

Name:

Preboard Exam (2023-24)
CLASS XII BIOLOGY (044)
Set 2

Roll. No.

Maximum Marks: 70

Time: 3 hours

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 labeled diagrams should be drawn.

SECTION - A

Q.No	Question	Marks																				
1.	<p>An infertile couple was advised to undergo In vitro fertilization by the doctor. Out of the options given below, select the correct stage for transfer to the uterus for successful results?</p> <p>(a) Zygote only (b) Zygote or early embryo upto 8 blastomeres (c) Embryos with more than 8 blastomeres (d) Blastocyst Stage</p>	1																				
2.	<p>Given below are four contraceptive methods and their modes of action. Select the correct match:</p> <table border="1"><thead><tr><th>S. No.</th><th>Method</th><th>S. No</th><th>Mode of action</th></tr></thead><tbody><tr><td>a)</td><td>Condom</td><td>(i)</td><td>Prevents movement of ovum from oviduct to uterus</td></tr><tr><td>b)</td><td>Vasectomy</td><td>(ii)</td><td>Prevents implantation</td></tr><tr><td>c)</td><td>Cu-T</td><td>(iii)</td><td>Prevents sperm reaching the cervix</td></tr><tr><td>d)</td><td>Tubectomy</td><td>(iv)</td><td>Semen contains no sperms</td></tr></tbody></table> <p>(a) a)-(i), b)-(ii) c)-(iii) d)-(iv) (b) a)-(ii) b)-(iii) c)-(iii) d) - (i) (c) a)-(iii) b)-(iv) c)-(ii) d)-(i) (d) a)-(iv) b)-(i) c)-(iii) d)-(ii)</p>	S. No.	Method	S. No	Mode of action	a)	Condom	(i)	Prevents movement of ovum from oviduct to uterus	b)	Vasectomy	(ii)	Prevents implantation	c)	Cu-T	(iii)	Prevents sperm reaching the cervix	d)	Tubectomy	(iv)	Semen contains no sperms	1
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N15/N15 :

3

In the Meselson's and Stahl's experiment, the ratio of N14/N15 : N14/N14 in the 1st & 2nd generation is -

- a) 0:1:0; 1:1:0
- b) 1:1:1; 0:2:2
- c) 1:1:0 ; 0:1:1
- d) 1:0:0; 0:2:0

1

4

Evolutionary divergence is development of a

- (a) common set of functions in groups of different ancestry.
- (b) dissimilar set of functions in closely related groups.
- (c) common set of structures in closely related groups.
- (d) dissimilar set of functions in unrelated groups.

1

5.

Case 1- A person is given vaccination for Covid -19.
Case 2- A person is given antibodies when he is bitten by a snake.
Name the kind of immunity in Case 1 & 2-

	Case 1	Case 2
(a)	Active	Active
(b)	Passive	Passive
(c)	Passive	Active
(d)	Active	Passive

1

6.

Interferons are most effective in making non-infected cells resistant against the spread of which of the following diseases in humans?

- (a) Amoebic dysentery
- (b) dengue fever
- (c) typhoid
- (d) malaria

1

7.

Which of the following water samples in the table given below, will have a lower concentration of organic matter?

