SET - 3

Roll No. | | | | | | | Candidates must write the Set No on the title page of the answer book.

SAHODAYA PRE BOARD EXAMINATION – 2023-24

- Please check that this question paper contains 12 printed pages.
- Set number given on the right-hand side of the question paper should be written on the title page of the answer book by the candidate.
- Check that this question paper contains 33 questions.
- Write down the Serial Number of the question in the left side of the margin before attempting it.
- 15 minutes time has been allotted to read this question paper. The question paper will be distributed 15 minutes prior to the commencement of the examination. The students will read the question paper only and will not write any answer on the answer script during the period. Students should not write anything in the question paper.

CLASS – XII

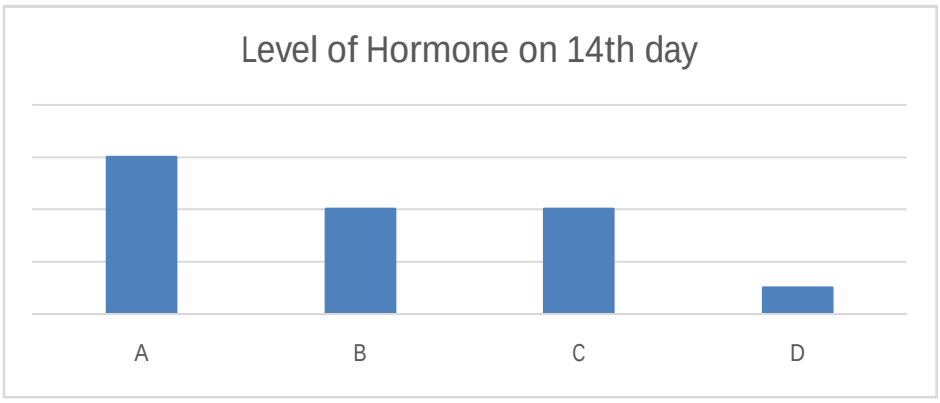
Sub.: BIOLOGY (044)

Time Allowed: 3 hours **Maximum Marks: 70**

General Instructions:

- All questions are compulsory.
- The question paper has five sections and 33 questions. All questions are compulsory.
- 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	
1.	In the embryo of a typical dicot and a grass, true homologous structures are :- (a) Coleoptile and coleorhiza (b) Embryo and endosperm (c) Cotyledon and Scutellum (d) Endosperm and perisperm	**[1]**
2.	_____ was helpful in polymerizing RNA with defined sequences in a template independent manner. (Select the correct option for the blanks). (a) DNA polymerase (b) RNA polymerase (c) DNA-dependent RNA polymerase (d) Polynucleotide phosphorylase	**[1]**

3.	 Identify the correct sequence of A – D. (a) LH, Progesterone, FSH, Oestrogen (b) FSH, LH, Progesterone, Oestrogen (c) Progesterone, Oestrogen, FSH, LH (d) LH, FSH, Oestrogen, Progesterone.	**[1]**
4.	Find the correct match. List-1 — List-2 (1) Diaphragm — (i) Inhibit ovulation and implantation. (2) Contraceptive pills — (ii) Increase phagocytosis of sperms within uterus. (3) Intra uterine devices — (iii) Absence of menstrual cycle and ovulationfollowing parturition (4) Lactational Amenorrhoea — (iv) They cover the cervix blocking the entry of sperms (a) (1)-(ii), (2)-(iv), (3)-(i), (4)-(iii) (b) (1)-(iii), (2)-(ii), (3)-(i), (4)-(iv) (c) (1)-(iv), (2)-(i), (3)-(iii), (4)-(ii) (d) (1)-(iv), (2)-(i), (3)-(ii), (4)-(iii)	**[1]**
5.	The frequency of recessive sex-linked gene for colorblindness in a human female population is 0.02, whereas the frequency of its normal allele is 0.98. What is the proportion of colorblind and carrier female in this population? (a) 0.0004 : 0.0392 (b) 0.0002 : 0.0098 (c) 0.004 : 0.392 (d) 0.04 : 0.098	**[1]**
6.	Match the items in Column-A and Column-B and choose the correct answer. Column-A — Column-B (1) Lady bird — (i) Methanobacterium (2) Mycorrhiza — (ii) Trichoderma (3) Biological control — (iii) Aphids (4) Biogas — (iv) Glomus (a) (1)-(ii), (2)-(iv), (3)-(iii), (4)-(i) (b) (1)-(iii), (2)-(iv), (3)-(ii), (4)-(i) (c) (1)-(iv), (2)-(i), (3)-(ii), (4)-(iii) (d) (1)-(iii), (2)-(ii), (3)-(i), (4)-(iv)	**[1]**

