# Question Paper Code 57/1/2

SECTION – A

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

1. **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]

2. **Identify 'a' and 'b' in the figure given below representing proportionate number of major vertebrate taxa.**
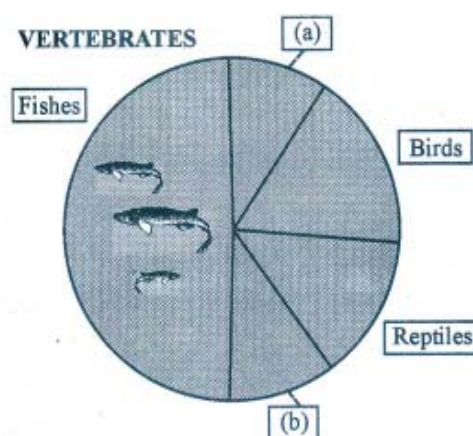
Ans. (a)   Mammals ,

(b)   Amphibians = ½ + ½

[1 mark]

3. **Give an example of an organism that enters 'diapause' and why.**

Ans. (Many species of) Zooplankton, unfavourable condition = ½ + ½

[1 mark]

4. **Name the two intermediate hosts which the human liver fluke depends on to complete its life cycle so as to facilitate parasitization of its primary host.**

Ans. Snail and Fish = ½ + ½

[1 mark]

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

Ans. Plant cells

[1 mark]

6. **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) = ½ + ½

[1 mark]

7. **Mention how does DNA polymorphism arise in a population.**

Ans. Inheritable mutations (in a population) , at high frequency $= \frac{1}{2} + \frac{1}{2}$

[1 mark]

8. **Write the name of the organism that is referred to as the 'Terror of Bengal'.**

Ans. *Eicchornia crassipes* / Water Hyacinth

[1 mark]

SECTION - B

9. **Name the organic materials the exine and intine of an angiosperm pollen grains are made up of. Explain the role of exine.**

Ans. Exine - Sporopollenin $= \frac{1}{2}$

Intine - Cellulose and pectin $= \frac{1}{2}$

Role - most resistant organic material // can withstand high temperature , acid and alkali $= 1$

[2 marks]

10. **(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]

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.**

[2 marks]

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 $\Big\} = \frac{1}{2}$

– 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 $= ½ + ½$

(ii) Female heterogamety , Birds $= ½ + ½$

[2 marks]

12. 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 $= ½$

	T	t	$= ½$
t	Tt	tt	
t	Tt	tt	$= ½$

(ii) Test cross $= ½$

[2 marks]

13. How can healthy potato plants be obtained from a desired potato variety which is viral infected ? Explain.

Ans. Remove meristem (apical or axillary) and grow $= 1$,

in vitro / sterile and special nutrient medium / culture medium $= 1$

[2 marks]

14. 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. $= ½ \times 3 = 1½$

They form hydrogen bonds with their complementary cut counterparts. $= ½$

[2 marks]

15. What is Bio piracy? State the initiative taken by the Indian Parliament towards it.

Ans. (i) Use of bio resources without authorisation , compensation $= ½ + ½$

(ii) The govt has cleared patent terms , emergency provisions , research and development initiative *(Any two)* $= ½ + ½$
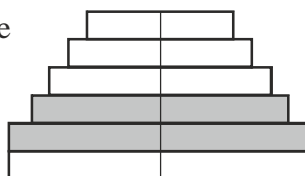
[2 marks]

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

Ans.   (½) Post-reproductive

(½) Reproductive
(½) Pre-reproductive

Construction of pyramid $= ½$

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)

[2 marks]

**18.** **Write the role of 'Ori' and 'restriction' site in a cloning vector pBR322.**

Ans. Ori - site where replication starts , responsible for controlling copy number = ½ + ½

Restriction site - site of ligation of alien / foreign DNA , in one of the two antibiotic resistance site / coding sequence of α galactosidase = ½ + ½

[2 marks]

SECTION - C

19. **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.

$$X \ X^c \quad \times \quad X \ Y \ = 1$$

$$X \ X \quad XY \quad XX^c \quad X^cY \ = 1$$
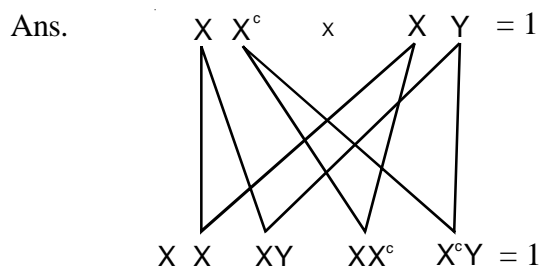
Male = 1

[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.