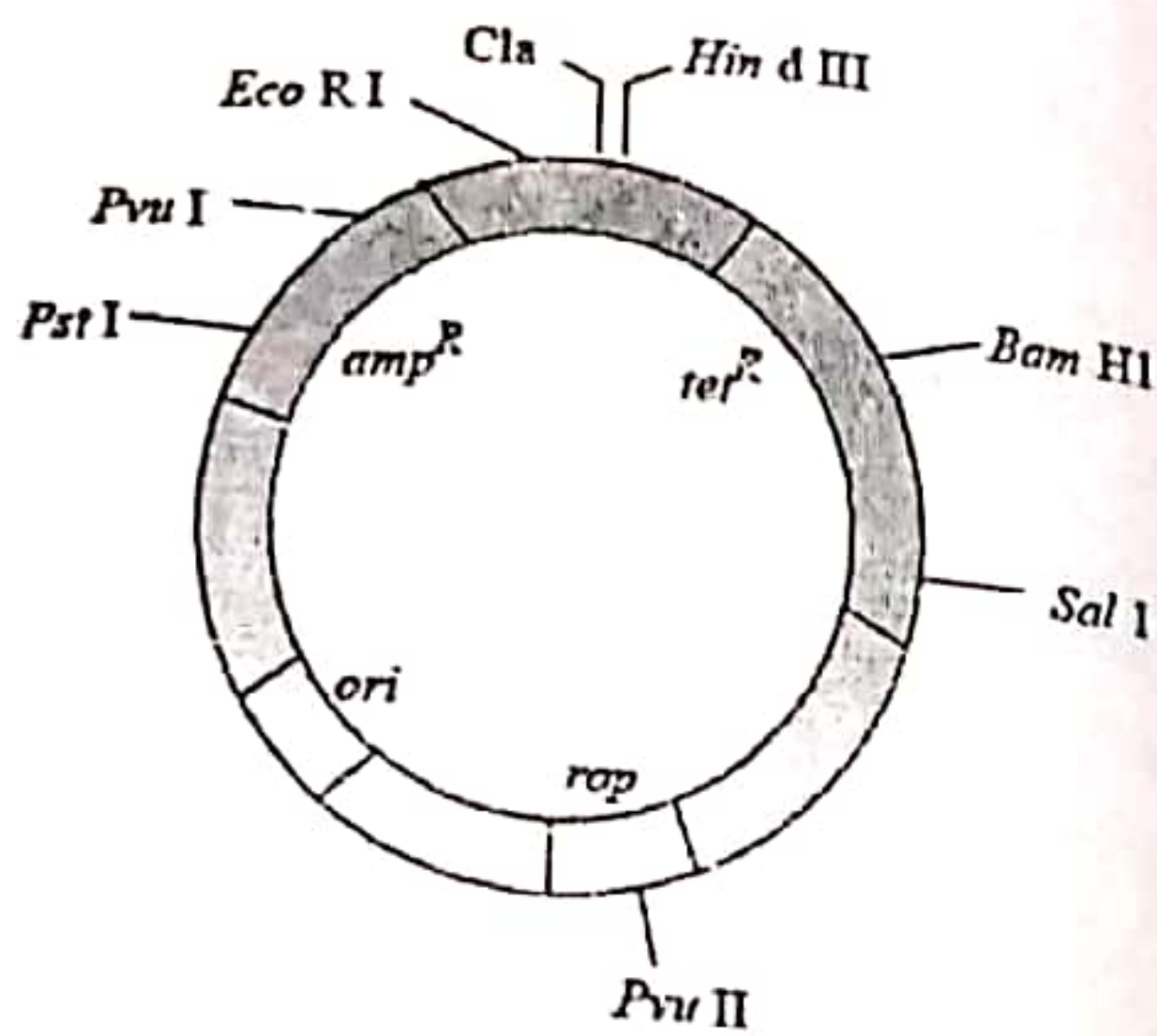
Water Sample	Level of pollution	Value of BOD
(a)	High	High
(b)	Low	Low
(c)	Low	High
(d)	High	Low

1

8.

The figure below shows the structure of a plasmid.

1



A foreign DNA was ligated at Pvu I. The transformants were then grown in a medium containing antibiotics tetracycline and ampicillin.

Choose the correct observation for the growth of bacterial colonies from the given table

	Medium with Tetracycline	Medium with Ampicillin
(a)	Growth	No growth
(b)	No growth	Growth
(c)	No growth	No growth
(d)	Growth	Growth

9.

Shreya was growing a bacterial colony in a culture flask under ideal laboratory conditions where the resources are not replenished. Which of the following equations will represent the growth in this case?

1

(Where population size is N , birth rate is b , death rate is d , unit time period is t , and carrying capacity is K).

- (a) $dN/dt = (b-d) \times N$
- (b) $dN/dt = r N$
- (c) $dN/dt = r N(K-N/K)$
- (d) $dN/dt = r N(K+N/K)$

10.

Herbivores eating plants is an example of -

1

- (a) amensalism.
- (b) commensalism.
- (c) predation.
- (d) parasitism.

11.	<p>Food chain 1- Phytoplankton → Zooplankton → Small fish → Bird</p> <p>Food chain 2- Grass → Goat → Lion</p> <p style="text-align: center;"><i>Food chain 1</i></p> <p>(a) Grazing (b) Detritus (c) Detritus (d) Grazing</p> <p style="text-align: center;"><i>Food chain 2</i></p> <p>Grazing Detritus Grazing Detritus</p>	1
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12	<p>Which of the following is an example of <i>in situ</i> conservation?</p> <p>(a) Zoological Park (b) National Park (c) Safari Park (d) Seed Bank</p>	1
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Question No. 13 to 16 consist of two statements - Assertion (A) and Reason (R). Answer these 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.