7. This is a punnet square of F_2 generation of dihybrid cross (TtRr × TtRr) given below: **[1]**

♀ → ♂ ↓	TR	Tr	tR	tr
TR	A	B	C	D
Tr	E	F	G	H
tR	I	J	K	L
tr	M	N	O	P

Find the incorrect option.

(a) The genotype of C is same with genotype of I

(b) The phenotype of F is same with phenotype of N

(c) M and D have same genotype

(d) F and K have same phenotype

8. An autosomal linked recessive trait can be transmitted from parents to the offsprings when **[1]**

(i) One of the parent is homozygous recessive and other is heterozygous

(ii) Both the parents are heterozygous

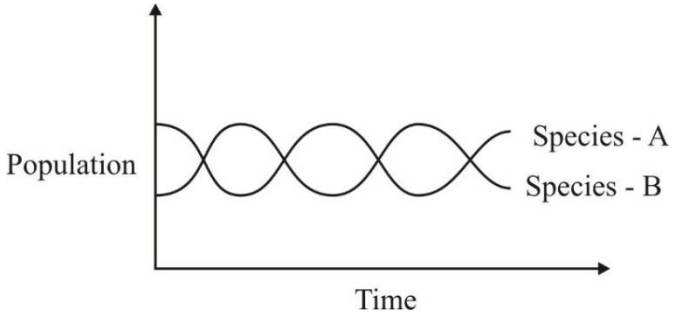
(iii) Both the parents are homozygous recessive

(iv) Both are either homozygous recessive or heterozygous

(a) only (i) and (ii) (b) only (iii) and (iv)

(c) (i), (ii) and (iii) only (d) (i), (ii), (iii) and (iv)

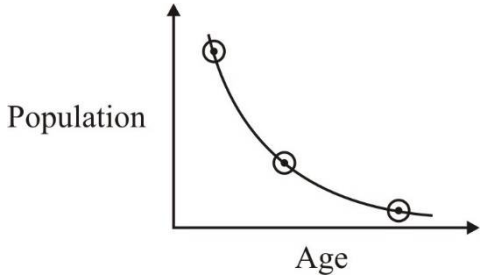
9. What is the relation between Species A and Species B in a forest ecosystem? **[1]**



(a) Symbiosis (b) Predation

(c) Commensalism (d) Ammensalism

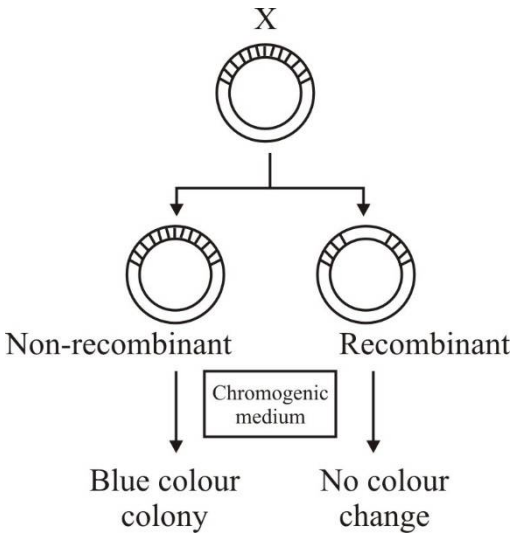
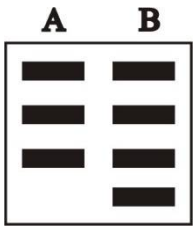
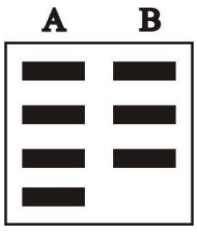
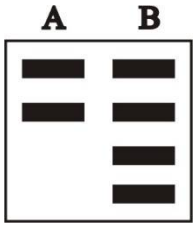
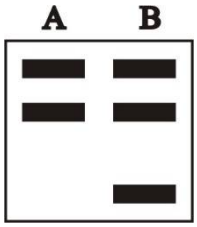
10. An age pyramid is given in graphical pattern for a population. **[1]**

