

Part – III

Time : 2 Hours

**BIOLOGY**

Cool-off time : 15 Minutes

**(Botany & Zoology)**

Preparatory Time : 10 Minutes

Maximum : 60 Scores

**General Instructions to Candidates :**

- There is a 'Cool-off time' of 15 minutes in addition to the writing time. Further there is a '10 minutes' 'Preparatory Time' at the end of the Botany Examination and before the commencement of Zoology Examination.
- Use the 'Cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- Read the instructions carefully.
- Calculations, figures and graphs should be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

**വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :**

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും. കൂടാതെ ബോട്ടനി പരീക്ഷയ്ക്കുശേഷം സുവോളജി പരീക്ഷ തുടങ്ങുന്നതിനുമുമ്പ് '10 മിനിറ്റ്' തയ്യാറെടുപ്പുകൾ നടത്തുന്നതിനായി നൽകുന്നതാണ്. ഈ വേളകളിൽ ചോദ്യങ്ങൾക്ക് ഉത്തരം എഴുതാനോ, മറ്റുള്ളവരുമായി ആശയ വിനിമയം നടത്താനോ പാടില്ല.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

**PART – A**

**BOTANY**

**(Maximum : 30 Scores)**

**Time : 1 Hour**

- I. Answer any 3 questions from 1 to 5. Each carries 1 score.**

**(3 × 1 = 3)**

1. Decomposition would be fast if the detritus contains \_\_\_\_\_.

- (a) Cellulose
- (b) Lignin and chitin
- (c) Nitrogen and water soluble sugars
- (d) Cellulose and pectin

2. Name the method in which the alien DNA is directly injected into the nucleus of an animal cell.

3. Observe the first pair and fill in the blanks.

Population interaction in which one species benefits and other is neither harmed nor benefited : Commensalism

Population interaction where one species is harmed and other is unaffected : \_\_\_\_\_.

4. If any protein coding gene is expressed in a heterologous host, the protein formed is called \_\_\_\_\_.

5. Which among the following is a non-albuminous seed ?

(Wheat, Groundnut, Maize, Barley)

**II. Answer any 9 questions from 6 to 16. Each carries 2 scores.**

(9 × 2 =

6. (a) Tapetum play an important role in the development of male gametophyte. Give reason.
- (b) Write any one peculiarity of tapetal cell.
7. Write the steps in making the bacterial cell competent to take up the recombinant DNA.
8. (a) Define Gross primary productivity.
- (b) What are the factors affecting primary productivity ?
9. Apomixis is a blessing to agriculture. Justify the statement with reasons.
10. (a) What is population density ?
- (b) List any two ways of measuring population density of a habitat.

11. Match the following :

- |                                |   |            |
|--------------------------------|---|------------|
| 1. ADA deficiency              | – | AIDS       |
| 2. Humen $\alpha$ -lactalbumin | – | Emphysema  |
| 3. ELISA                       | – | Genethrapy |
| 4. $\alpha$ -1 Antitrypsin     | – | Rosie      |

12. The most spectacular and evolutionarily fascinating examples of mutualism are found in plant – animal relationship. Elucidate with examples.

13. Give suitable terms for the following :

- (a) A technique in plant biotechnology in which two different plant protoplasts are fused to create a hybrid with desirable traits from different varieties of plants.
- (b) Genetically identical plants obtained by micropropagation.

14. The species facing competition might evolve mechanism that promote co-existence rather than exclusion. Evaluate the statement.

15. (a) Write the first trophic level of Grazing food chain and detritus food chain.

(b) In aquatic ecosystem, which food chain is the major conduit for energy flow ?

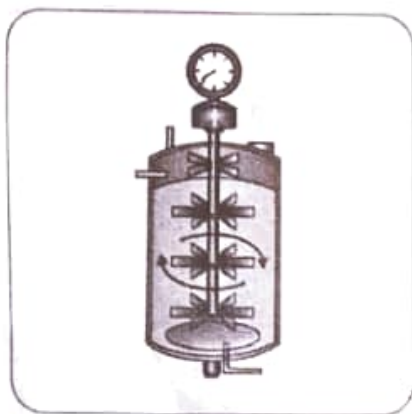


16. Pathogens are used very effectively in biotechnology to transfer the DNA into host cells (plant and animal cell). Substantiate with suitable example.