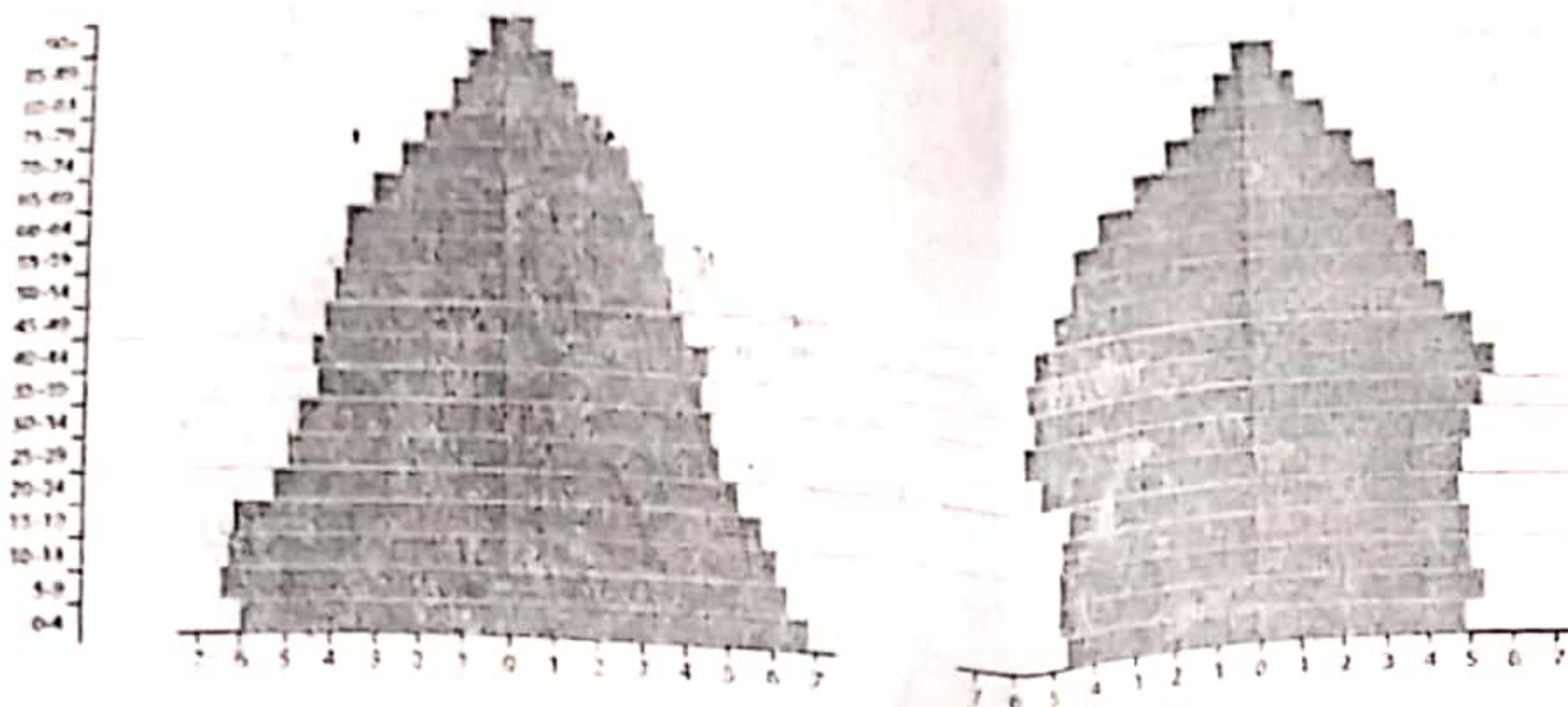
13.	<p>Assertion: Date palm can undergo cross-pollination</p> <p>Reason: It bears bisexual flowers.</p>	1
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14.	<p>Assertion: When white eyed, yellow bodied <i>Drosophila</i> females were hybridized with red eyed, brown-bodied males; and F1 progeny was intercrossed, F2 progeny had 62.8% parental types and 37.2% recombinant types.</p> <p>Reason: When two genes in a dihybrid are on the same chromosome, the proportion of parental gene combinations is much higher than the non-parental type.</p>	1
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15.	<p>Assertion: Functional ADA cDNA genes must be inserted in the lymphocytes at the early embryonic stage.</p> <p>Reason: Adenosine Deaminase complementary Deoxyribonucleic Acid is inserted.</p>	1
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15.	<p>Given below are two Age Pyramids of different populations. The male population is on the left hand side, female population is on the right hand side, newborns towards the base and gradually increasing age groups as we move from base to the top, with the oldest population at the top. Study</p>	1
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the pyramids and comment upon the appropriateness of the Assertion and the Reason.



