

Question Paper Code 57/1/1

SECTION – A

Q. Nos. 1 - 8 are of one marks each

1. Write the name of the organism that is referred to as the ‘Terror of Bengal’.

Ans. *Eichhornia crassipes* / Water Hyacinth

[1 mark]

2. What are ‘true breeding lines’ that are used to study inheritance pattern of traits in plants ?

Ans. Self pollination continuous , for several generations / homozygous = $\frac{1}{2} + \frac{1}{2}$

[1 mark]

3. Name any two types of cells which act as ‘Cellular barriers’ to provide Innate Immunity in humans.

Ans. Polymorpho-nuclear Leukocytes / Neutrophils / Monocyte , Natural Killer (type of lymphocyte), macrophages

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

[1 mark]

4. Mention the type of host cells suitable for the gene guns to introduce an alien DNA.

Ans. Plant cells

[1 mark]

5. How is ‘stratification’ represented in a forest ecosystem

Ans. Trees occupy vertical strata , shrubs the second layer and herbs / grasses occupy the bottom layers // vertical distribution of species , at different levels = $\frac{1}{2} + \frac{1}{2}$

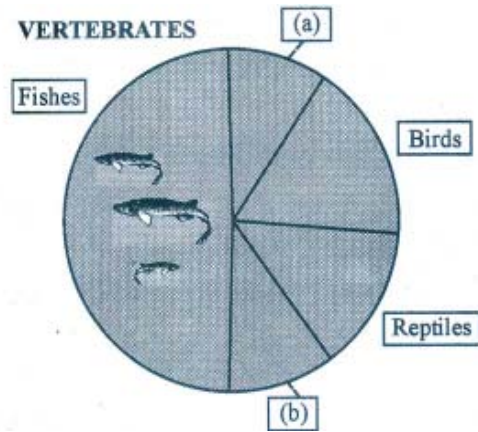
[1 mark]

6. Give an example of an organism that enters ‘diapause’ and why.

Ans. (Many species of) Zooplankton, unfavourable condition = $\frac{1}{2} + \frac{1}{2}$

[1 mark]

7. Identify ‘a’ and ‘b’ in the figure given below representing proportionate number of major vertebrate taxa.



- Ans. (a) Mammals
 (b) Amphibians = $\frac{1}{2} + \frac{1}{2}$

[1 mark]

8. State the cause of Accelerated Eutrophication

Ans. Pollutants from human activities / effluents from industries / effluents from home / sewage / agricultural (chemical) wastes radically accelerate the ageing process.

[1 mark]

SECTION - B

9. Why do algae and fungi shift to sexual mode of reproduction just before the onset of adverse conditions ?

Ans. For survival during unfavourable conditions / Fusion of gametes helps to pool their resources for survival (hunger theory of sex) / Zygote develops a thick wall that is resistant to desiccation and damage which undergoes a period of rest before germination.

[2 marks]

10. A cross was carried out between two pea plants showing the contrasting traits of height of the plant. The result of the cross showed 50% of parental characters.

- (i) Work out the cross with the help of a Punnett square.
 (ii) Name the type of the cross carried out.

Ans. (i) $Tt \times tt = \frac{1}{2}$

	T	t	= $\frac{1}{2}$
t	Tt	tt	}
t	Tt	tt	

(ii) Test cross = $\frac{1}{2}$

[2 marks]

11. How does the gene 'I' control ABO blood groups in humans ? Write the effect the gene has on the structure of red blood cells.

- Ans. – Gene 'I' has three different alleles $I^A, I^B, i = \frac{1}{2}$
 – I^A produces A type of sugar / Antigen \longrightarrow A group
 I^B produces B type of sugar / Antigen \longrightarrow B group } = $\frac{1}{2}$
 – i - No sugar - O group = $\frac{1}{2}$
 – Structure - sugar polymers protrude from the surface of plasma membrane of RBCs = $\frac{1}{2}$

[2 marks]

OR

Write the types of sex-determination mechanisms the following crosses show. Give an example of each type.