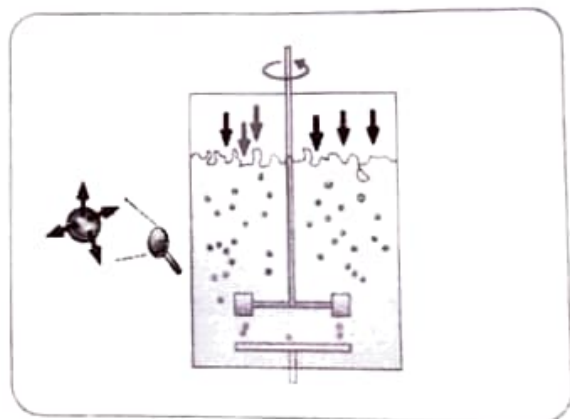
(3 × 3 = 9)

**III. Answer any 3 questions from 17 to 20. Each carries 3 scores.**

17. (a) What are the adaptations of water pollinated flowers ?  
(b) Give examples for the following :  
(i) A water pollinated plant where pollen released on the surface of water  
(ii) Water pollinated plant where pollen released inside the water
18. For effective treatment of a disease, early diagnosis and understanding its pathophysiology is very important. Early detection is possible through molecular diagnosis. Explain three molecular diagnostic tools for the early detection of disease.
19. Given below the diagram of two bioreactors.
- (a) Identify (i) and (ii).
- (b) Compare the functioning mechanism of the two reactors.



(i)



(ii)

20. Given below the organisms of a Grassland eco-system.

Grasshopper, Grass, Snake, Frog

- (a) Draw the pyramid of numbers.
- (b) Pyramid of biomass in a marine eco-system is inverted. Give reason.
- (c) Write any one limitation of ecological pyramids.

**PART - B**

**ZOOLOGY**

**Time : 1 Hour**

**(Maximum : 30 Scores)**

**(3 × 1 = 3)**

**I. Answer any 3 questions from 1 to 5. Each carries 1 score.**

1. Name the oral contraceptive for female developed by CDRI.
2. Exaggerated response of the immune system to certain antigens present in the environment is called \_\_\_\_\_.
3. Note the relationship between the first two words and fill the missing word.
  - (a) Primary sex organ in male : Testes;  
Primary sex organ in female : \_\_\_\_\_.
  - (b) Leydig cells : Androgen;  
Corpus luteum : \_\_\_\_\_.
4. How many Thymine bases will a double stranded DNA have, if it has 30 Adenine bases ?
5. Select the genetic disorder in which a blood clotting protein is affected leading to a non-stop bleeding even through a simple wound.

(Phenylketonuria, Haemophilia, Thalassemia, Sickle-cell Anaemia)