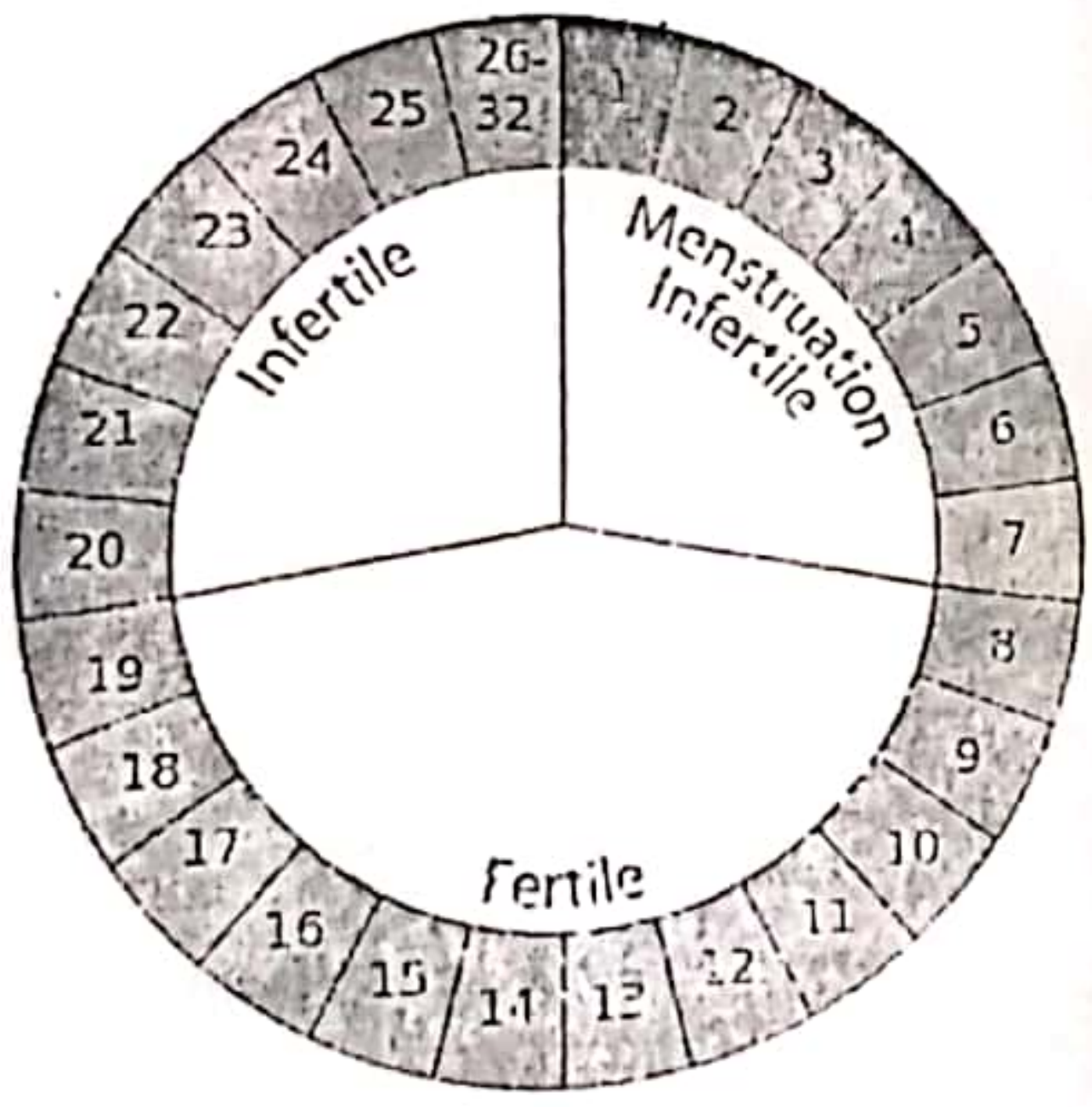
Assertion: The 1st pyramid is an expanding one & the 2nd one is of a stable population.

Reason: Expanding has maximum in pre-reproductive and stable has equal number of reproductive and pre-reproductive individuals

SECTION - B

17. Study the figure and answer the questions that follow:

2



- (a) Which days are considered the most fertile? Why is the period of 20-28 days considered infertile?
- (b) Which hormones peak in the fertile period shown here? Which phase of the menstrual cycle is this?

18. A lady with curly hair (homozygous dominant) marries a man with straight hair (homozygous recessive). Their children will have wavy hair. Show the same with the help of a cross, name and explain the phenomenon.

2

19. A person is suffering from sustained high fever and stomach pain. How will the doctor diagnose the disease? Name the disease and causal organism & two preventive measures.

2

20

CCTAGG
GGATCC

2

- (a) The above sequence is cut by BamHI between the 2 G's. What kind of strands will be produced?
- (b) Draw a diagram to show the joining of foreign and plasmid DNA, having the same sequence.

21

2

- (a) Draw a pyramid of numbers and biomass for the given food chain-

Phytoplanktons → Zooplanktons → Whale

- (b) State the difference and explain.

OR

- (a) Draw two food chains to show the same organism at two different trophic levels.

