

Question Paper Code 57/3

SECTION – A

Q. Nos. 1 - 5 are of one mark each

1. Name the enzyme that helps to join DNA fragments. [1 Mark]

Ans (DNA) ligase

2. A colour blind boy is born to a couple with a normal colour vision. Write the genotype of the parents.

Ans Father - XY , Mother -XX^C = 1/2 + 1/2

[1 Mark]

3. Write the function of a Bioreactor.

Ans Bioreactors are required to produce large volumes (100 - 1000 litres) of recombinant proteins/ desired protein / enzymes

[1 Mark]

4. What is an auto-immune disease

Ans When the body attacks self cells it results in damage

5. How are different varieties of pollen grains stored for long period of time in pollen banks ?

Ans In Liquid nitrogen (- 196 ° C) / cryopreservation

[1 Mark]

SECTION - B

Q Nos. 6-10 are of two marks each

6. What is the pathogenic property of baculovirus, used as a biological agents ? Name the genus of these organisms.

Ans Attacks insect, and other arthropods = 1/2 × 2

Nucleopolyhedrovirus = 1

[2 Marks]

7. Differentiate between monoecious and dioecious plants. Give one example of each.

Ans Monoecious- bisexual condition of a plant / when both male and female flowers are on the same plant , e.g coconut palm / cucurbits / or any other correct example = 1/2 + 1/2

Dioecious -unisexual conditon of a plant / male and female flowers present on different plants ,

eg- Papaya / date palm / or any other correct example = 1/2 + 1/2

[2 Marks]

8. What happens when chromatids fail to segregate during cell division cycle ? Explain your answer with an example.

Ans Failure of segregation of chromatids during cell division cycle results in the gain or loss of chromosome/ called aneuploidy = 1

E.g Down' syndrome results in the gain of extra copy of chromosome 21 /

Turner's syndrome results due to loss of an X-chromosome in human female = 1

OR

ABO blood groups is a good example of co-dominance. Justify.

Ans -ABO blood group in humans is contributed by gene 'I' that has 3 alleles 'I^A' 'I^B' and 'i.'

- Because human beings are diploid each person has two of the three alleles.

- I^A and I^B produce two different types of sugar while allele i does not produce sugar on the

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plasma membrane of RBC

- When I^A and I^B are present they both express their own type of sugar- this is codominance

= $\frac{1}{2} \times 4$

[2 Marks]

9. Why are certain group of bacteria referred to as methanogens ? List any two characteristic features of methanogens.

Ans There are methane producing bacteria = 1

They are anaerobic , break down cellulose to produce methane $\frac{1}{2} + \frac{1}{2} = 1$

10. Explain the role played by predators in a community.

- Ans
- Predators act as conduits for energy transfer across trophic levels.
 - They keep prey population under control.
 - They help in maintaining species diversity in a community by reducing intensity of competition among competing prey species.
 - An efficient predator may cause extinction of prey species (Any two) = 1 + 1

[2 Marks]

SECTION - C

Q Nos. 11-22 are of three marks each

11 What type of organs eye of an Octopus and that of a human called ? Give another example from the animal group and one from the plants of such organs. Name and explain the evolutionary process they exhibit.

Ans Analogous = 1

- Flippers of Penguins & Dolphins / Eye of octopus and mammals = $\frac{1}{2}$ (any other appropriate & correct example)

- Sweet potato (root modification) and potato (stem modification) = $\frac{1}{2}$

They are anatomically dissimilar structure though they perform similar function , convergent evolution = $\frac{1}{2} + \frac{1}{2}$

[3 Marks]

12 (a) Why must bacterial cells be first made 'competent' in r-DNA technology ? How is process carried ?

(b) Name the method by which an alien DNA can be made to enter (i) plant cell; (ii) animal cell.

Ans (a) Since DNA is hydrophilic , it cannot pass through cell membrane hence bacterial cells are made competent = $\frac{1}{2} + \frac{1}{2}$

by treatment with a specific concentration of a divalent cation, such as Ca^{++} which increases efficiency of entry of DNA through the pores of cell wall = 1

(b) i) plant cells - biolistic/ gene guns = $\frac{1}{2}$

ii) animal cells- Micro injection = $\frac{1}{2}$

[3 Marks]

13. Explain with the help of two examples how certain plants have evolved morphological and chemical defenses against primary consumers such as cows and goats.

