

Question Paper Code 57/2

SECTION – A

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

1. What is Gene therapy ?

Ans Correction of genetic defect / involves delivery of a normal gene to take over the function of non-functional gene = 1

[1 Mark]

2. Name the category of disease in which 'Rheumatoid arthritis' in human is put under.

Ans Auto-immune disease = 1

[1 Mark]

3. Write the conclusion Griffith arrived at the end of his experiment with Streptococcus pneumonia.

Ans He concluded that the R-strain bacteria had somehow been transformed by heat-killed S-strain bacteria, this must be due to transfer of genetic material = $\frac{1}{2} + \frac{1}{2}$

[1 Mark]

4. State where do the signals for parturition originate from in humans.

Ans Fully developed foetus and the placenta = 1

[1 Mark]

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

Ans Ans Father - XY , Mother - XX^c = $\frac{1}{2} + \frac{1}{2}$

[1 Mark]

SECTION - B

Q Nos. 6-10 are of two marks each

6. Name the first antibiotic discovered and by whom.

Ans Penicillin , Alexander Flemming = 1 + 1

[2 Marks]

7. Mycorrhizal association exists between fungi (Glomus sp) and roots of higher plants. How is this association beneficial to each member ?

Ans The Glomus helps the plant in absorption of essential nutrients / phosphorus from the soil , and the plant in turn provide the fungus with energy yielding carbohydrate = 1 + 1

[2 Marks]

8. 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]

9. 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 /

Out-B-17 - 57/1, 2, 3 /10



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 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]

10. What is parthenogenesis ? Give two examples .

- Ans A new organism develops from an unfertilised egg / without fertilization of an egg = 1
e.g Drones /turkey / Rotifers / some lizards (whiptail) (Any two) = $\frac{1}{2} + \frac{1}{2}$

[2 Marks]

SECTION - C

Q Nos. 11-22 are of three marks each

11. 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]

12. Excessive and continuous use of pesticides has resulted in evolution of some new species of pests. Explain what must have led to this. What is this type of evolution called?

- Ans Excessive use of pesticides has resulted in selection of resistant varieties in a much lesser time scale, as evolution is a stochastic process based on chance events in nature and chance mutation in organism = 1 + 1

