Question Paper Code 57/1

SECTION A

1. Name the part of the flower which the tassels of the corn-cob represent.

Ans. Style = ½ , stigma = ½

[1 mark]

2. Mention any two contrasting traits with respect to seeds in pea plant that were studied by Mendel.

Ans. Round/Wrinkled = ½, Yellow/ Green = ½

[1 mark]

3. Why is secondary immune response more intense than the primary immune response in humans?

Ans. Body will have memory of the First Encounter / Presence of antibodies developed during primary immune response.

[1 mark]

4. Why is it not possible for an alien DNA to become part of a chromosome anywhere along its length and replicate normally?

Ans. Alien DNA must be linked to ori / origin of replication / site to start replication.

[1 mark]

5. State the role of C-peptide in human insulin.

Ans. C-peptide (extra stretch of polypeptide) which makes the insulin inactive / proinsulin is inactive because it contain C-peptide.

[1 mark]

6. Name the enzymes that are used for the isolation of DNA from bacterial and fungal cells for recombinant DNA technology.

Ans. Bacteria: lysozyme = ½, fungi: chitinase = ½

[1 mark]

7. State Gause's Competitive Exclusion Principle.

Ans. Two closely related species competing for same resources, cannot coexist indefinitely (the inferior will be eliminated).

[1 mark]

8. Name the type of association that the genus Glomus exhibits with higher plants.

Ans. Symbiosis / Mycorrhizae / Mutualism.

[1 mark]

SECTION B

9. Why are the human testes located outside the abdominal cavity? Name the pouch in which they are present.

Ans. Needs lower temperature (2 - 2.5°C) less than the body temperature for the formation of sperms/ for spermatogenesis. = 1

Scrotal sac / Scrotum = 1

[2 marks]

10. In Snapdragon, A cross between true breeding red flower (RR) plants and true breeding white flower (rr) plants showed a Progeny of plants with all pink flowers.

(a) The appearance of pink flowers is not known as blending. Why?

(b) What is the phenomenon known as?

Ans. (a) R (dominant allele red colour) is not completely dominant over r (recessive allele white colour) / r maintains its originality and reappear in F_2 generation. = 1

(b) Incomplete dominance = 1

[2 marks]

11. With the help of one example, explain the phenomena of co-dominance and multiple allelism in human population.

Ans. ABO blood group in human being is an example of multiple allelism = ½

Three alleles for the gene I i.e. I^A, I^B, i = ½

When I^A and I^B are present together the blood group is AB. = ½

Both A and B are expressed and is called codominance. = ½

[2 marks]

12. Write the scientific name of the fruit-fly. Why did Morgan prefer to work with fruit-flies for his experiments? State any three reasons.

Ans. *Drosophila melanogaster* = ½

Grown in simple synthetic medium, complete the life cycle in two weeks / short life cycle, single mating produce more progeny , dimorphism, many heritable variations / easy to handle.

(any three) = 1½

[2 marks]

OR

Linkage or crossing-over of genes are alternatives of each other. Justify with the help of an example.

Ans. In Drosophila a yellow bodied white eyed female was crossed with brown bodied red eyed male, F_1 progeny produced and intercrossed the F_2 phenotypic ratio of Drosophila deviated significantly from Mendel's 9:3:3:1, the genes for eye colour & body colour are closely located on the 'X' chromosome showing linkage & therefore inherited together, recombinants were formed due to crossing over but at low percentage. = ½×4

[2 marks]

13. List the symptoms of Ascariasis. How does a healthy person acquire this infection?

Ans. Internal bleeding, muscular pain, anaemia, blockage of intestinal passage.

(any three) = 1½

Intake of water, vegetables / fruits / foods contaminated with eggs of the parasite. = ½

[2 marks]

14. Explain the significant role of the genus Nucleopolyhedrovirus in an ecological sensitive area.

Ans. Species specific, narrow spectrum , insecticidal application (IPM), no negative impact on plants / mammals / birds / fish / even non target insects. = ½×4

[2 marks]

15. How does a restriction nuclease function? Explain.

Ans. Restriction nuclease cut DNA at specific sites = 1

exonuclease cuts DNA at the ends, endonuclease cuts at specific position within DNA. / Restriction endonuclease cuts the DNA at specific pallindromic sequence. = ½+½

[2 marks]

16. How have transgenic animals proved to be beneficial in:

(a) Production of biological products

(b) Chemical safety testing

Ans. a) (Rosie - transgenic cow) produced human protein / alpha lactalbumin enriched milk, alpha-1 antitrypsin used to treat emphysema. = ½+½

b) (Toxicity Testing) - more sensitive to toxic substances, results obtained in less time. = ½+½

[2 marks]

17. Describe the mutual relationship between fig tree and wasp and comment on the phenomenon that operates in their relationship.