II. Answer any 9 questions from 6 to 16. Each carries 2 scores.

6. In a debate conducted in school, a student argued that, 'AIDS can be transmitted through touch or physical contact'.

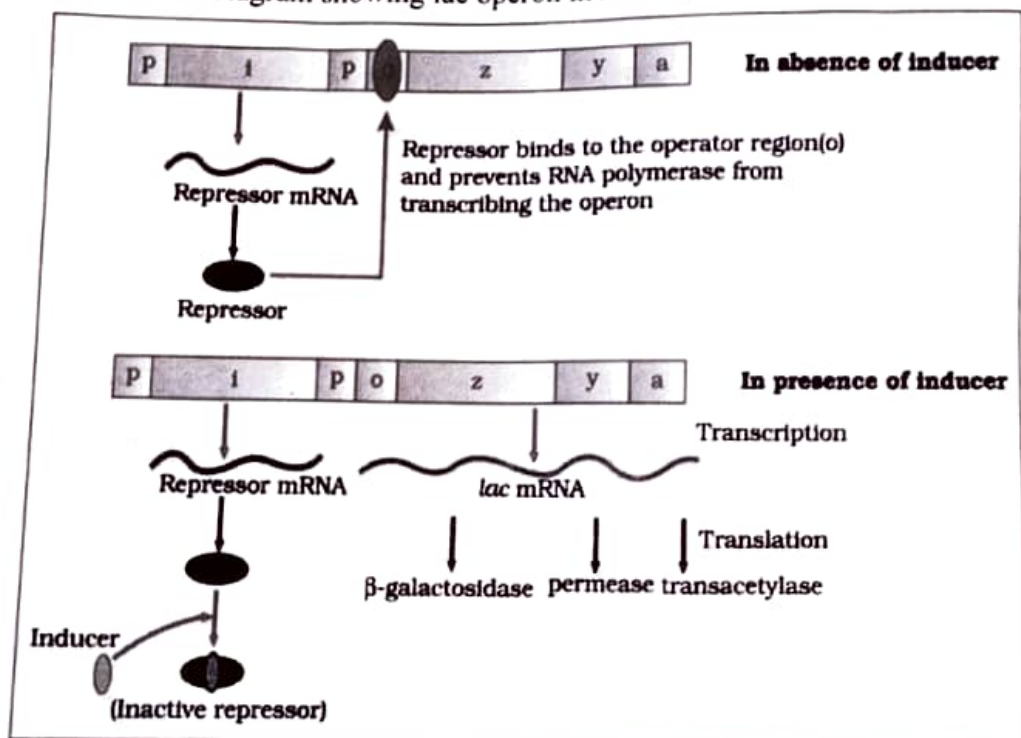
- Do you agree with this statement? Substantiate.
- Name the clinical test used to diagnose AIDS.
- Write any one measure to prevent AIDS.

7. Complete the table.

Hints : Biocontrol, *Clostridium butylicum*, Citric Acid, Lactic Acid-Bacteria

Microorganism	Uses of Microorganism
a	Curdling of milk
<i>Bacillus thuringiensis</i>	b
<i>Aspergillus niger</i>	c
d	Production of butyric acid

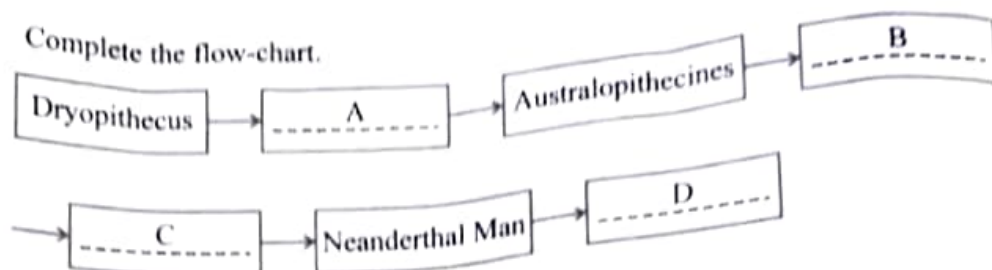
8. Observe the diagram showing lac operon in *E. coli*.



- Name the inducer.
- What do the letters 'o' and 'p' in lac operon stand for?



9. Complete the flow-chart.



10. Given below is a table showing codons of various amino acids. Observe it and write the name of :

- (a) Stop codons  
(b) Initiator codon

First position	Second position				Third position
	U	C	A	G	
U	UUU Phe	UCU Ser	UAU	UGU	U
	UUC Phe	UCC Ser	UAC	UGC	C
	UUA Leu	UCA Ser	UAA	UGA	A
	UUG Leu	UCG Ser	UAG	UGG	G
C	CUU Leu	CCU Pro	CAU His	CGU Arg	U
	CUC Leu	CCC Pro	CAC His	CGC Arg	C
	CUA Leu	CCA Pro	CAA Gln	CGA Arg	A
	CUG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	AUU Ile	ACU Thr	AAU Asn	AGU Ser	U
	AUC Ile	ACC Thr	AAC Asn	AGC Ser	C
	AUA Ile	ACA Thr	AAA Lys	AGA Arg	A
	AUG Met	ACG Thr	AAG Lys	AGG Arg	G
G	GUU Val	GCU Ala	GAU Asp	GGU Gly	U
	GUC Val	GCC Ala	GAC Asp	GGC Gly	C
	GUA Val	GCA Ala	GAA Glu	GGA Gly	A
	GUG Val	GCG Ala	GAG Glu	GGG Gly	G