- (i) **Female XX with Male XO**
 (ii) **Female ZW with Male ZZ**

- Ans. (i) Male heterogamety , Grasshopper = $\frac{1}{2} + \frac{1}{2}$
 (ii) Female heterogamety , Birds = $\frac{1}{2} + \frac{1}{2}$

[2 marks]

- 12. (i) Name the scientist who suggested that the genetic code should be made of a combination of three nucleotides.**
 (ii) **Explain the basis on which he arrived at this conclusion.**

Ans. (i) George Gamow = $\frac{1}{2}$

(ii) There are four bases and 20 amino acids = $\frac{1}{2}$

(There should be atleast 20 different genetic codes for these 20 amino acids)

Only possible combinations that would meet the requirement is combinations of 3 bases that will give 64 codons = 1

[2 marks]

- 13. State the disadvantage of inbreeding among cattle. How it can be overcome ?**

Ans. - Inbreeding depression / reduce fertility and productivity = 1

- Selected animals should be mated with unrelated superior animals of the same breed / outbreeding = 1

[2 marks]

- 14. Explain with the help of a suitable example the naming of a restriction endonuclease.**

Ans. EcoRI = $\frac{1}{2}$

Eco stands for the genus and species of the prokaryotic cell from which the enzyme was isolated i.e *E.coli* = $\frac{1}{2}$

R stands for strain = $\frac{1}{2}$

'I' follows order in which enzyme was isolated = $\frac{1}{2}$

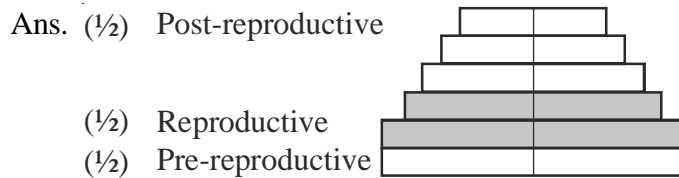
[2 marks]

- 15. State how has *Agrobacterium tumifaciens* been made a useful cloning vector to transfer DNA to plant cells.**

Ans. *Agrobacterium tumifaciens* has Ti plasmid, the plasmid modified into a cloning vector, which is no more pathogenic to host plants, and is able to deliver genes of interest. = $\frac{1}{2} \times 4$

[2 marks]

16. Construct an age pyramid which reflects a stable growth status of human population.



Construction of pyramid = $\frac{1}{2}$

NOTE : Proceed marking only when pyramid is correctly drawn.

[2 marks]

17. Apart from being part of the food chain, predators play other important roles. Mention any two such roles supported by examples.

- Ans. - Keeps prey population under control
- Biological control methods
 - Maintains species diversity
 - Reduces intensity of competition among prey species

(Any two roles and relevant examples each) (1 + 1)

[2 marks]

18. How are 'sticky ends' formed on a DNA strand ? Why are they so called ?

Ans. Restriction enzymes cut the strands of the DNA, a little away from the centre of the palindromic sites, but between the same two bases on opposite strands. = $\frac{1}{2} \times 3 = 1\frac{1}{2}$

They form hydrogen bonds with their complementary cut counterparts. = $\frac{1}{2}$

[2 marks]

SECTION-C

19. Explain any three advantages the seeds offer to angiosperms.

- Ans. - Since reproductive process such as pollination and fertilisation are independent of water, seed formation is more dependable.
- Seeds have better adaptive strategies for dispersal to new habitats and help the species to colonise in other areas.
 - As they have sufficient food reserves young seedlings are nourished until they are capable of photosynthesis on their own.
 - The hard seed coat provides protection to the young embryo.
 - Being products of sexual reproduction, they generate new genetic combinations / variations.

- Dehydration and dormancy of mature seeds are crucial for survival under adverse conditions.

(Any three points) = 1 + 1 + 1

[3 marks]

20. Name and explain the role of inner and middle walls of the human uterus.

Ans. Inner - Endometrium = $\frac{1}{2}$,

supports foetal growth, helps in placenta formation after implantation = $\frac{1}{2} + \frac{1}{2}$,

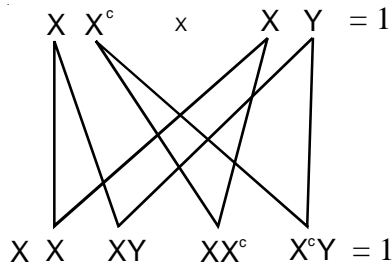
Middle - Myometrium = $\frac{1}{2}$,

Exhibits strong contraction during delivery of baby = 1

[3 marks]

21. A colourblind child is born to a normal couple. Work out a cross to show how it is possible. Mention the sex of this child.

Ans.