Ans. Wasp - helps in pollination / pollinator (specific)

Oviposition / seeds and ovules used for nourishing larva.

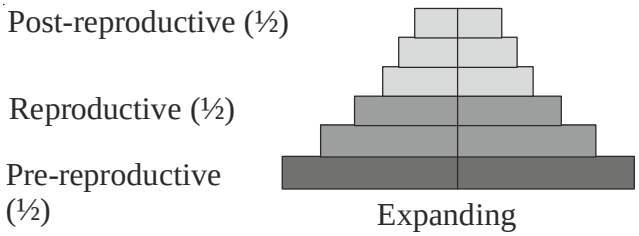
(any two) = ½+½

Co evolution exists between their close specific tight relationship. = 1

[2 marks]

18. Construct an age pyramid which reflects an expanding growth status of human population.

Ans.



Construction of Pyramid = ½

[2 marks]

SECTION C

19. Make a list of any three out breeding devices that flowering plants have developed and explain how they help to encourage cross-pollination.

Ans. (i) Time of pollen release and stigma receptivity are different (not synchronized), self pollination prevented.

(ii) Anther & stigma are placed at different positions, so the pollen can not come in contact with the stigma of the same flower.

(iii) Self incompatibility, genetic mechanism (prevent the pollen germination on the stigma of the same flower)

(iv) Production of unisexual flowers / dioecious plants, cross pollination ensured.

(any three) = (½ x 6)

[3 marks]

OR

Why are angiosperm anthers called dithecous? Describe the structure of its microsporangium.

Ans. • Anther bilobed, each lobe of anther has two theca. = ½+½

• Microsporangium surrounded by four wall layers named as epidermis, endothecium, middle layer and tapetum. = 1

• In young anther a group of compactly arranged homogenous cells called sporogenous tissue occupies the centre of each microsporangium which produce microspores / pollen grains. = 1

[3 marks]

20. If implementation of better techniques and new strategies are required to provide more efficient care and assistance to people, then why is there a statutory ban on amniocentesis? Write the use of this technique and give reason to justify.

Ans. To legally check female foeticide / Misuse of sex determination technique = 1

To detect the abnormal chromosomes / genetic disorder = 1

Justify : Prevent (female foeticide) change in sex ratio of the population. = 1

[3 marks]

21. Why is pedigree analysis done in the study of human genetics? State the conclusions that can be drawn from it.

Ans. (i) Control crosses are not possible in case of humans beings. = 1

(ii) Analysis of traits in several generations of a family / To trace pattern of inheritance / Whether the trait is dominant or recessive / sex linked or not.

(any two) = 1+1

[3 marks]

22. Identify 'a', 'b', 'c', 'd', 'e' and 'f' in the table given below :

No.	Syndrome	Cause	Characreristics of affected individual	Sex Male/Female/Both
1	Down's	Trisomy of 21	'a' (i) (ii)	'b'
2	'c'	XXY	Overall masculine development	'd'
3	Turner's	45 with OX	'e' (i) (ii)	'f'

Ans. a. short statured / small round head / furrowed tongue / partially open mouth / palm is broad / physical development retarded / psychomotor development retarded / mental development retarded .

(any two) = ½

b. both / male and female = ½

c. klinefelter's syndrome = ½

d. male = ½

e. sterile ovaries / rudimentary ovaries, lack of secondary sexual characters. = ½

f. female= ½

[½×6= 3 marks]

23. Community Service department of your school plans a visit to a slum area near the school with an objective to educate the slum dwellers with respect to health and hygiene.

(a) Why is there a need to organize such visits?

(b) Write the steps you will highlight, as a member of this department, in your interaction with them to enable them to lead a healthy life.

