the bacteria involved in the production of biogas.

C. Name the animals in which methanogens occur and the role they play in the animals.

OR

D. Write briefly how biogas is generated from activated sludge.

### SECTION E

**Question no. 31 to 33 are long answer type question carrying 5 marks each**

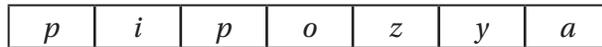
31.	<p>If a desired gene is identified in an organism for some experiment, explain the process of the following:</p> <p>(A) Cutting of desired gene at specific locations.            (B) Synthesis of multiple copies of the desired gene.</p>	[5]
32.	<p>(A) Describe the post zygotic events leading to implantation and placenta formation in humans. Mention any two functions of placenta.</p> <p>OR</p> <p>(B) (a) Draw a diagram of an enlarged view of T.S of one microsporangium of an angiosperm and label the following parts:            (i) Tapetum    (ii) Middle layer    (iii) Endothecium    (iv) Microspore mother cells            (b) Explain the following by giving reasons            (i) Pollen grains are well preserved as fossils            (ii) Pollen tablets are used by atheletes.</p>	[5]

33. (A) Illustrated below is a DNA segment, which constitute a gene.

- (i) Will the whole gene be transcribed into RNA primarily?
- (ii) Name the shaded and unshaded parts of the gene.
- (iii) Explain how these genes are expressed.
- (iv) How is this gene different from prokaryotic gene in its expression?

**OR**

(B) Study the schematic representation of the genes involved in the lac operon given below and answer the following questions:



- (i) Identify and name the regulatory gene in this operon. Explain its role in 'switching off' the operon.
- (ii) Why is the lac operon's regulation referred to as negative regulation?
- (iii) Name the inducer molecule and the products of the genes 'z' and 'y' of the operon. Write the functions of these gene products.