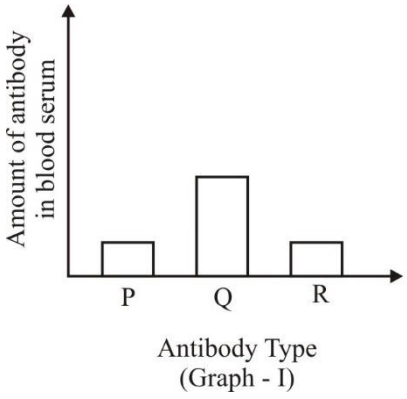
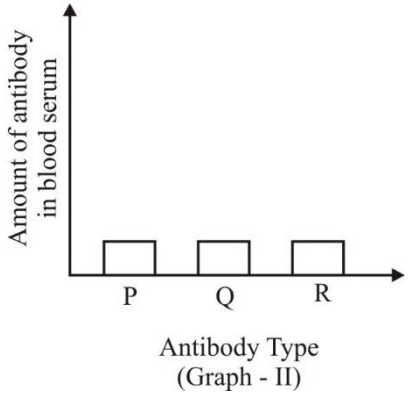


The above pattern reflects that the population is

(a) Expanding (b) Stable

(c) Declining (d) Cannot be predicted

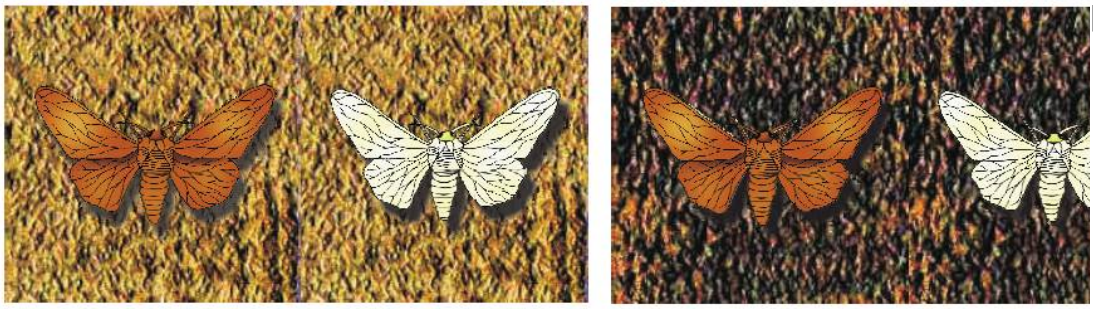
11.	 Inthe above diagram X is a marker gene related to: (a) Antibiotic resistance (b) Enzyme production (c) Humulin production (d) Antibiotic synthesis	**[1]**
12.	pBR322 (A) is an artificial plasmid having two restriction sites for EcoRI, while T_2 bacteriophage (B) has three restriction sites for EcoRI. After restriction digestion the DNA fragments are allowed to run on agarose gel. Which of the following correctly depict the gel electrophoresis pattern? (a)  (b)  (c)  (d) 	**[1]**
13.	**Assertion :** DNA replication in bacteria is bidirectional. **Reason :** A chromosome with primary constriction is called SAT-chromosome. (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion. (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion. (c) If Assertion is true but Reason is false (d) If Assertion is false but Reason is true	**[1]**

14.	**Assertion :** Endomycorrhiza of forest trees contribute to the efficient nutrient cycling in tropical forest ecosystem. **Reason :** The fungi that formed mycorrhizal association with plant make nutrient ions available to them. (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion. (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion. (c) If Assertion is true but Reason is false (d)If Assertion is false but Reason is true	**[1]**
15.	**Assertion :** In rDNA technology human genes are often transferred into bacteria and yeast. **Reason :** Both bacteria and yeast multiply very fast to form huge population which expresses the desired gene. (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion. (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion. (c) If Assertion is true but Reason is false (d)If Assertion is false but Reason is true	**[1]**
16.	**Assertion :** Biodiversity is worth preserving for ethical reasons and broad utilitarians. **Reason :** 32% of Amphibia are facing the threat of extinction as their breeding ground is reducing by human activity. (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion. (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion. (c) If Assertion is true but Reason is false (d) If Assertion is false but Reason is true	**[1]**
	SECTION – B	
17.	The graphs below show the result of blood tests of a person X during illness (Graph I) and after recovering (Graph II)   	**[2]**