Ans. - 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]

20. **A cross between a normal couple resulted in a son who was haemophilic and a normal daughter. In course of time, when the daughter was married to a normal man, to their surprise, the grandson was also haemophilic.**

    (a) **Represent this cross in the form of a pedigree chart. Give the genotypes of the daughter and her husband.**

    (b) **Write the conclusion you draw of the inheritance pattern of this disease.**

Ans.
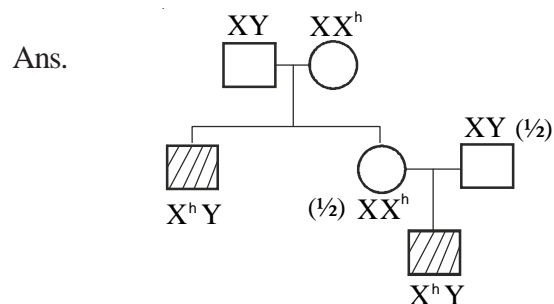
        Construction of pedigree chart = 1

    (b)   Sex - linked recessive inheritance pattern = 1

                                                                            [3 marks]

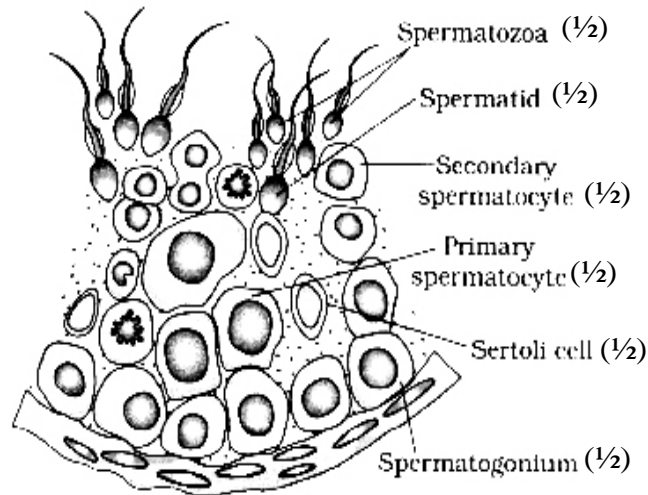**21.** **Women are often blamed for producing female children. Consequently, they are ill treated and ostracized. How will you address this issue scientifically if you were to conduct an awareness programme to highlight the values involved ?**

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 above explanation = ½ × 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) = ½ × 3

                                                                            [3 marks]

22. **Draw a labelled diagram of the sectional view of a human seminiferous tubule (six parts to be labelled)**

Spermatozoa (½)

Spermatid (½)

Secondary spermatocyte (½)

Primary spermatocyte (½)

Sertoli cell (½)

Spermatogonium (½)

(Any six) = ½ × 6

[3 marks]

23. (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)* = ½ + ½

(ii)   GPP – R = NPP   = 1

[3 marks]

24.   Study the graph given below and answer the question that follow :
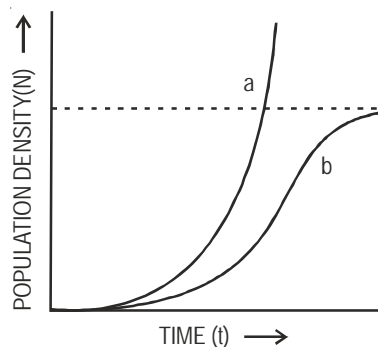
(i)   Write the status of food and space in the curves (a) and (b).

(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 = ½

b - limited food and space = ½

(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]

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 = ½ × 6

[3 marks]

26.   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) = ½ + ½

[3 marks]

27.   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.	*Brassica*	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 = ½ × 3