Ans - Thorns of *Acacia* / Cactus are morphological means of defence against cows & goats = 1

- Plants produce & store chemicals that make herbivore sick when they are eaten inhibit feeding or digestion and disrupt its reproduction or even kill it = 1

- *Calotropis* produces highly poisonous cardiac glycosides so cows and goats can never browse on these plants / Chemical substances like nicotine / caffeine / defences / strychnine / opium are



actually defences against grazers & browsers = 1

[3 Marks]

14. What was the challenge for production of insulin using rDNA techniques ? How did Eli Lilly produce insulin using rDNA technology ?

Ans The challenge for production of insulin using rDNA technique was getting insulin assembled into a mature form = 1

- Prepared two DNA sequence corresponding to A and B chains of human insulin.
- introduced them in plasmids of *E.coli* to produce insulin chains.
- chains A and B were produced separately.
- extracted and combined by creating disulfide bonds to form human insulin = $\frac{1}{2} \times 4$

[3 Marks]

15. Identify A, B, C, D, E and F in the following table

S.No.	Component-I	Component-II	Chemical linkage bonding the two components	Product
i.	A	B	C	Nucleoside
ii.	Nucleoside	D	E	Nucleotide
iii.	Nucleotide	Nucleotide	F	Dinucleotide

- Ans i) A - Nitrogenous base / A - Pentose sugar .
B - Pentose Sugar / B- Nitrogenous base
C - N glycosidic linkage.
ii) D - phosphate group.
E - phospho ester linkage
iii) F- (3 -'5') phosphodiester linkage.

[3 Marks]

16. Write the aim with which animal breeding programmes are carried. Describe the essential steps to be followed in Poultry management.

Ans Aims - increasing the yield of animals , improving the desirable qualities of the produce = $\frac{1}{2} + \frac{1}{2}$

Steps to be followed in Poultry Management

- Selection of disease free and suitable breeds
- Proper and safe farm conditions
- Proper feed and water
- Proper hygiene and health care = $\frac{1}{2} \times 4$

[3 Marks]

17. Name the organism from which the 'cry' genes are isolated. Mention with the help of suitable example why and how bio-technologists have made use of 'cry' genes.

Ans *Bacillus thuringiensis* = 1

- Source of insecticidal (crystal) protein that control the cotton bollworms / corn borer = 1
- Specific Bt toxin genes were isolated from *Bacillus thuringiensis* , incorporated into several crop plants such as cotton = $\frac{1}{2} \times 2$