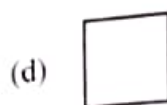
11. Expand :

- (a) ZIFT  
(b) ICSI

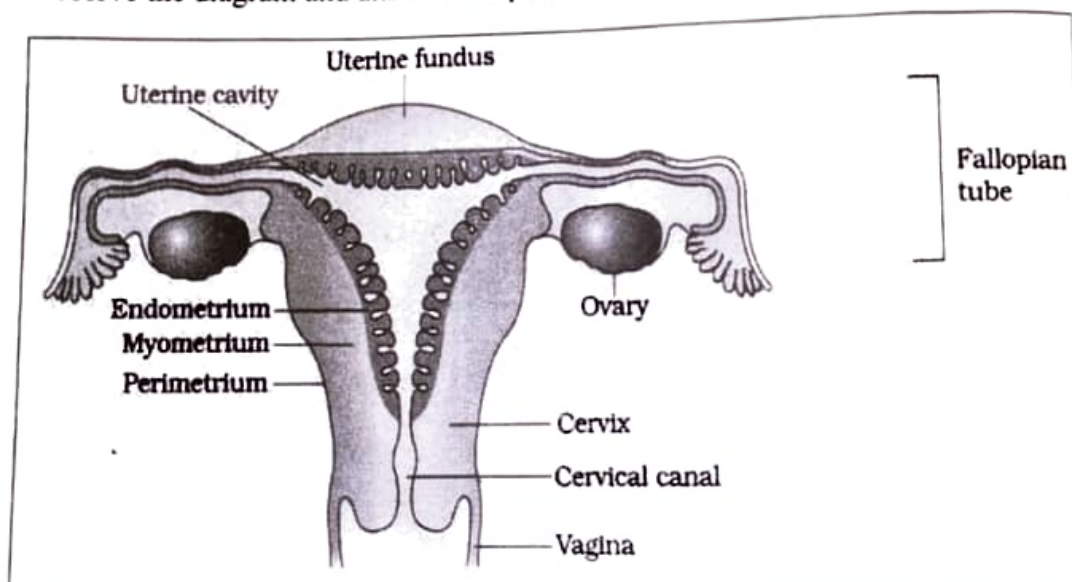
12. Match the following :

Column A	Column B
Physical Barrier	Neutrophil
Physiological Barrier	Skin
Cellular Barrier	Interferon
Cytokine Barrier	Saliva in mouth
	Antibody

13. First child of a couple was affected with sickle-cell anaemia. During the second pregnancy, they visited a genetic counsellor and he prepared a pedigree chart of the family. Identify these symbols used in a pedigree chart.



14. Observe the diagram and answer the questions about oviduct.



- (a) Finger like projections that help in collection of ovum.
- (b) Part of oviduct with narrow lumen that joins the uterus.
- (c) Funnel shaped part of oviduct that is seen near the ovary.
- (d) Site of fertilisation.

15. Snapdragon plants have red flowers and white flowers. If red flowered plants are crossed with white flowered ones,  $F_1$  generation produce pink flowers.

- (a) Name this pattern of inheritance.
- (b) Write the genotypic and phenotypic ratio of  $F_2$ .

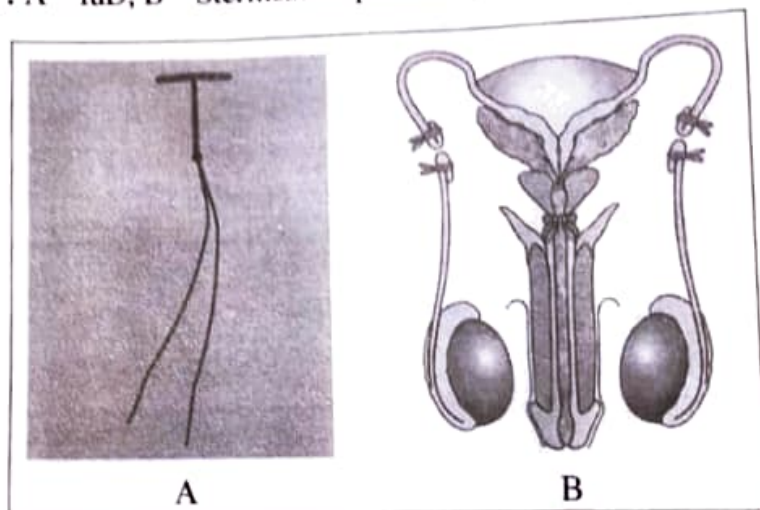
16. In a population, the allele frequency of a species is  $p^2 + 2pq + q^2 = 1$ .