- (b) Calculate and compare the energy available to this organism if the energy available from the Sun is 100kJ

SECTION - C

22

3

Draw an analogy to prove that different species are important for sustenance of an ecosystem as given by Paul Ehrlich.

23

3

- (a) Mathematically express the Hardy-Weinberg Principle.
- (b) State and explain the phenomenon that leads to speciation if a group of mountain goats separated due to a landslide, cannot go back to original population and start breeding with each other and cannot do so with the original population.

24

3

Draw a diagram showing activated tRNA with the amino acid- Phenylalanine

25

State the agent(s) which helps in pollinating in the following plants. Explain the adaptations in these plants to ensure pollination:

- (a) Zostera
- (b) Mustard
- (c) Grasses

3

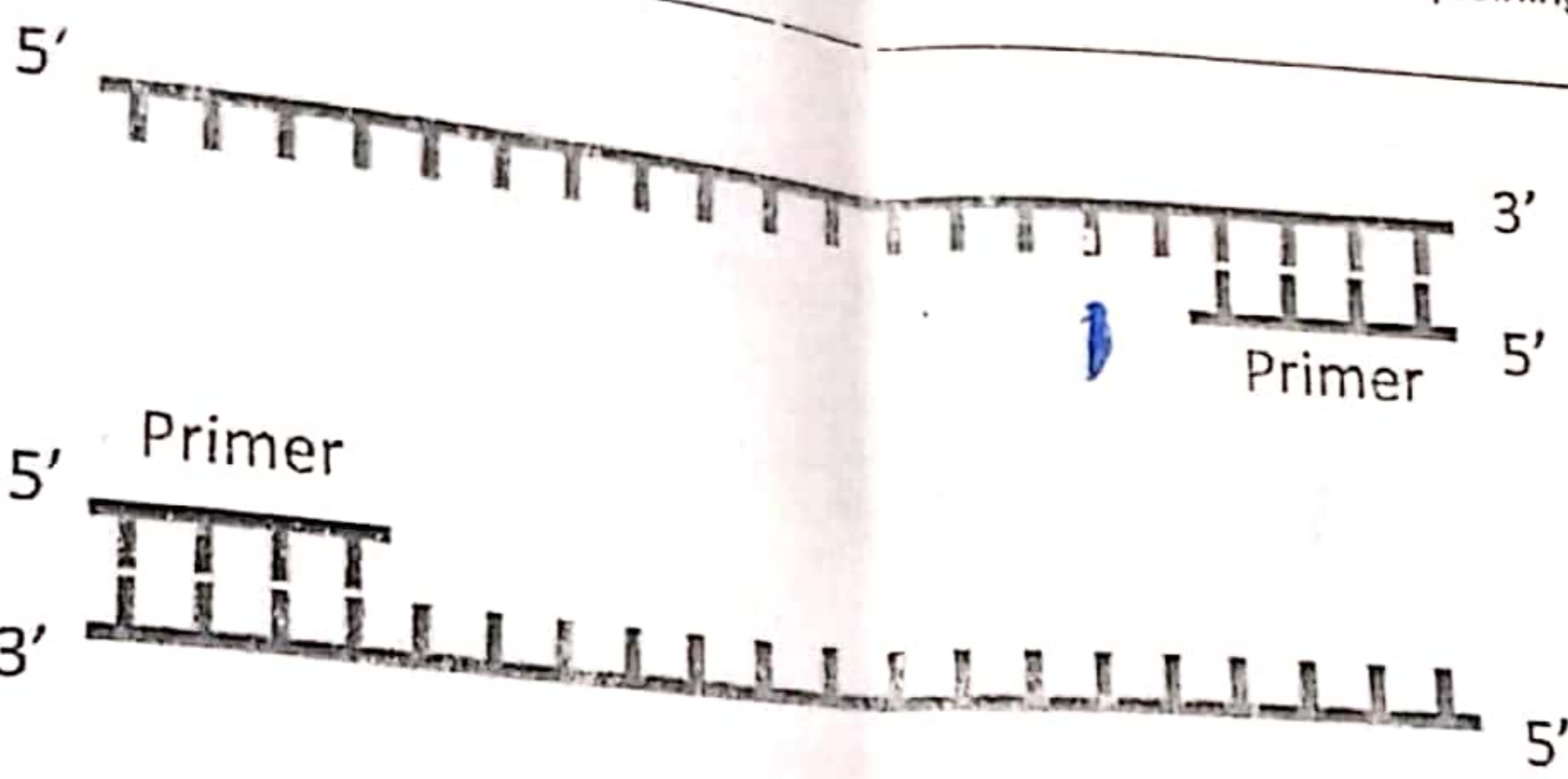
26

First time infection with measles produces a poor response such that the person suffers from the disease. Second time infection is so potent that it prevents infection. Explain the difference using appropriate terminology. Highlight the importance of vaccination programs with respect to the above concept.

