Question Paper Code 57/2/1

SECTION – A

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

1. Name two animals that exhibit Oestrus cycle.

Ans. cow / sheep / rat / deer / dog / tiger / anyother (correct example) = ½ × 2

[1Mark]

2. What is point mutation? Give one example.

Ans. Arising due to change in a single base pair of DNA , sickle cell anemia = ½ × 2

[1 Mark]

3. Mention one difference to distinguish an exon from an intron.

Ans. Exon : coded / expressed sequence of nucleotides in mRNA , = ½

Intron : Intervening sequence of nucleotides not appearing in processed mRNA = ½

[1 Mark]

4. Suggest a molecular diagnostic procedure that detects HIV in a suspected AIDS patient.

Ans. PCR / ELISA = 1

[1 Mark]

5. What does nature's carrying capacity for a species indicate ?

Ans. (In nature) a given habitat has enough (limited) resources to support a maximum possible number , no further growth in population is possible = ½ + ½

[1 Mark]

SECTION –B

Q. Nos. 6-10 are of two marks each

6. Write the location and functions of Myometrium and Endometrium.

Ans. Myometrium : middle layer of uterus , contractions of the uterus during delivery / child birth / parturition = ½ + ½

Endometrium : Inner layer of uterus , cyclic changes during menstruation / implantation of embryo = ½ + ½

[2 Marks]

7. How does a test cross help to determine the genotype of an individual ?

Ans. Individual of unknown genotype crossed with recessive parent , = 1

All dominant in progeny - Homozygosity , dominant to recessive ratio 1:1 in progeny - Heterozygosity = ½ + ½

[2 Marks]

OR

Mention two applications of DNA polymorphism.

Ans. Genetic mapping , DNA finger printing = 1 + 1

[2 Marks]

8. What kind of areas are suitable for practicing apiculture? Write the scientific name of the variety commonly reared for the purpose.

Ans. (Bee pastures of) wild shrub , fruit orchards , cultivated crop (any two) = ½ + ½

Apis indica = 1

[2 Marks]

9. Suggest four advanced ex-situ methods to conserve threatened biodiversity.

Ans. Cryopreservation , in vitro fertilisation , tissue culture , seed banks = ½ × 4

[2 Marks]

10. Lower BOD of a water body helps reappearance of clean-water organisms. Explain.

Ans. Lowering of BOD results in decreased biodegradable material → reduced microbial decomposition → oxygen utilisation reduced → more Dissolved Oxygen (DO) available (clean water - organisms reappear) = ½ × 4

[2 Marks]

SECTION –C

Q. Nos. 11-22 are of three marks each

11. "Post-industrialization, the population of melanised moth increased in England at the expense of white-winged moths." Provide explanations.

Ans. Pre Industrialisation had more white winged moth against grey lichens on tree trunk, industrialisation led to deposition of soot & smoke on tree bark , making bark of trees dark , against the dark background white moth could easily be preyed upon , melanised moth could camouflage against dark bark , increased in number (through reproduction) / natural selection = ½ × 6

[3 Marks]

12. Why does the 'insertional inactivation' method to detect recombinant DNA is preferred to 'antibiotic resistance' procedure?

Ans. The presence of a chromogenic substrate gives blue coloured colonies , in absence of an insert / in non-transformants , presence of an insert (in the enzyme site) , results into (insertional inactivation of the β-galactosidase) colonies which do not produce colour = ½ × 4

Antibiotic resistance method requires duplicate plating / cumbersome procedure = 1

[3 Marks]

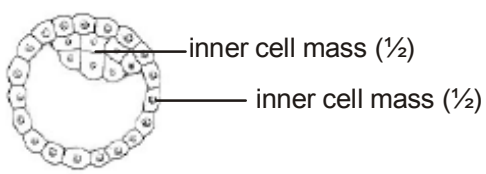
13. Explain the role of the enzyme EcoRI in recombinant DNA technology.

Ans. EcoRI inspects length of DNA and recognises specific palindromic nucleotide sequence , binds with DNA , cuts each of the two strands of double helix at specific points = 1 × 3

[3 Marks]

14. Draw a labelled diagram of the embryonic stage that gets implanted in the human uterus. State the functions of the two parts labelled.

Ans.