	(a) If person X has exposed to pollen grains of *Parthenium*, which type of antibody will be produced in his body? (b) With reference to the above graph, what will you infer about the disease in a person X? (c) Name the chemical secreted by stimulatory cells due to the presence of allergens in the body.	
18.	(a) What do doctors prescribe to lower the blood cholesterol level in patients with high blood cholesterol? Name the source organism from which this drug can be obtained? (b) What is BOD?	**[2]**
19.	(a) How is it ensured that only one sperm fertilise the ovum? (b) What induces the completion of meiotic division in secondary oocyte? (c) Arrange the hormone in sequence of the production in a pregnant woman – hCG, Relaxin, LH, Progesterone.	**[2]**
20.	A small stretch of DNA template strand that codes for a polypeptide as shown here 3′- CAT CAT AGA TGA AAC 5′ (a) Which type of mutation could have occurred in each type resulting in the following mistakes during replication of the above original sequence; (i) 3′- CAT CAT AGA TGA ATC - 5′ (ii) 3′- CAT ATA GAT GAA AC - 5′ (b) How many amino acids will be translated from each of the strands (i) and (ii) respectively? **OR** (a) Why does replication occurs within replication fork not in the entire length simultaneously? (b) What enables histones to acquire a positive charge?	**[2]**
21.	How is the variation differently explained by mutation theory of Hugo de vries and Darwin's theory of natural selection? Mention any four points.	**[2]**

SECTION – C

22. **[3]**



(a) (b)

(a) Enumerate the effect of anthropogenic action on organic evolution based on the above figure (a) and (b).

(b) Fossil study reveals the presence of man like bones with hominid features. Name this ancestral stage of human and mention their place of dwelling.

23. **[3]**

A patient is suffering from fatigue, high fever and weight loss and has been observing an increasing number and size of lumps in various regions of her body over a very short time.

(a) What could she be suffering from? Mention the property exhibited by the spread of lumps in the various regions of body?

(b) Some synthetic drugs are used to help patients cope with depression and insomnia and are often abused. Name two such drugs.

(c) A lymphoid tissue constitutes around 50% of lymphoid tissue in human body. Write any two of its location.

24. **[3]**

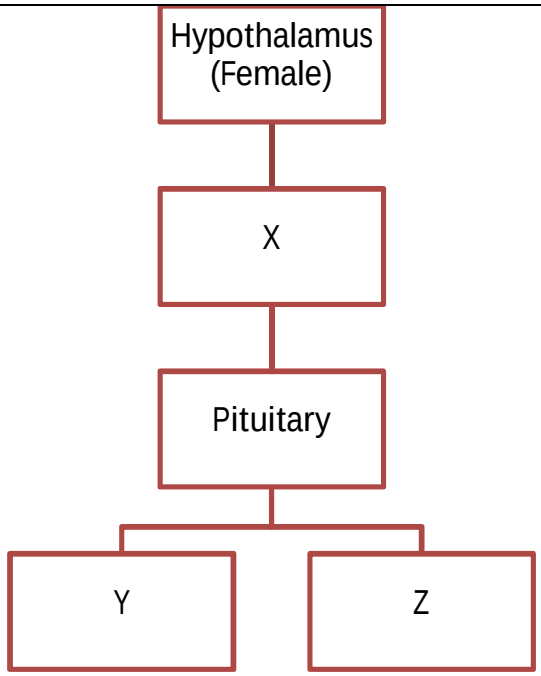
(a) Draw a diagram of female gametophyte of angiosperm and label the following:

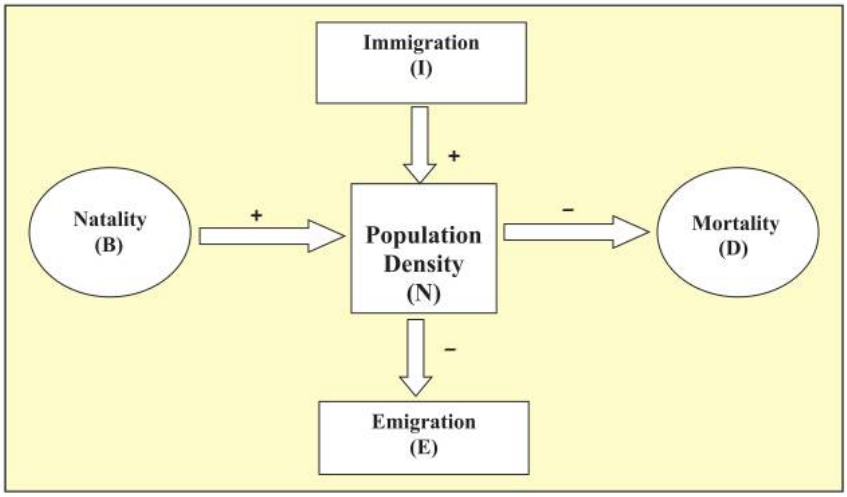
(i) A cell with filiform apparatus

(ii) A cell which is maximum in number

(b) Mention any two significant role of fruit.

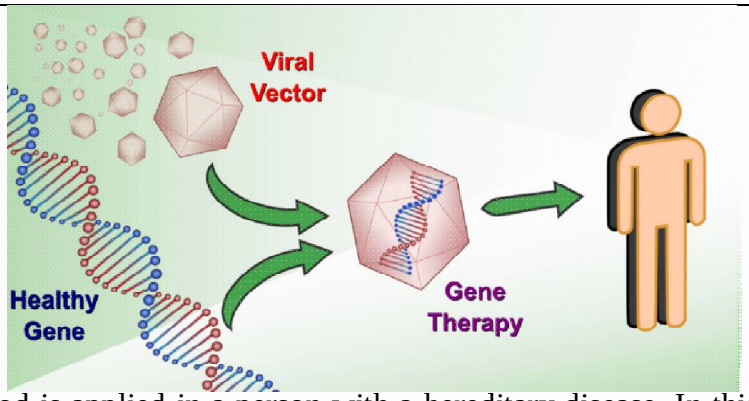
25. **[3]**



	(a) Name the hormone X, Y and Z. (b) What is the role of Y and Z? (c) Name a hormone of posterior pituitary that helps in parturition. **OR** (a) Enlist two reasons causing infertility inspite of unprotected sexual co-habitation. (b) Suggest ART for the following situation: (i) Low sperm count in male (ii) Female is unable to produce gamete but can provide environment for fertilization (c) How is IUT different from IUI?	
26.	Based on the following diagram answer the following questions:  (a) If N is the population density at time t, then what is the population density at time t + 1? (b) Under normal condition which two parameters influence population density. (c) If a new habitat is just colonized which parameter contribute significantly to population growth? (d) Which parameter decreases the population density of a migrating bird in Keolado National Park (Bharatpur) in Rajasthan?	**[3]**
27.	(a) Name an inborn error of metabolism that is linked with non-synthesis of tyrosine. Which enzyme is defective in this disease? (b) A normal couple has their first child who is haemophilic. Workout a cross to show how it is possible. State the possibility of normal and haemophilic children along with sex that can be born to them.	**[3]**
28.	(a) Bottled fruit juices are clearer as compared to those made at home. Give the reason. (b) How does 'Swiss cheese' develop with large holes? (c) Curd is easier to digest by human than milk. Justify.	**[3]**

SECTION – D

29. **[4]**



This method is applied in a person with a hereditary disease. In this method, genes are inserted into a person's cells and tissues to treat a disease.

- The first clinical gene therapy was done in 1990 to a 4 years old girl with adenosine deaminase (ADA) deficiency. This disorder is caused due to the deletion of the gene for adenosine deaminase that is essential for immune system to function.