- (a) Name the principle.
- (b) Mention any 3 factors that may affect it.

**III. Answer any 3 questions from 17 to 20. Each carries 3 scores.**

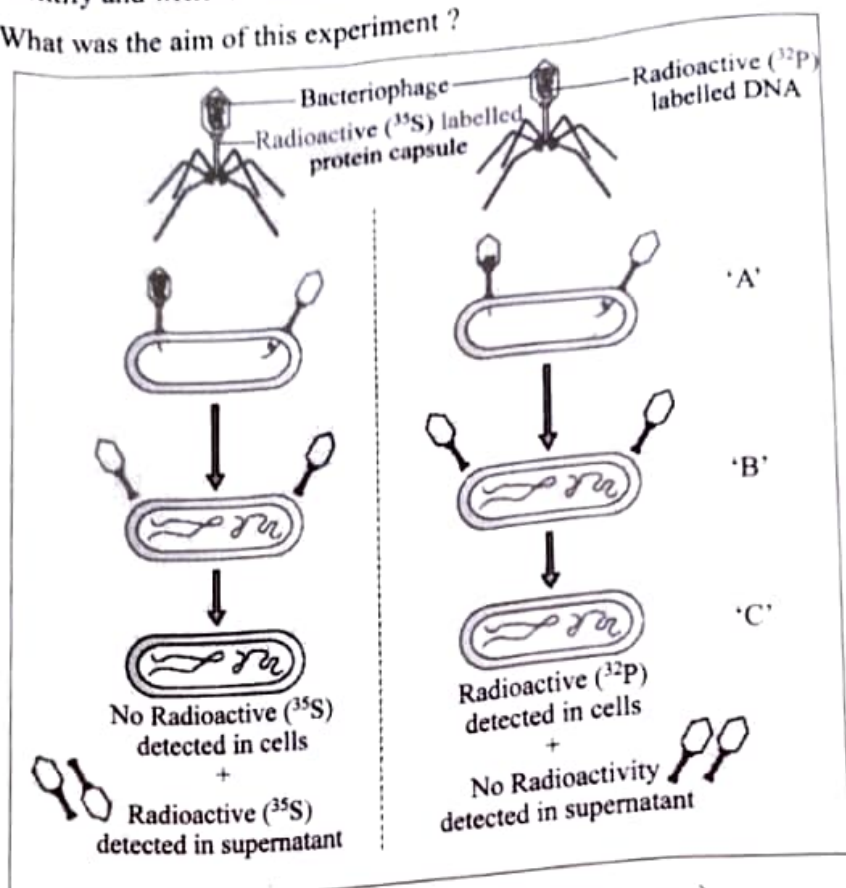
17. (a) Identify pictures 'A' and 'B'.

**Hint :** A – IUD, B – Sterilisation procedure in male



- (b) Amniocentesis for sex-determination is banned in our country. Is this necessary? Comment.

18. (a) Identify and write the name of the experiment shown in figure.  
 (b) What was the aim of this experiment ?



- (c) Name the processes marked as 'A', 'B' and 'C'/(3 steps).

19. The accelerated rates of species extinction that the world is facing now are largely due to human activities.

'Evil Quartet' is the sobriquet used to describe biodiversity loss.

- (a) List out the 4 major causes of biodiversity loss.  
 (b) Mention 2 major approaches to biodiversity conservation.

20. Male heterogamety is seen in humans and *Drosophila*.

- (a) What is male heterogamety ?  
 (b) How is sex determined in man ?  
 (c) Is sperm or egg responsible for sex determination in chicks ? Explain.