Male = 1

[3 marks]

OR

Mendel published his work on inheritance of characters in 1865, but it remained unrecognized till 1900. Give three reasons for the delay in accepting his work.

- The communication was not easy in those days and his work could not be widely publicised.
- His concept of genes as stable and discrete units that controlled the expression of traits and of the pair of alleles which did not 'blend' with each other was not accepted by contemporaries as an explanation for the apparently continuous variation seen in nature.
- Mendel's approach of using mathematics to explain biological phenomena was totally new and unacceptable to many of the biologists of his time.
- Though Mendel's work suggested that factors (genes) were discrete units, he could not provide any physical proof for the existence of factors and what they were made of.

(Any three points) = 1 + 1 + 1

[3 marks]

22. Women are often blamed for producing female children. Consequently, they are ill treated and ostracized. How will you address this issue scientifically if you were to conduct an awareness programme to highlight the values involved ?

Ans. - Male produces two types of sperms (X & Y type in the ratio 1 : 1), Female produces only

one type of ovum (X type), hence the sex of baby is determined by the type of sperm fertilising the ovum therefore women should not be blamed // A genetic cross showing sex determination in human beings covering above value points can be considered in lieu of the explanation = $\frac{1}{2} \times 3$

- Sensitivity towards community / Social awareness / Self discipline / Responsible behaviour / Leadership quality / Caring attitude / Responsible attitude towards society / Concern for others / Sharing of knowledge or information / Presence of mind / Being proactive / any other relevant value.

(Any three values) = $\frac{1}{2} \times 3$

[3 marks]

23: (a) Name the tropical sugar cane variety grown in South India. How has it helped in improving the sugar cane quality grown in North India ?

(b) Identify 'a', 'b' and 'c' in the following table:

No.	Crop	Variety	Insect Pests
1.	<i>Brassica</i>	Pusa Gaurav	(a)
2.	Flat bean	Pusa Sem 2 Pusa Sem 3	(b)
3.	(c)	Pusa Sawani Pusa A-4	Shoot and fruit borer

Ans. (a) *Saccharum officinarum*, crossed with, North Indian variety (*Saccharum barberi*) to increase quality = $\frac{1}{2} \times 3$

(b) (a) Aphids

(b) Jassids / aphids / fruit borer

(c) Okra (Bhindi) = $\frac{1}{2} \times 3$

[$1\frac{1}{2} + 1\frac{1}{2} = 3$ marks]

24. Why are beehives kept in crop field during flowering period ? Name any two crop fields where this is practiced.

Ans. To increase pollination efficiency, increase crop yield / honey yield = 1 + 1

Sunflower, *Brassica*, apple, pear

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

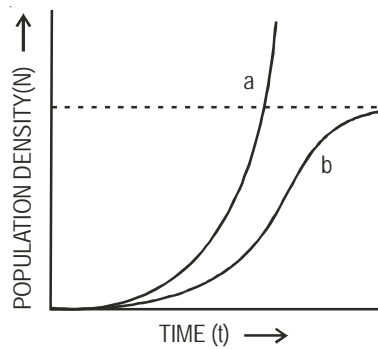
[3 marks]

25. How did the process of RNA interference help to control the nematode from infecting roots of tobacco plants ? Explain.

Ans. Using *Agrobacterium* vectors, nematode specific genes introduced into host plant, produced sense - antisense RNA in host cells, ds RNA - initiated RNAi, silenced specific mRNA of nematode, parasite could not survive in transgenic host = $\frac{1}{2} \times 6$

[3 marks]

26. Study the graph given below and answer the question that follow :



- (i) Write the status of food and space in the curves (a) and (b).
- (ii) In the absence of predators, which one of the two curves would appropriately depict the prey population ?
- (iii) Time has been shown on X-axis and there is a parallel dotted line above it. Give the significance of this dotted line.

Ans. (i) a - unlimited food and space = $\frac{1}{2}$

b - limited food and space = $\frac{1}{2}$

(ii) Curve a = 1

(iii) Carrying capacity / a given habitat has enough resources to support maximum possible number - beyond which no further growth is possible = 1

[3 marks]

27. (i) What is primary productivity ? Why does it vary in different types of eco - systems ?
- (ii) State the relation between gross and net primary productivity.