(a) What is gene therapy? [1]

(b) How does enzyme replacement therapy treat ADA deficiency? [1]

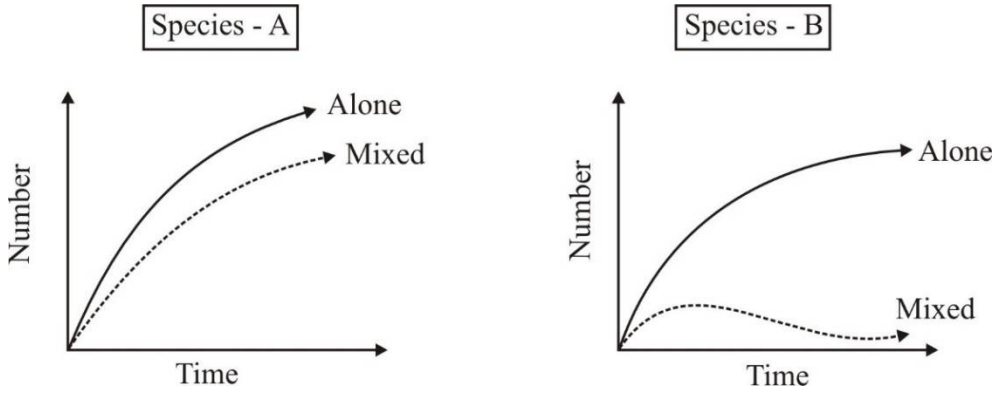
OR

State the possibility of permanent cure of this disease.

(c) How had gene therapy been carried by using rDNA technology? [2]

30. **[4]**

Observe the graph given below:



The graphs represent interspecific interaction between two species of Barnacle in the coasts of Scotland. Species A (*Balanus*) and species B (*Chathamalus*) were grown in separate culture as well as mixed culture. It was found that each species follows logistic growth pattern when they grow separately but when they grow together the pattern is little changed for species B (*Chathamalus*).

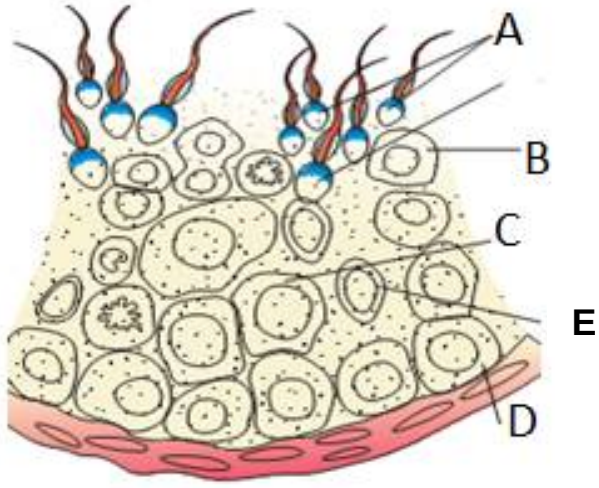
(a) Which species is comparatively superior? Support it with data provided in the graph.

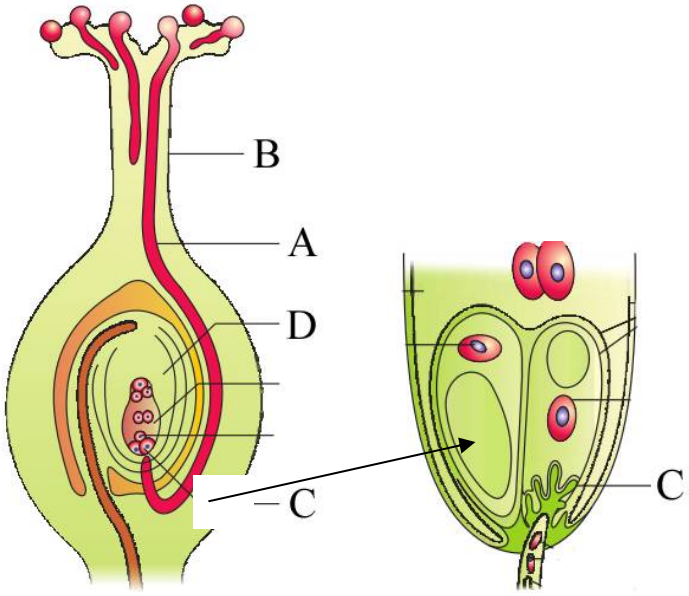
OR

Under which condition species B can spread in whole geographic area?

(b) State the underlying principle for the above result and name the scientist associated with this principle.