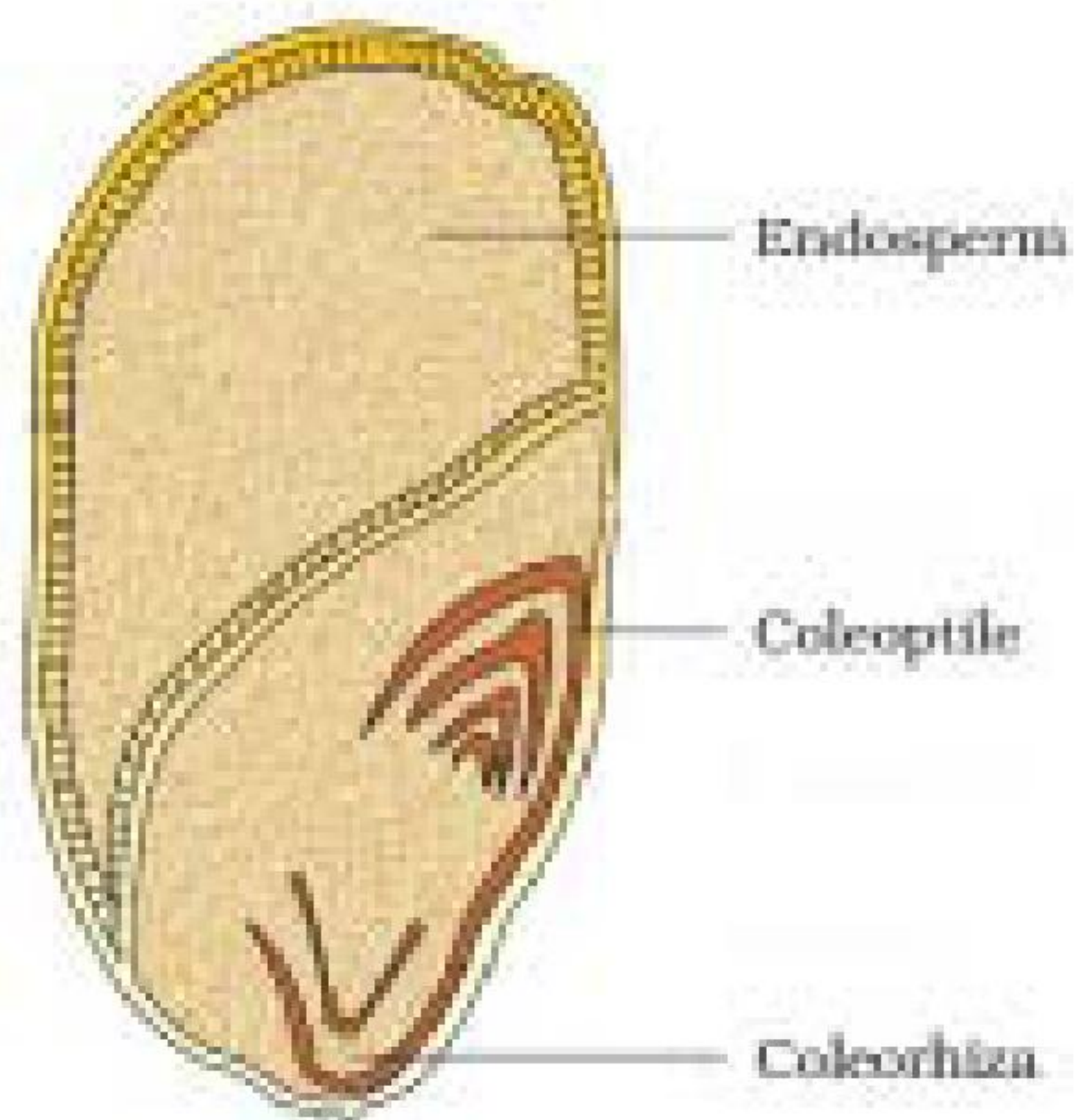
[3 Marks]

- 18. (a) Draw a diagram of a sectional view of monocot seed (grain).
(b) Label and write the functions of coleoptile , coleorhiza , endosperm .**

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Ans



$$= \frac{1}{2} \times 3$$

Functions

coleoptile- sheath of plumule / protection of plumule

coleorhiza- sheath of radicle / protection of radicle

endosperm- filled with reserve food materials for nutrition of developing embryo. $= \frac{1}{2} \times 3$