Ans. (i) To create awareness about disease and their effects on the body / about immunization / health and hygiene. = 1

(ii) Disposal of waste

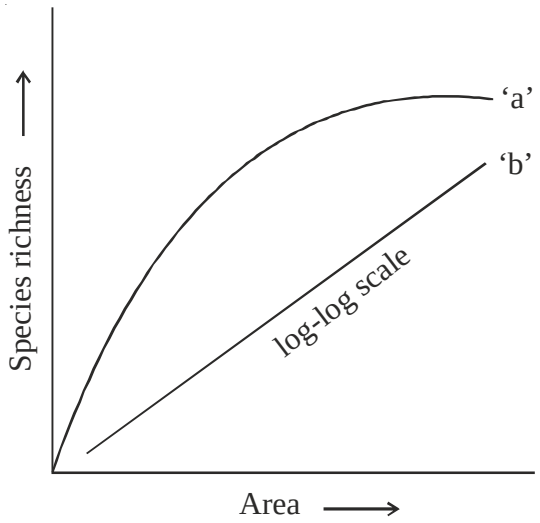
Control of Vectors

Hygienic food and water / fresh drinking water /

Balanced diet / Regular exercise / Yoga

(any four) = ½×4=2 [1+2=3 marks]

24. The following graph shows the species-area relationship. Answer the following question as directed.



(a) Name the naturalist who studied the kind of relationship shown in the graph. Write the observation made by him.

(b) Write the situations as discovered by the ecologists when the value of 'Z' (slope of the line) lies

(i) 0.1 and 0.2

(ii) 0.6 and 1.2

What does 'Z' stand for?

(c) When would the slope of the line 'b' become steeper?

Ans. a) Alexander Von Humboldt. = ½

Within a region species richness increased with increasing explored area but only up to a limit. = ½

b) i. the slopes of regression lines are similar / unaffected distribution in an area / normal range = ½

ii. the slope of regression is steeper when we analyse the species area relationship among very large areas like entire continent = ½

Z (slope of the line) regression co-efficient = ½

c) If species richness is more / 0.62 - 1.2 = ½ [½ x 6 = 3 marks]

25. Name and describe the technique that helps in separating the DNA fragments formed by the use of restriction endonuclease.

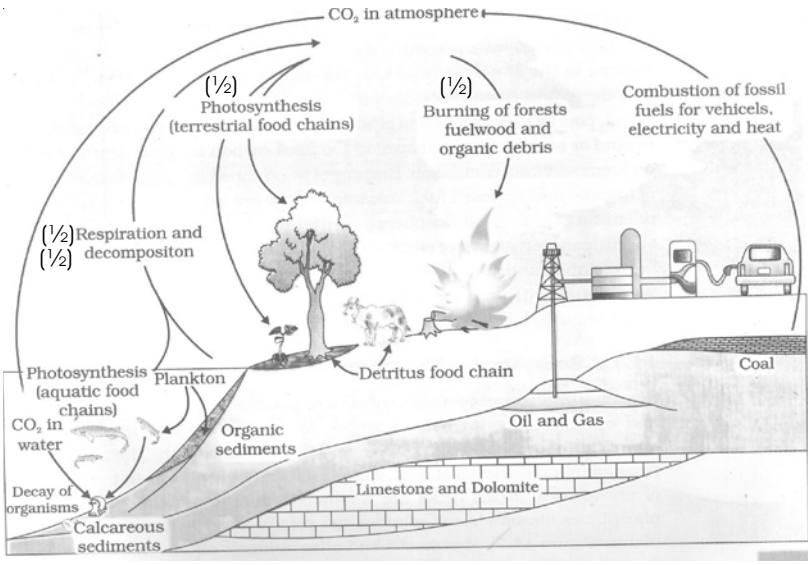
Ans. Gel electrophoresis = ½,

DNA are -vely charged, forced to move towards anode, electric field in agarose gel matrix, separate according to their size / sieving effect, smaller fragments moves faster and further than the larger. = ½×5

[3 marks]