Ans. (i) – Production of biomass / energy per unit area in a given time (per year) by plants during photosynthesis. = 1

– Depends upon - plant species inhabiting a particular area , environmental factors availability of nutrients , photosynthetic capacity of plants (*Any two*) = $\frac{1}{2} + \frac{1}{2}$

(ii) $GPP - R = NPP = 1$

[3 marks]

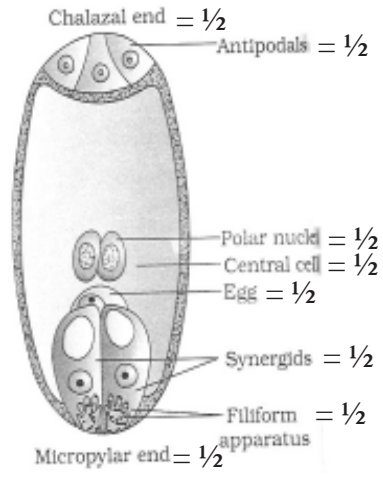
SECTION -D

28. (a) Coconut palm is monoecious, while date palm is dioecious. Why are they so called ?
- (b) Draw a labelled diagram of sectional view of a mature embryo sac of an angiosperm.

Ans. (a) Coconut palm bears both kinds (sexes) of flowers on the same plant = 1

Date palm bears only one type (sex) / male and female flowers on different plants = 1

(b)



(Any six labels) = $\frac{1}{2} \times 6 = 3$

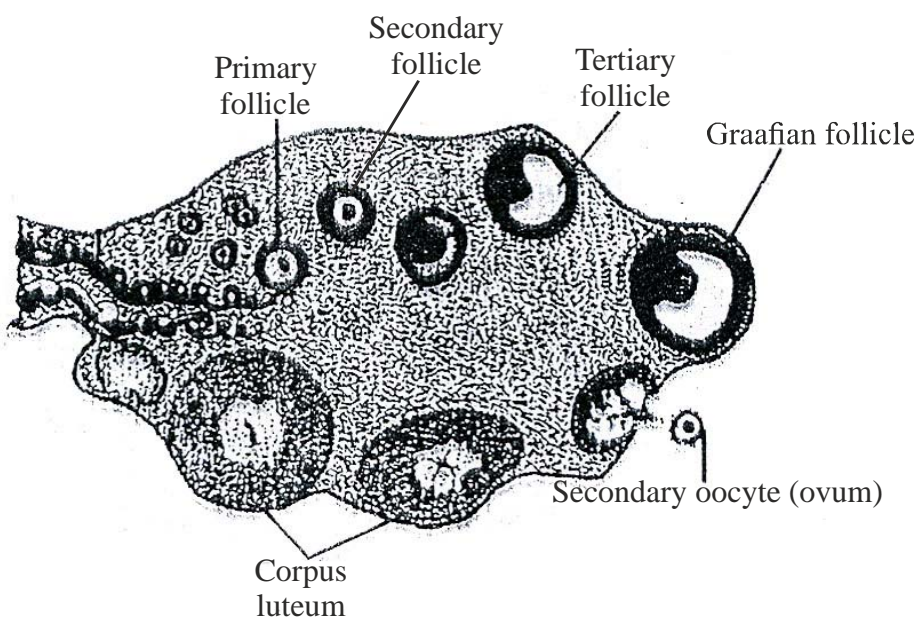
[5 marks]

OR

- (a) How is 'oogenesis' markedly different from 'spermatogenesis' with respect to the growth till puberty in the humans ?
- (b) Draw a sectional view of human ovary and label the different follicular stages, ovum and Corpus luteum.

Ans. (a) Oogenesis is initiated at the embryonic stage = 1
 Spermatogenesis begins only at puberty = 1

(b)