Evolution by anthropogenic action = 1

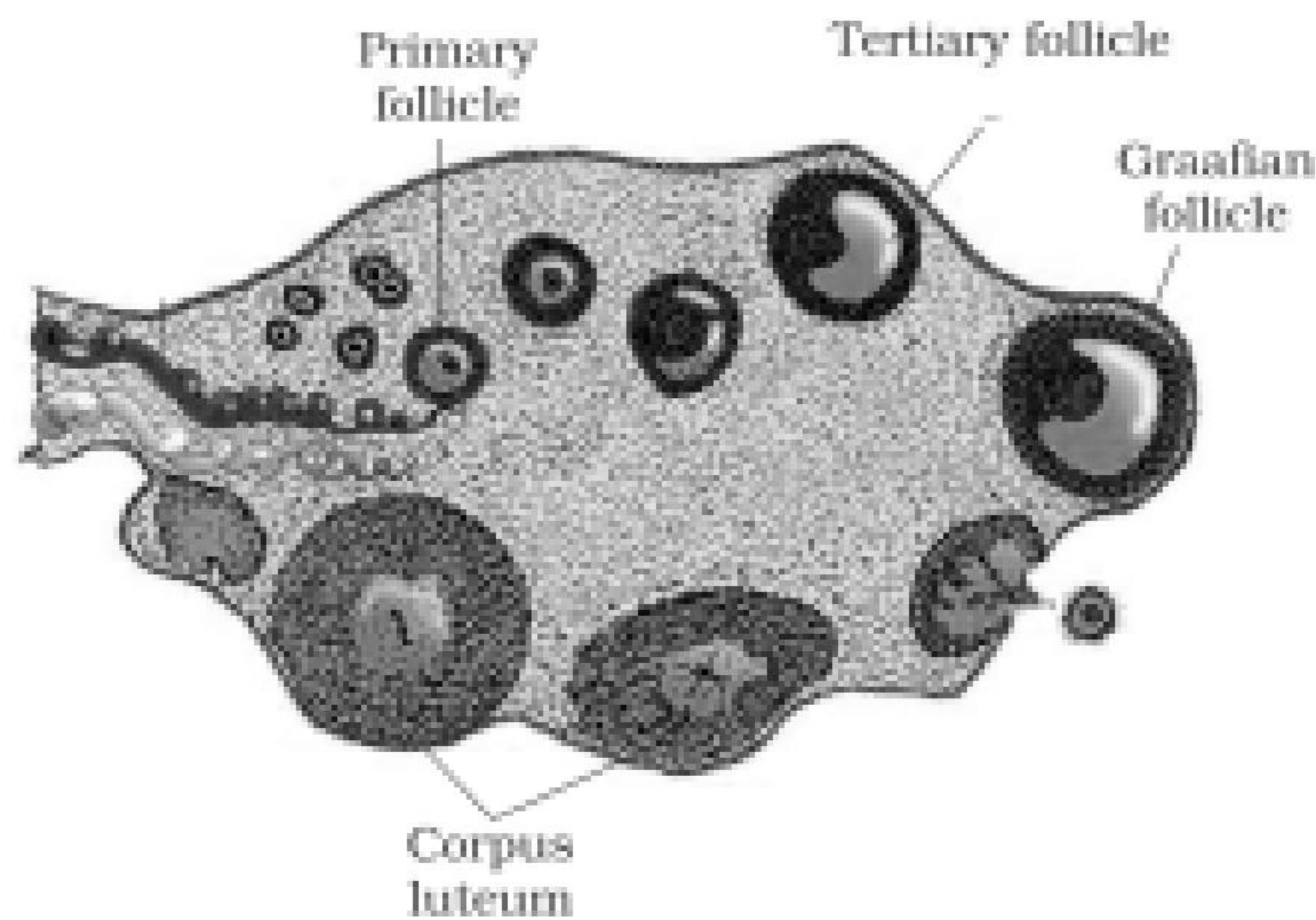
[3 Marks]

13. (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.

Write the function of corpus luteum.