3

OR
Differentiate between innate and acquired immunity, stating and explaining their types.

27



3

- (a) Identify the stage in the above figure. What if this stage was not there?
- (b) What is the preceding step and how can it be brought about?
- (c) The DNA strands can be multiplied ~ 1 billion times, in how many cycles?
- (d) Give one application of the technique involved

28

Explain the functions of the following structures in the human female reproductive system.

3

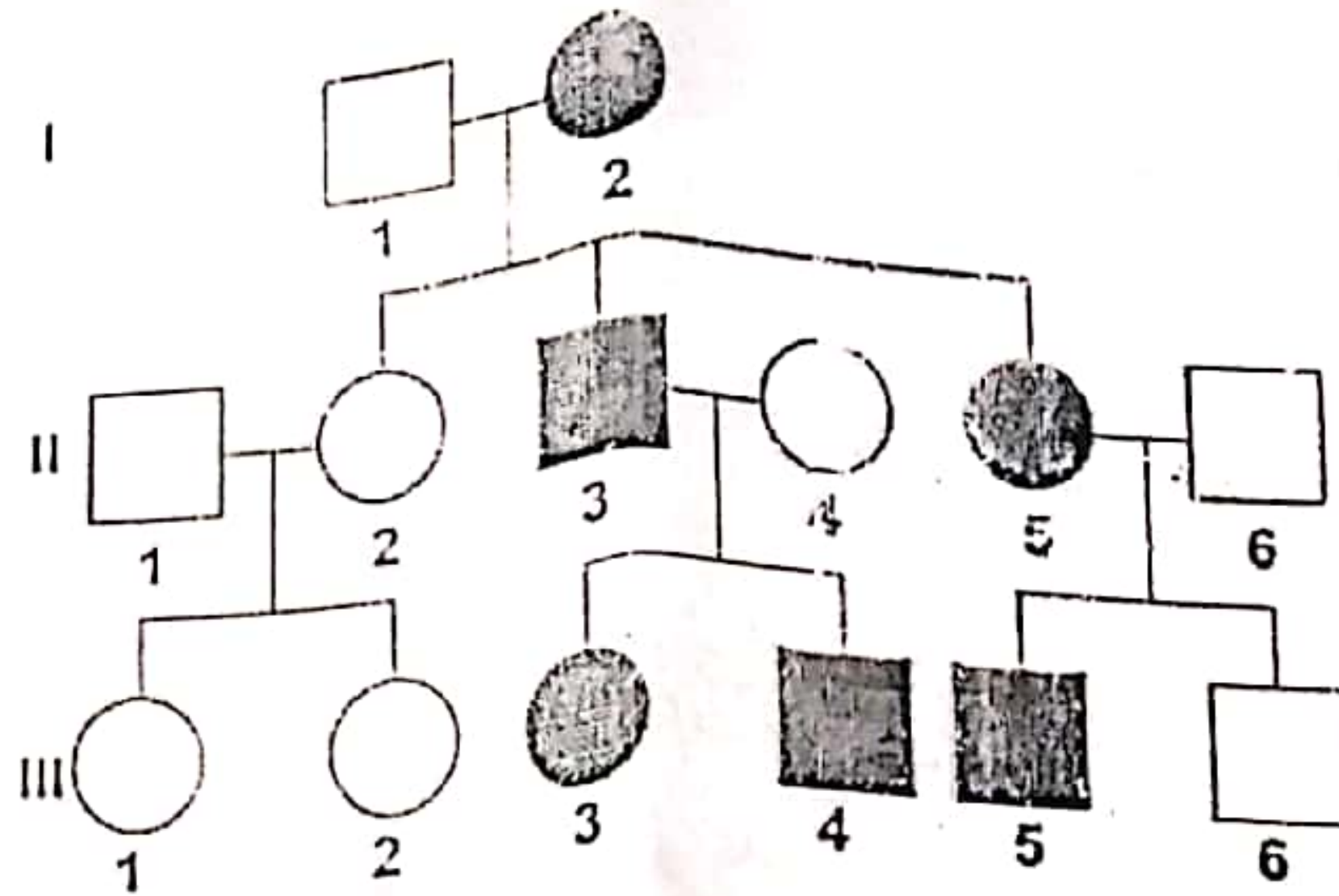
- (a) oviduct
- (b) uterus
- (c) vagina

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

1+1+2

29.

Study the Pedigree chart given below and answer the questions that follow:



- (a) On the basis of the inheritance pattern exhibited in this pedigree chart, what conclusion can you draw about the pattern of inheritance?
- (b) Name a disease that follows the same pattern of inheritance.
- (c) Give the genotype of parents 1 and 2 in generation I and explain.