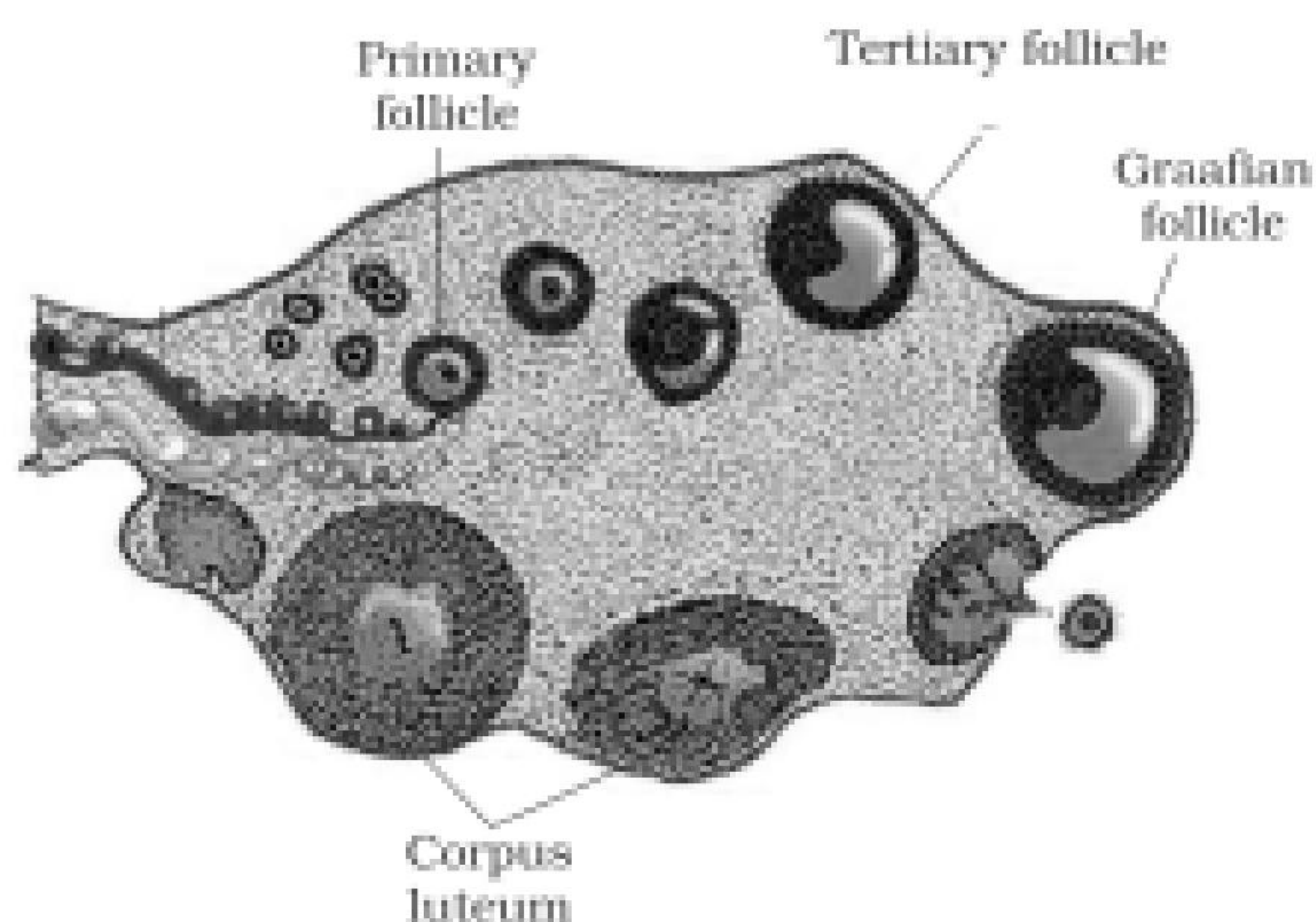
19. Mention the role of (i) selectable marker, (ii) Ori and (iii) rop in E. coli cloning vector pBR322.

- Ans
- Selectable marker - helps in identifying and eliminating non transformants and selectively permitting the growth of the transformants = 1
 - Ori - helps to start replication and any piece of DNA when linked to this sequence can be made to replicate within host cell, responsible for controlling the copy number of the linked DNA $= \frac{1}{2} + \frac{1}{2}$
 - rop-codes for the proteins involved in the replication of the plasmid = 1

[3 Marks]

20. (a) Draw a diagram of a sectional view of human ovary and label (i) Primary follicle; (ii) Tertiary follicle; (iii) Graafian follicle and (iv) Corpus luteum.
(b) Write the function of corpus luteum.