Ans



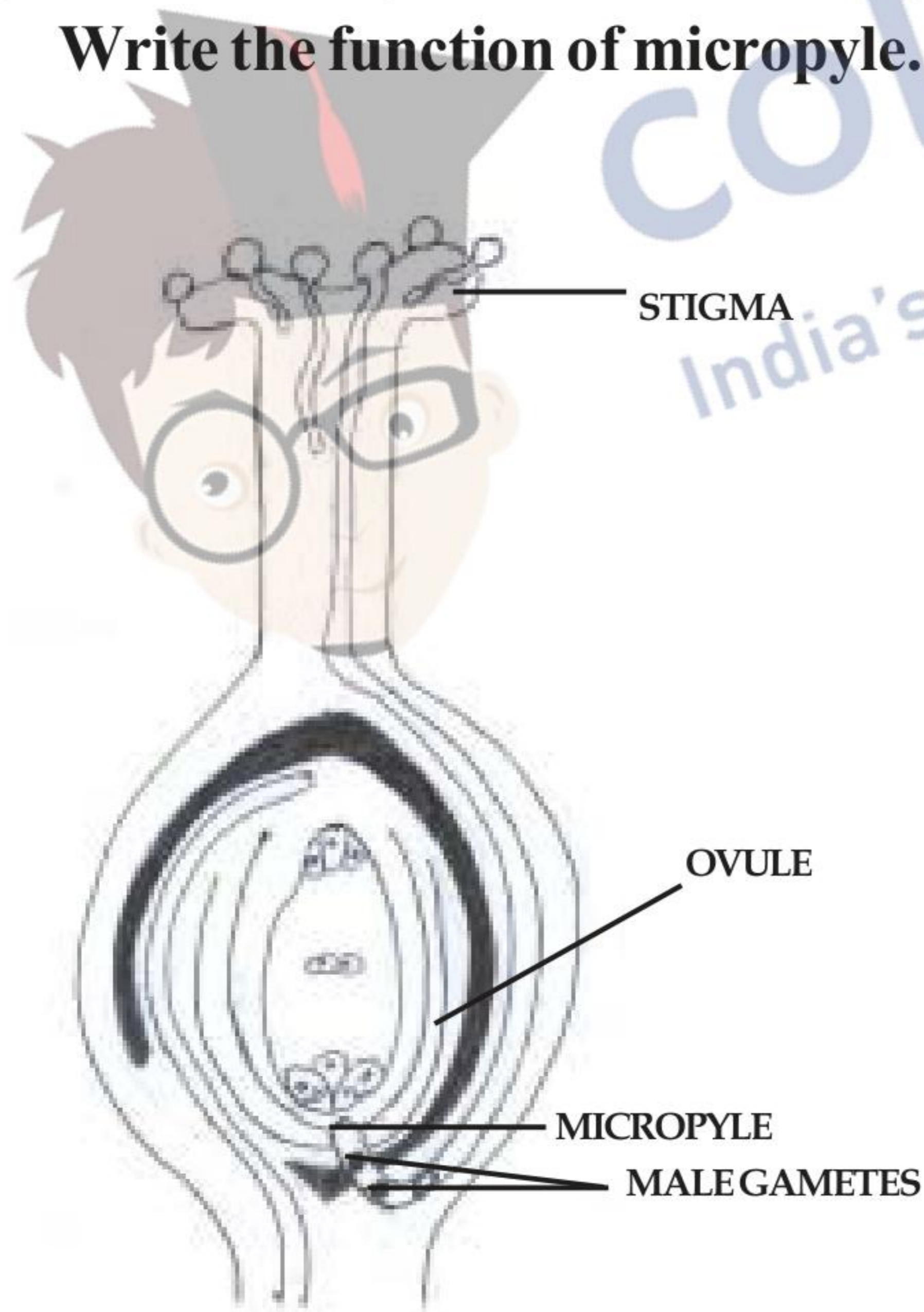
= $\frac{1}{2} \times 4$

- 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)



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

- (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]

14. β -galactosidase enzyme site, is a preferred selectable marker in comparison to antibiotic resistant selectable marker in biotechnology experiments. Justify.

Ans When a gene of interest is inserted within the coding sequence of β -galactosidase enzyme (select-

Out-B-17 - 57/1, 2, 3 /12



able marker), if the recipient cell fails to develop blue colour in presence of a chromogenic substrate, it is an indicative of successful recombinant formation and presence of blue colour show no recombinants formed, whereas when an antibiotic resistant selectable markers are used it requires simultaneous plating of two different plates having different antibiotics, to differentiate between transformants from non-transformants and then select the transformants to identify the recombinants from them, which is a very time consuming and cumbersome process in comparison to the first one = $\frac{1}{2} \times 6$

15. 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	d	Immuno-suppressive agent in organ 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 infarction 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]

16. Explain the following salient features of a DNA molecule :

- (a) Complimentarity of the base pairs of its two chains.
 (b) Anti-parallel polarity of the two chains.

- Ans (a) Complimentarity- Adenine (A), Guanine (G), Thymine (T) and Cytosine (C) are the four bases in a DNA molecule; 'A' always pairs with 'T' with the help of two hydrogen bonds; 'G' always pairs with 'C' with the help of three hydrogen bonds = $\frac{1}{2} \times 3$
 (b) It means if one chain has polarity 5' → 3' the other has 3' → 5', a polymer thus formed has at one end a free phosphate moiety at 5' of deoxyribose sugar (5' end of the polynucleotide chain), at the other end of the polymer the deoxyribose sugar has a free 3' OH (3' end of polynucleotide chain) = $\frac{1}{2} \times 3$

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. The Indian Agricultural Research Institute has introduced several cereal and vegetable crops that are nutritionally rich in vitamins and minerals. What is this kind of breeding called? Write the main objectives with which such breeding programme is carried.

- Ans Biofortification = 1



Objectives : Improving -

- i) Protein content and quality
- ii) Oil content and quality
- iii) Micronutrient and mineral content
- iv) Vitamin content = $\frac{1}{2} \times 4$

19. 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]

20. 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]

21 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]

22. list any two types of IUDs that are available for human females and state their mode of action.