OR

- (c) (c) What are the genotypes of 3 & 5 in generation II? Give a reason why both kids of 3&4 of generation III are affected whereas only one is affected out of 5&6 of generation III?

Read the given paragraph and answer the questions that follow:

Anabolic steroids are synthetic (man-made) versions of testosterone. Testosterone is the main sex hormone in men. Women do have some testosterone in their bodies, but in much smaller amounts.

Health care providers use anabolic steroids to treat some hormone problems in men, delayed puberty, and muscle loss from some diseases. But some people misuse anabolic steroids. Some Olympians also have known to be using these drugs.

- (a) What is the importance of testosterone in males?
- (b) Why do people use anabolic steroids?

30.

(c) What are the legal and illegal uses of these steroids?

1+1+2

(c) What will be the side effects in females if they use anabolic steroids?
OR

SECTION - E

31

Explain the two processes of spermatogenesis and spermiogenesis by drawing a schematic diagram.

5

OR

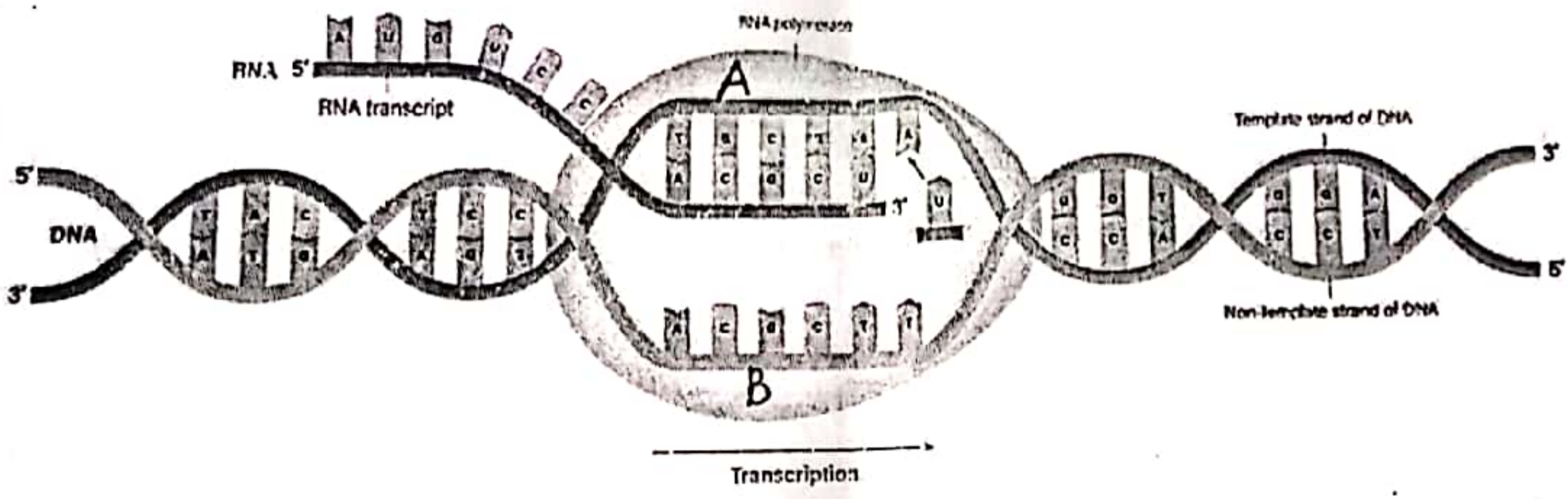
Diagrammatically represent the process of megasporogenesis and explain the kinds of divisions involved.

32.

Observe the diagram showing transcription of mRNA :