(b)   (a)   Aphids

(b)   Jassids / aphids / fruit borer

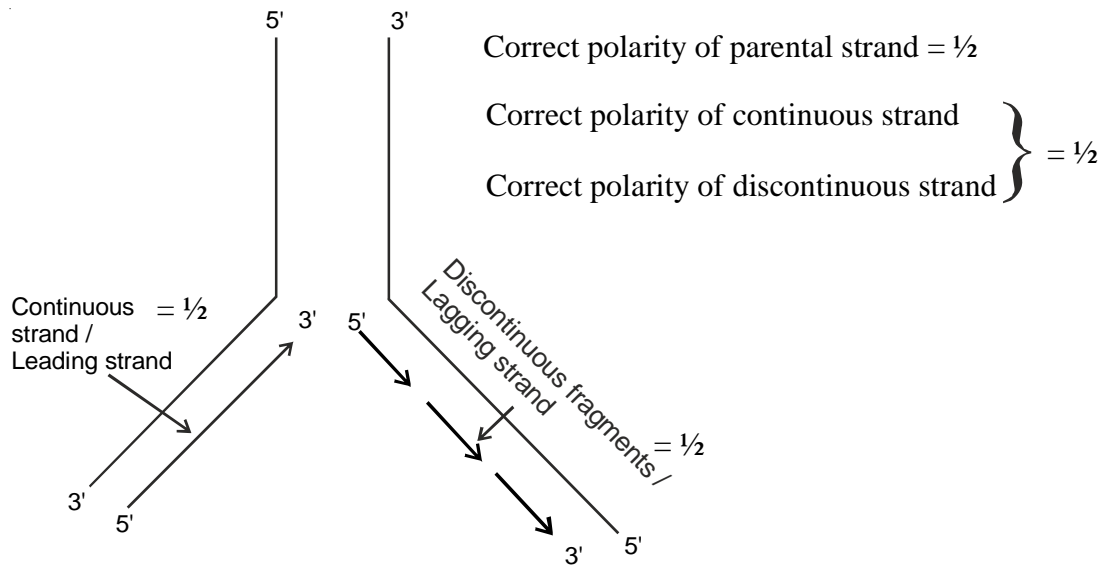(c)   Okra (Bhindi)   = ½ × 3

[1½ + 1½ = marks]

SECTION - D (5 × 3 = 15)

28. **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 = ½ + ½

- DNA dependant DNA polymerase forms a new strand in 5'⟶ 3' direction = ½

- Role of DNA ligase is to join discontinuously synthesised fragments = ½

Correct polarity of parental strand = ½

Correct polarity of continuous strand

Correct polarity of discontinuous strand } = ½

Continuous = ½
strand /
Leading strand

Discontinuous fragments /
Lagging strand = ½

b. S phase = ½

Polyploidy = ½

[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 ½×5=2½

Key concepts

• Branching descent ½

• Natural Selection ½

(b) Neanderthal man

- Brain size 1400 cc

- They used hides to protect their bodies

- They buried their dead ½ × 3 = 1 ½

[3½ + 1½ = 5 marks]

29. (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 ½ × 4 = 2

(b) Isolated single cells , digests cell walls , to obtain protoplast from two different varieties , fusion of protoplast. ½ × 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) Conact with other cells inhibits their uncontrolled growth = 1

tumour cells reach distant sites, through blood. = ½ + ½

(b) Proto oncogenes = ½

when activated under certain condition could lead to oncogenic transformation of the cells. = ½

(c) Biopsy / radiography / CT / MRI

(Any 2) = ½+½

(d) It activates immune system, destroys tumour = ½+½

[5 marks]

30. Explain the ovarian and uterine events that occur during a menstrual cycle in a human female, under the influence of Pituitary and Ovarian hormones respectively.

Ans. Release of FSH and LH from pituitary , during follicular phase or between 5th - 14th day of menstrual cycle leads to growth of primary follicle to Graafian follicle (G.F.) in the ovary , Estrogen from growing follicle helps proliferation of uterine endometrium or its repair , high level of LH at middle / 14th day of the menstrual cycle leads to rupture of GF causing release of ovum / ovulation , remaining

cells of GF transform into Corpus Luteum (CL) under the influence of LH , CL secretes progesterone that maintains endometrium in preparation for pregnancy , level of FSH and LH fall due to rise of progesterone and estrogen (25th day of the cycle) , leading to degeneration of CL , level of progesterone falls , leading to disintegration of uterine endometrium and menstruation starts (0-5 day of the cycle)
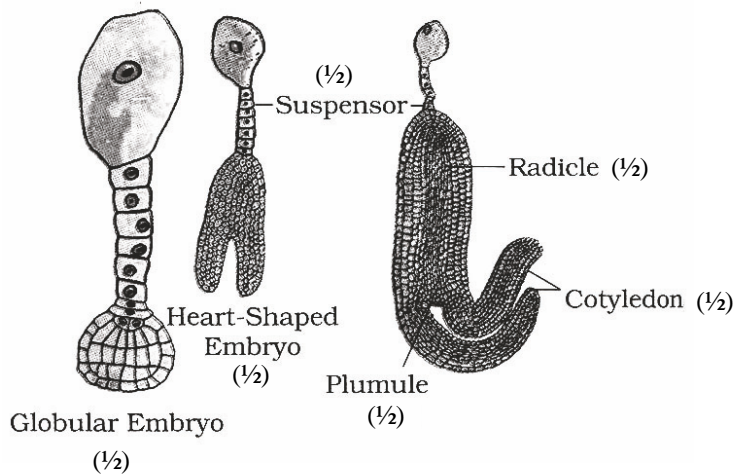
$= ½ × 10$

[½ × 10 = 5 marks]

OR

(a) **Why does endosperm development precede embryo development in angiosperm seeds? State the role of endosperm in mature albuminous seeds.**

(b) **Describe with the help of three labelled diagrams the different embryonic stages that include mature embryo of dicot plants.**

Ans. (a) As it provides nutrition for the developing embryo / It is an adaptation to provide assured nutrition to the developing embryo = ½

Provides nutrition during seed germination = ½

(b) The zygote (in the embryo sac) divides to give rise to pro embryo and subsequently to the globular , heart shaped and mature embryo as shown in the diagram = 1

$= ½ × 6$

[1 + 4 = 5 marks]