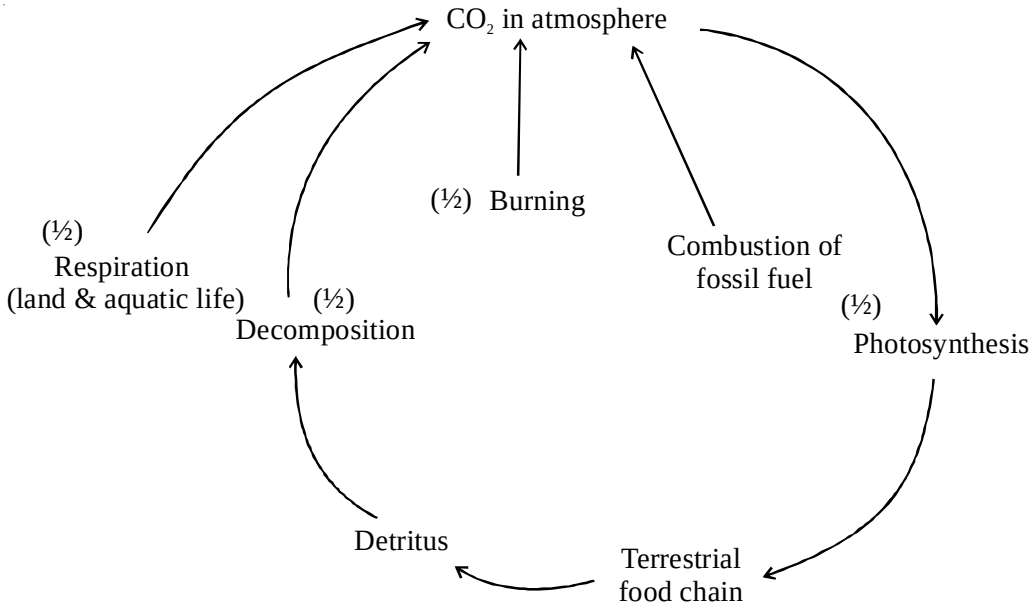
26. State the function of a reservoir in a nutrient cycle. Explain the simplified model of carbon cycle in nature.

Ans. **Function** : To meet the deficit which occurs due to imbalance in the rate of influx & efflux. =1



= ½×4

//



Carbon-cycle in Biosphere = ½×4

27. Since the origin of life on the earth, there were five episodes of mass extinction of species.

(i) How is the 'Sixth Extinction', presently in progress, different from the previous episodes?

(ii) Who is mainly responsible for the 'Sixth Extinction''?

(iii) List any four points that can help to overcome this disaster.

Ans. (i) The rates are faster / accelerated / current species extinction rate are estimated to be 100-1000 times faster than in the pre-human times. = ½

(ii) Human activities. = ½

(iii) a. Preventing habitat loss and fragmentation

b. Checking overexploitation

c. Preventing alien species invasion

d. Preventing co-extinction

e. Conservation / Preservation of species.

(any four) = ½×4 = 2 [1+2= 3 marks]

SECTION D

28. (a) Where does fertilization occur in humans? Explain the events that occur during this process

(b) A couple where both husband and wife are producing functional gametes, but the wife is still unable to conceive, is seeking medical aid. Describe any one method that you can suggest to this couple to become happy parents.

Ans. a) i. Ampullary Isthmic junction in fallopian tube / fallopian tube = ½

ii. The sperms come in contact with zona pellucida = ½

iii. Induces change in the membrane = ½

iv. Blocks entry of other sperms / ensures only one sperm fertilizes the ovum / prevents polyspermy. = ½

v. The secretion of acrosome helps the sperm to enter the cytoplasm = ½

vi. Entry of sperm induces completion of second meiotic division forming ovum and 2nd polar body = ½

vii. The haploid nucleus of Sperm and that of ovum fuses = ½

viii. Formation of diploid Zygote, fertilisation completed. = ½ (½×8=4)

b) Methods IVF / ZIFT / AI = ½

IVF : Ova from wife and sperm from the husband is collected

It is induced to formed zygote under laboratory conditions = ½

//

ZIFT : Zygote or early embryo are then transferred to the fallopian tube (ZIFT) or into uterus (IUT) to complete further development = ½

//

AI : Semen collected from the husband is artificially introduced either into the vagina or into the uterus (IUI) of the wife = ½

[5 marks]

OR

(a) Explain the different ways apomictic seeds can develop. Give an example of each.

(b) Mention one advantage of apomictic seeds to farmers.

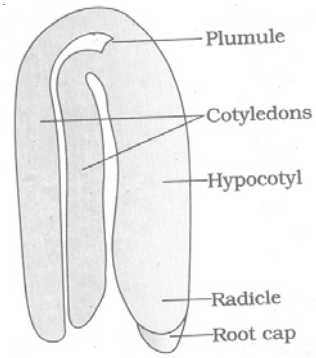
(c) Draw a labeled mature stage of a dicotyledonous embryo.

Ans. (a) (i) Diploid egg cell is formed without reduction division and develops into embryo without fertilisation, eg. *Asteraceae* / grasses. = ½+½

(ii) In citrus / mango, some of the diploid nucellar cells surrounding the embryo sac start dividing, protrude into embryo sac & develop into a embryo = ½+½.

(b) No segregation of character in hybrid seeds, economically beneficial / desired varieties are cultivated. =1

(c)



(any four labelling) = ½×4=2

[5 marks]

29. (a) Describe the various steps of Griffith's experiment that led to the conclusion of the 'Transforming principle' .