5

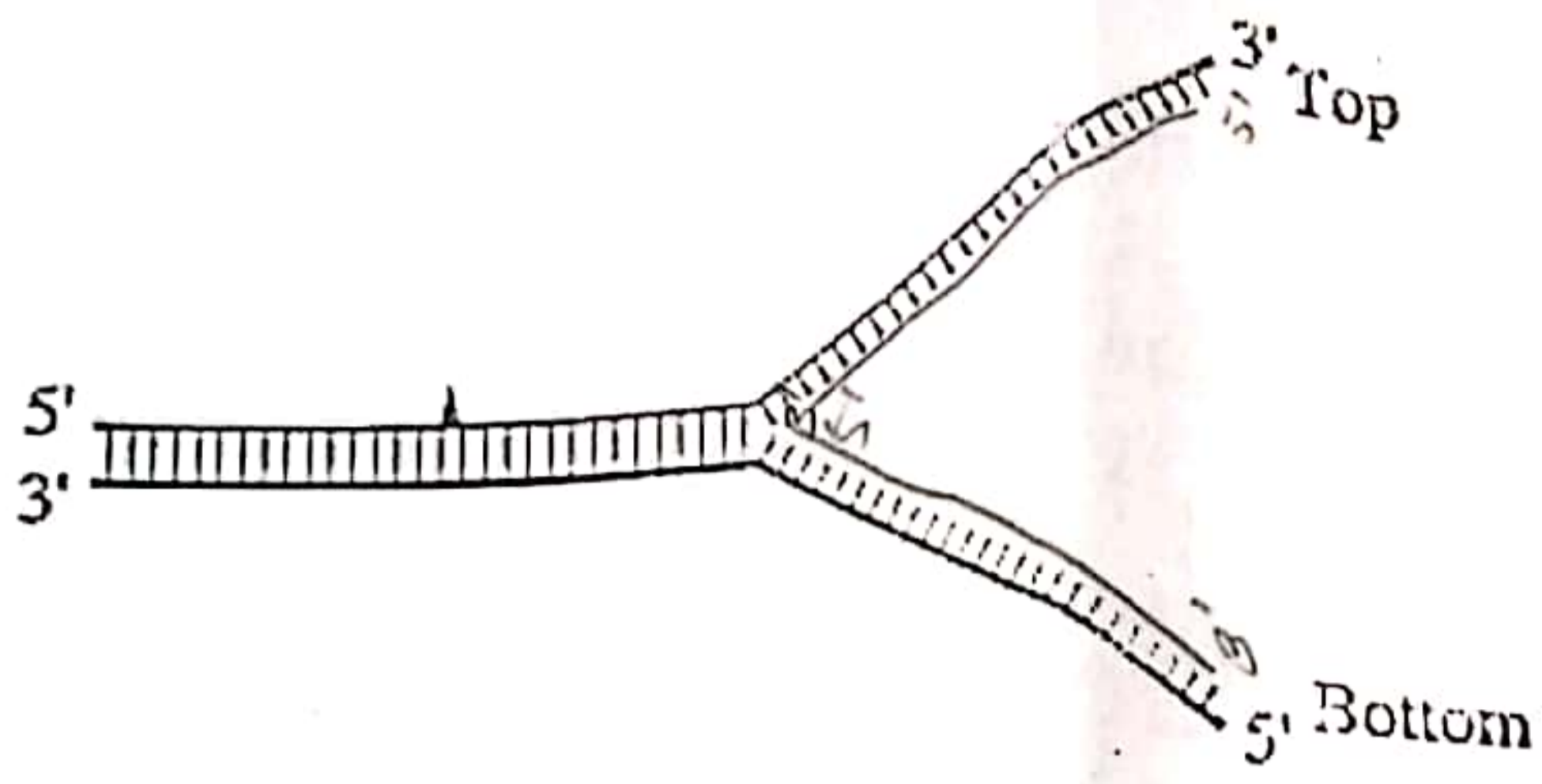
Transcription



- (a) Identify the stage. What is the full name of the enzyme involved?
- (b) Mark A and B ^{strands} and state their significance.
- (c) Due to a mutation the rho factor loses its typical conformation. What impact will it have on the process?

OR

Study the schematic representation given below and answer the questions that follow:

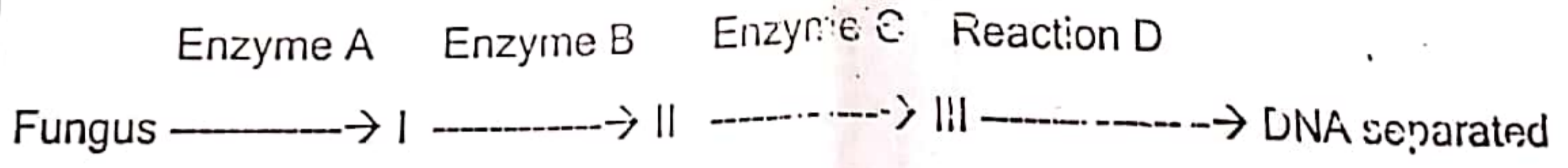


- (a) Identify the diagram and process. Write the full name of the enzyme that brings about the above process.
- (b) What are the substrates? State the two roles that the substrate plays.
- (c) Name the two kinds of synthesis and the resultant strands formed. Why is it so and what is done to complete the process?

33.

5

(a) In an experiment for extraction of genomic DNA from fungi the following steps are involved-



Complete the flow chart, also stating the changes that occur at step I, II & III.

(b) How will a desired fungal gene be obtained for rDNA technology? Will the above technique be applied? Explain.

OR

Explain all the steps of rDNA technology in case an antibiotic resistance gene-Tet^R is to be introduced in E.coli. How will it be selected?