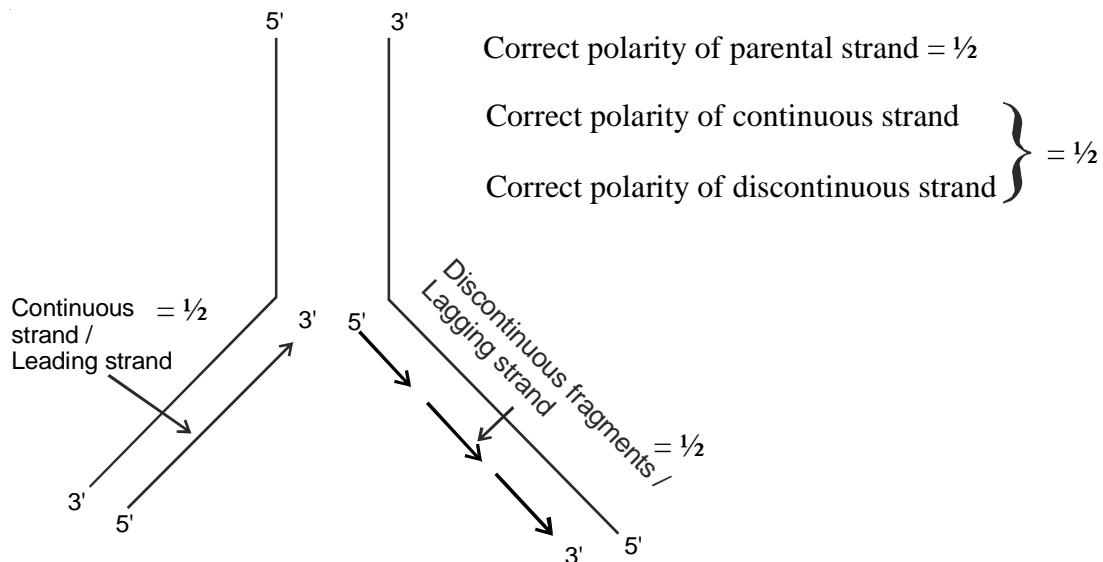


= $\frac{1}{2} \times 6 = 3$

[5 marks]

29. (a) Explain the process of DNA replication with the help of a schematic diagram.
- (b) In which phase of the cell cycle does replication occur in Eukaryotes? What would happen if cell-division is not followed after DNA replication?

- Ans. (a) - Replication of DNA begins at ori, to form a replication fork = $\frac{1}{2} + \frac{1}{2}$
- DNA dependant DNA polymerase forms a new strand in 5' \longrightarrow 3' direction = $\frac{1}{2}$
- Role of DNA ligase is to join discontinuously synthesised fragments = $\frac{1}{2}$



- (b) S phase = $\frac{1}{2}$
- Polyploidy = $\frac{1}{2}$

[5 marks]

OR

- (a) Explain Darwinian theory of evolution with the help of one suitable example. State the two key concepts of the theory.
- (b) Mention any three characteristics of Neanderthal man that lived in near east and central Asia.

- Ans: (a)
- Competition
 - Useful variations
 - Survival of the fittest
 - Natural selection
 - Relevant example
 - Explanation of the above points $\frac{1}{2} \times 5 = 2\frac{1}{2}$

Key concepts

- Branching descent $\frac{1}{2}$
- Natural Selection $\frac{1}{2}$

- (b) Neanderthal man
- Brain size 1400 cc
 - They used hides to protect their bodies
 - They buried their dead $\frac{1}{2} \times 3 = 1\frac{1}{2}$

[$3\frac{1}{2} + 1\frac{1}{2} = 5$ marks]

30. (a) Name the technology that has helped the scientists to propagate on large scale the desired crops in short duration. List the steps carried out to propagate the crops by the said technique.

(b) How are somatic hybrids obtained ?

Ans. (a) Tissue culture / micro propagation = 1

Explants, grown in a test tube, under sterile condition, in special nutrient medium / culture medium $\frac{1}{2} \times 4 = 2$

(b) Isolated single cells, digests cell walls, to obtain protoplast from two different varieties, fusion of protoplast. $\frac{1}{2} \times 4 = 2$

[5 marks]

OR

(a) Cancer is one of the most dreaded diseases of humans. Explain 'Contact inhibition' and 'Metastasis' with respect to the disease.

(b) Name the group of genes which have been identified in normal cells that could lead to cancer and how they do so ?

(c) Name any two techniques which are useful to detect cancers of internal organs.

(d) Why are cancer patients often given α -interferon as part of the treatment ?

Ans. (a) Contact with other cells inhibits their uncontrolled growth = 1;

tumour cells reach distant sites, through blood. = $\frac{1}{2} + \frac{1}{2}$

(b) Proto oncogenes = $\frac{1}{2}$

when activated under certain condition could lead to oncogenic transformation of the cells. = $\frac{1}{2}$

(c) Biopsy / radiography / CT / MRI

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

(d) It activates immune system, destroys tumour = $\frac{1}{2} + \frac{1}{2}$

[5 marks]