Ans



$$= \frac{1}{2} \times 4$$

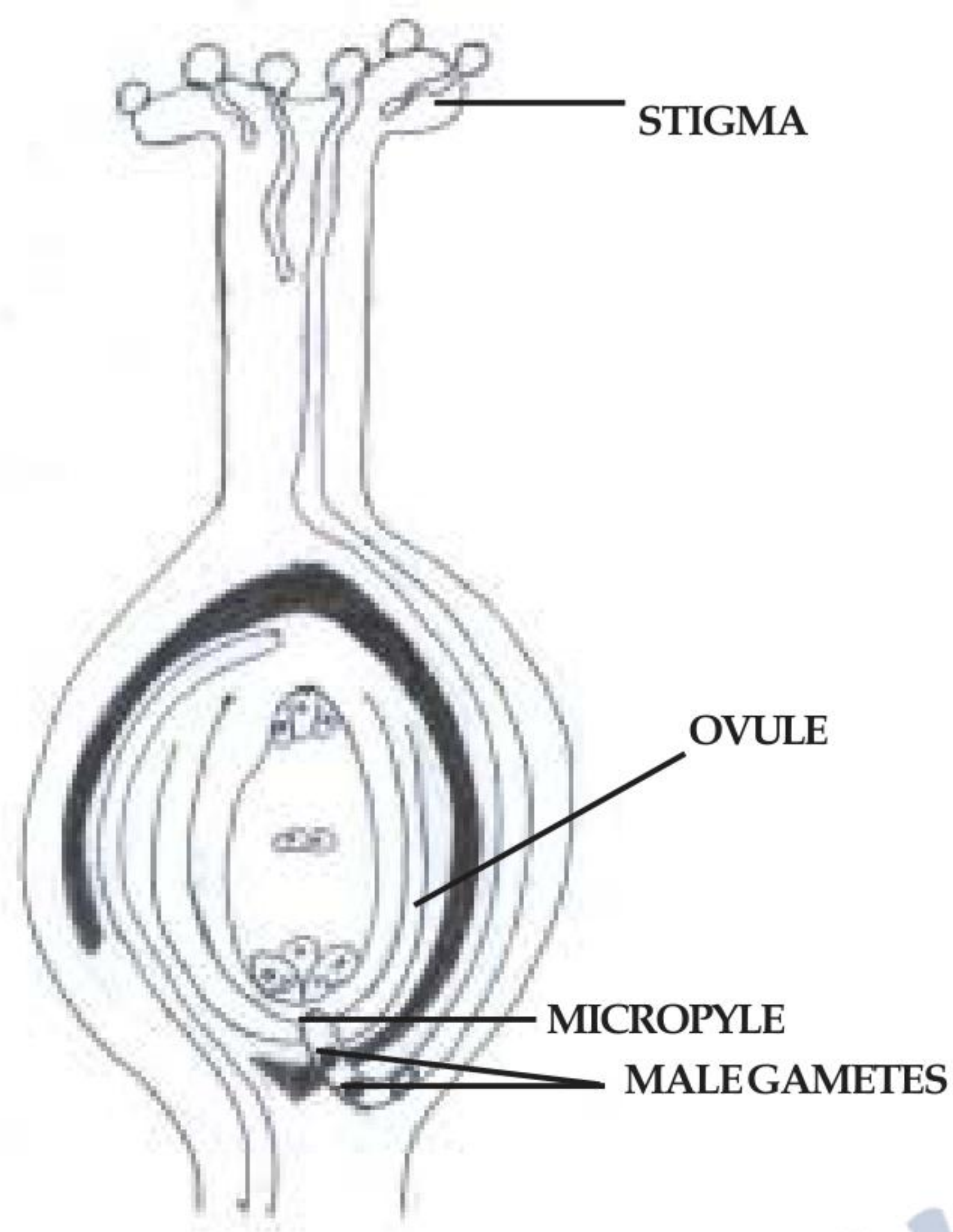
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- b) Secretes (large amounts of) progesterone, which is essential for maintenance of endometrium = $\frac{1}{2} \times 2$

OR

- (a) Draw a diagram of Pistil showing pollen tube growth in angiosperm and label (i) Stigma; (ii) male gametes; (iii) micropyle and (iv) Ovule.
 (b) Write the function of micropyle.

Ans (a)



- (b) the pollen tube enters the ovule through micropyle, it facilitates the entry of oxygen and water for seed germination. = $\frac{1}{2} + \frac{1}{2}$ [3 Marks]

21. Identify a, b, c, d, e and f in the following table :

Name of Enzyme/ Bioactive Molecule	Source	Functions
(i) a	Streptococcus	b
(ii) c organ	d	Immuno-suppressive agent in transplant patients
(iii) Statins	e	f

- Ans i) a) Streptokinase b) 'Clot buster' for removing clots from the blood vessels (of patients who have undergone myocardial infaction leading to heart attack) /clot buster enzyme
 ii) c) Cyclosporin A d) *Trichoderma polysporum*
 iii) e) *Monascus purpureus* (yeast)
 f) Blood cholesterol lowering agent.

[3 Marks]

22. Explain the following with reference to drug/alcohol abuse : (a) Addiction, (b) dependence and (c) withdrawal symptoms.