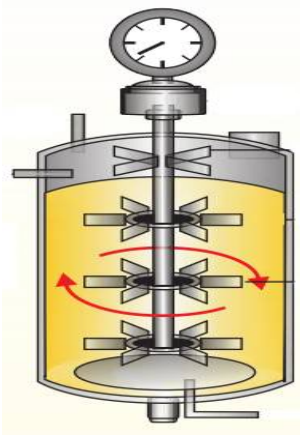
(c) With an example, explain the mechanism in which two or more species competing for the same resources can co-exist.

	SECTION – E	
31.	(a) Who and how revealed the biochemical nature of transforming principle? (b) If a bacterium divides in every 25 minutes what would be the proportion of hybrid and light densities of DNA molecule after 100 minutes. (c) Replication was allowed to take place in the presence of radioactive deoxyribonucleotides in E.coli mutant for DNA ligase. Newly synthesized radioactive DNA was purified and centrifuged using density gradient centrifugation. What type of differences will be observed in daughter DNA strands? **OR** (a) (i) 5′AUCAUAAUGAACGUAAGGUAAACGAUC3′. Identify the UTR sequence and write its role. (ii) Mention the role of 23S rRNA in bacteria during protein synthesis. (iii) Name the free living non-pathogenic nematode whose genome has been sequenced. (b) Explain the significance of SNPs in human genome. (c) Why does the lac-operen shut down some time after the addition of lactose in the medium where E.coli is growing?	**[5]**
32.	 (a) (i) Mention the ploidy level of B and C. (ii) Name the process by which A is produced from spermatid. (iii) Write two roles of E in the given figure. (iv) Name the cells produced from D by mitotic differentiation. (b) Nothing goes waste in the living system. Prove this statement considering developmental stages of Graafian follicle in the ovary. (c) (i) State the fate of trophoblast in human blastocyst at the time of implantation. (ii) Which organ of female reproductive system is homologous to penis of male. **OR**	**[5]**



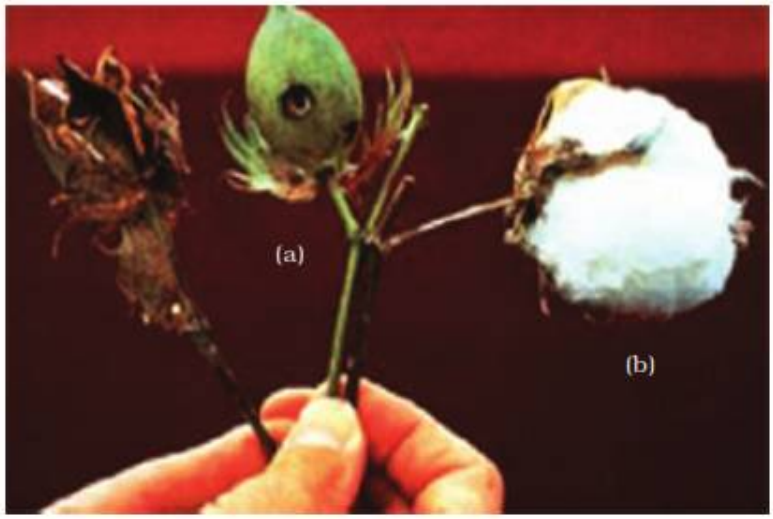
(a) (i) Mention the ploidy level of A and B.
(ii) Write the function of C.
(iii) Mention the role of D in development of some seeds of orange.
(b) State how apomixis is commercially beneficial.
(c) (i) Name two parasitic species that contain thousands of tiny seeds in their fruits.
(ii) Ajanta was given castor and bean seeds, which one will you select to observe endosperm?

33. Bioreactors are the containment vehicles of any biotechnology based production process. For large scale production and for economic reasons the final success of biotechnological process depends on the efficiency of the bioreactor.
Answer the following questions w.r.t. the given paragraph. **[5]**



(a) List the operational guidelines that must be adhered to so as to achieve optimization of the bioreactor system. Enlist any four.
(b) Mention the phase of the growth we refer to in the statement "Optimization of growth and metabolic activity of the cells".
(c) Is the biological product formed in the bioreactor suitable for the intended use immediately? Give reason in support of your answer.

OR



(a) What does cry gene in *Bacillus thuringiensis* code for? State its importance in the above plant.
(b) Why does crystal protein not affect the bacteria but kill the insect?
(c) Name two Lepidopterans and two Dipterans sensitive to the crystal toxin.
(d) What is the role of cry I Ab and cry II Ab in pest control?

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