(b) How did the chemical nature of the 'Transforming principle' get established ?

Ans. (a) *Streptococcus pneumonia* = ½

S - Strain 'inject into mice' mice die = ½

R - strain 'inject into mice' mice alive = ½

S - strain (heat killed) 'inject into mice' mice alive = ½

R - strain (alive) + S (heat killed) strain 'inject into mice' mice die = ½

R strain transformed into virulent = ½

(b) Purified biochemicals (protein, DNA, RNA) from heat killed S - Strain = ½

Treated with protease - did not affect transformation = ½

Treated with RNase - did not affect transformation = ½

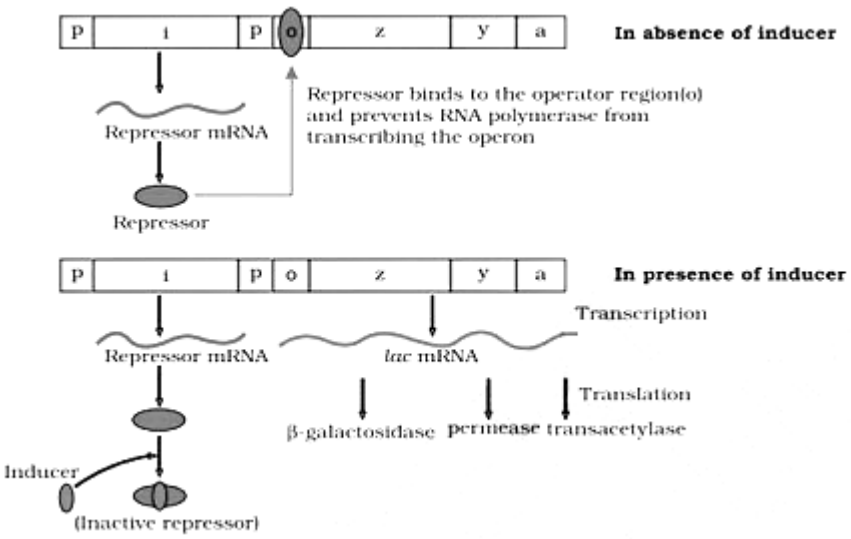
Treated with DNase - transformation affected = ½ (½×10=5)

[5 marks]

OR

Describe how the lac operon operates, both in the presence and absence of an inducer in *E.coli*.

Ans.



i. structural gene zya = ½
ii. operator = ½
iii. i = ½
iv. repressor = ½
v. binding = ½
vi. Operon shut = ½
vii. inducer = ½
viii inducer + binding = ½
ix. operator free = ½
x. enzymes / operator = ½ (½×10=5)

[5 marks]

30. With advancement in genetics, molecular biology and tissue culture, new traits have been incorporated into crop plants.

Explain the main steps in breeding a new genetic variety of crop.

Ans. i. Collection of variability / germplasm collection, collection and preservation of all different wild varieties, species, and relatives of cultivated species / entire collection of plants. = ½+½

ii. Evaluation and selection of parents, to identify plant with desirable combination of character / purelines are created. = ½ + ½

iii. Cross hydridization among selected parents, cross hybridizing the two parents to produce hybrids. = ½+½

iv. Selection and testing of superior recombinants, selection among the progeny of the hybrids that have desired character combinations, superior to both the parents / self pollinated for several generations. = ½+½

v. Testing, release and commercialisation of new cultivars, newly selected lines are evaluated for yield / other agronomic traits of quality / disease resistance in research feels followed by testing the material in farmers fields. = ½+½

[1×5 = 5 marks]

OR

(a) State the objective of animal breeding.

(b) List the importance and limitation of inbreeding. How can the limitations can be overcome.

(c) Give an example of new breed each of cattle and poultry.

Ans. a) Increase the yield of animal and improving the desirable qualities of the produce=1

b) **Importance :**

Increases homozygosity / to evolve pureline / expose harmful recessive genes / help in accumulation of superior genes / elimination of less desirable genes.

(any four) = ½×4

Limitation:

Reduces fertility and productivity / inbreeding depression. = ½

It can be overcomed by out breeding / cross breeding / out cross / interspecific hybridization / selected animals is to be bred with unrelated superior animals of the same breed. = ½

c) Jersey / Hisardale - a new breed by crossing Bikaneri ewes and Mirano rams (cattle) and Leghorn (poultry) = ½+ ½ [5 marks]