Ans i) Non medicated IUDs = 1 , increase phagocytosis of sperms within the uterus = $\frac{1}{2}$

ii) Copper releasing IUDs = 1 , Cu ions suppress sperm motility and fertilising capacity of sperms = $\frac{1}{2}$

iii) Hormone releasing IUDs = 1 , make uterus unsuitable for implantation / makes cervix hostile to sperms = $\frac{1}{2}$

(Any two) ($1\frac{1}{2} + 1\frac{1}{2}$)

[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. Skin colour in humans does not have distinct alternate forms but shows a whole range of possible variations in skin colour. Explain the pattern of inheritance of such a trait. What is this type of inheritance known as ? Provide another example of exhibiting such an inheritance pattern.

Skin colour is controlled by three genes; A,B,C dominant genes and a,b,c the recessive genes ; the effect of each type of allele is additive ; more the dominant allele, darker the skin colour; more the recessive allele lighter the skin colour ; when three dominant alleles and three recessive alleles

are present in an individual the skin colour is intermediate = $\frac{1}{2} \times 6$

- Polygenic inheritance =1

- Human Height /or any other correct example =1

OR

Explain the process of transcription in a prokaryote

Ans DNA dependent RNA polymerase ; binds to the promoter site (of DNA) ; to initiate transcription; it uses nucleoside triphosphate / nucleotides as substrates; polymerises in a template dependant fashion; following the rule of complementarity.

DNA dependent RNA polymerase is only capable of catalysing elongation process; it associates temporarily with initiation factor (σ) / to initiate transcription ; and with termination factor (ρ) to terminate transcription, once the polymerase reaches terminator region the nascent RNA falls off so also the RNA polymerase from DNA template thus completing transcription. = $\frac{1}{2} \times 10 = 5$

25. (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.

Out-B-17 - 57/1, 2, 3 /15



(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]

OR

- (a) Comment on the pattern in which all communities undergo a change in composition and structure with changing environmental conditions.**
(b) Explain 'Climax community' and 'sere'.
(c) Differentiate between primary and secondary succession with examples.

- Ans (a) Orderly and sequential changes parallel with changes in physical environment =1
(b) climax community-changes finally lead to a community that is in equilibrium with environment =1
Sere-the entire sequence of communities that successively change in a given area =1
(c) **Primary succession** **Secondary succession**
(i) occurs in newly cooled lava / occurs in abandoned / destroyed forest
bare rock / newly created pond.
(ii) Slow process Fast Process

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

[5Marks]

- 26 (a) Explain the steps involved in *in vitro* fertilisation popularly known as test tube baby programme.**
(b) State the importance of this programme.

- Ans (a) i) Ova from wife / donor and sperms from husband / donor are collected
ii) They are induced to form zygote under simulated conditions (in the labortory)
iii) The zygote or early embryos upto 8 blastomeres could then be transferred to fallopian tube /ZIFT
iv) Embryos more than 8 blastomeres, into the uterus / IUT/ Intra uterin transfer = 1×4
(b) Allows couples to bear children who were unable to do so naturally = 1

[4+1=5]

OR

- (a) State one difference and one similarity between geitonogamy and xenogamy.**
(b) Explain any three devices developed in flowering plants to discourage self pollination and encourage cross pollination.

- Ans (a) Difference- In geitonogamy pollen grains from one flower are transferred to the stigma of another flower on the same plant whereas in xenogamy the pollen grains are transferred to the stigma of a flower on another plant(of the same species) genetically similar , genetically

Out-B-17 - 57/1, 2, 3 /16



different

Similarity -In both types of pollination pollen grains from the anther are transferred to the stigma of another flower of the same species =1

- (b)
- Pollen release & stigma receptivity not synchronised / hence the maturity of stigma and pollen are different /Protandry / Protogyny
 - Anther and Stigma are placed at different positions so that pollen cannot come in contact with stigma of the same flower.
 - Self incompatibility/ Self sterility.
 - Production of unisexual flowers (Any three) = 1×3

[5Marks]



collegedunia.com
India's largest Student Review Platform

Out-B-17 - 57/1, 2, 3 /17