- Ans (a) Addiction- frequent use of drugs / alcohol leads to increase in the level of tolerance of receptors present in our body, thus making these receptors respond to only higher doses of

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drugs / alcohol = $\frac{1}{2} + \frac{1}{2}$

//

Psychological attachment to certain effects such as euphoria and temporary feeling of well being associated with drugs and alcohol = 1

- (b) Dependence - Due to inherent addictive nature / its psychological attachment to drugs / alcohol and are unable to live without them = 1
- (c) Withdrawal syndrome-when a person is taking drugs / alcohol regularly and the intake of drugs is abruptly discontinued it leads to various characteristics symptoms (nausea, anxiety, shakiness, sweating etc.) = 1

[3 Marks]

SECTION - D

Q Nos. 23 are of four marks each

- 23. With the revolution in information technology, now it has become an integral part of everybody's life, living in rural and urban India. You are asked to address the gathering of students of eco-clubs of your neighbourhood schools on generation and management of e-waste.**

- (a) Write how e-waste is generated.
- (b) Explain how would you address the awareness issue of e-waste management amongst the students.
- (c) How have the developed countries exploited the developing countries with respect to e- waste managements ?

- Ans (a) irreparable computers / any other electronic good = 1
- (b) Recycling is the only possible solution of e-waste management keeping in mind the safety measures to be adopted by the worker involved in the cycling of e- wastes , so as to avoid their exposure to the toxic substance present in the e- wastes = 1 + 1
- (c) By exporting their e-waste to the developing countries / China / India / Pakistan = 1

[4 Marks]

SECTION - E

Q Nos. 24-26 are of five marks each

- 24 a) Write the percentage of land area that was covered by forests by the end of the last century.**
- (b) Describe any two practices that led to deforestation.**
- (c) State the consequences of deforestation.**
- (d) Suggest a method to overcome deforestation.**

- Ans (a) 19.4% = $\frac{1}{2}$
- (b) -Trees are axed for timber / firewood / land for industrial requirement
-Slash and burn agriculture
- habitat loss and fragmentation- clearing of forest land into grass land for raising cattle
(Any two) = 1+1
- (c) -Deterioration of our environment in terms of air - water and soil quality.
-causes loss of bio diversity
- disturbance in hydrological cycle / biogeochemical cycle
(Any two) = 1 + 1
- (d) Reforestation or any other appropriate alternative = $\frac{1}{2}$

[5Marks]

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Ans. (a) **Parents :** **VVAA** × **vvaa = (1)**
Violet , axial **White , terminal**

gametes : **VA** **va**

F₁ **VvAa (Violet axial)** = 1

F₂	VA	vA	Va	va	
VA	VVAA Violet axial	VvAA Violet axial	VVAa Violet axial	VvAa Violet axial	= 1
vA	VvAA Violet axial	vvAA White Axial	VvAa Violet axial	vvAa White Axial	
Va	VVAa Violet axial	VvAa Violet axial	VVaa Violet terminal	Vvaa Violet terminal	
va	VvAa Violet axial	vvAa white Axial	Vvaa Violet terminal	vvaa White terminal	

Phenotypes – violet : white : violet : white
axial : axial : terminal : terminal

Phenotype ratio – 9 : 3 : 3 : 1 = 1

(b) **Law of Independent Assortment :** When two pairs of traits are combined in a hybrid segregation of one pair of characters is independent of the other pair of characters = 1

OR

(a) **How did Darwin explain adaptive radiation by taking an example of finches ?**

(b) **How did Darwin's view on evolution differ from that of de-Vries ?**

Ans a) Darwin conjectured that the birds evolved on the island itself = $\frac{1}{2}$

There were seed-eating features and other altered beaks arose allowing different types of food eating habits like insectivorous and vegetarian finches = $\frac{1}{2}$

This process of evolution of different species in a given geographical area starting from a point and radiating to other areas of (geographical) habitats is called adaptive radiation = 1

b) **Darwin**

-Minor Variation(heritable) cause evolution

-Variations are small and directional

-Evolution is gradual

de Vries

-Mutation caused evolution

-Mutation are random and directionless

-Single step large mutation / saltation causes speciation = $1 \times 3 = 3$

[2 + 3=5]



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