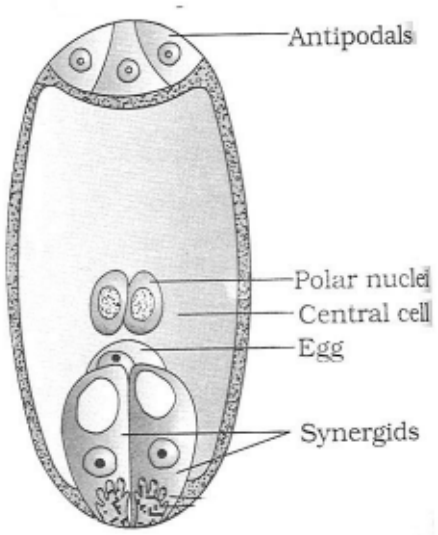
-Trophoblast - helps in implantation / attachment to endometrium / attachment to uterus = 1

-Inner cell mass - gets differentiated into an embryo = 1

[3 Marks]

15. (a) Draw a labelled sketch of a mature 7-celled,8-nucleate embryo-sac.
(b) Which one of the cell in an embryo-sac produce endosperm after double fertilization?

Ans. (a)



= ½ × 5 = 2½

(b) Central cell = ½

[3 Marks]

16. Narrowly utilitarian arguments are put forth in support of biodiversity conservation. Explain the other two arguments that are put forth in support of the same cause.

Ans. - Broadly utilitarian = ½

Ecosystem services - Purify air , cycling of nutrients , habitat for wildlife , pollinating crops , aesthetic pleasure (any two) = ½ × 2 = 1

- Ethical = ½

Philosophical / spiritual / moral duty towards future generations = ½ × 2 = 1

(½ + 1 + ½ + 1) [3 Marks]

17. On a visit to a Hill station, one of your friend suddenly become unwell and felt uneasy.

(a) List two symptoms you would look for to term it to be due to allergy.

(b) Explain the response of the body to an allergen.

(c) Name two drugs that can be recommended for immediate relief.

Ans. (a) sneezing , watery eyes, running nose , difficulty in breathing (any two)= ½ + ½

(b) body releases antibodies , IgE type = ½ + ½

(c) Antihistamine , adrenalin , steroids (any two) = ½ +½

[3 Marks]

18. (a) Why did Hershey and Chase use radioactive sulfur and radioactive phosphorus in their experiment ?

(b) Write the conclusion they arrived at and how.

Ans. (a) In order to label protein coat of virus with radioactive sulfur , label DNA with radioactive phosphorus = ½ + ½

(b) Bacteria which were infected with viruses having radioactive DNA were found to contain radioactive DNA later on = ½

Bacteria which were infected with viruses having radioactive protein coat were not found to contain radioactivity = ½

Conclusion - DNA is the genetic material = 1

[3 Marks]

19. (a) Explain any two defence mechanisms plants evolved against their predators.

(b) How does predation differ from parasitism?

Ans. (a) (i) Thorns are (morphological) means of defence = 1

(ii) produce / store chemicals which inhibit digestion / disrupts reproduction / kill // Calotropis produces highly poisonous cardiac glycosides // plants may produce chemcials such as nicotine / caffiene / quinine / strychnine / opium are produced as defence = 1

(b)

Parasitism	Predation
- Lives & feed on the host	Only feeds on prey
- host specific	prudent / not prey specific
- Co-evolve with the host	Control / check prey population
	(any one difference) = 1

[3 Marks]

20. Human blood group is a good example of multiple allelism and co-dominance. Justify.

Ans. **Multiple allelism** : Generally in an individual / population **,** only two alleles of a trait govern the character **,** but in case of ABO blood group **,** three alleles I^A, I^B and i are found to govern blood group in human population = ½ × 4 =2

Co-dominance : Allele I^A and I^B when present in an individual , both being dominant express their own types of sugars / traits (no marks for the second step if two alleles are not given correctly) = ½ × 2 =1

[3 Marks]

21. (a) What is Gene therapy?

(b) Describe the procedure of such a therapy that could be a permanent cure for a disease. Name the disease.

Ans. (a) (Collection of) methods that allows correction of gene defect that has been diagnosed in a child / embryo // Genes are inserted into a person's cells and tissues to treat a disease , this involves delivery of a normal gene into the individual / embryo to take over the function of and compensate for non-functional / a defective gene = 1

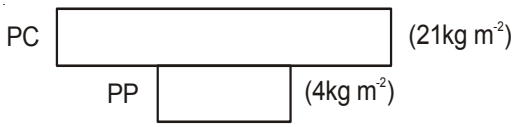
(b) If the desired gene is isolated and introduced into cells at early embryonic stages it can provide a permanant cure = 1

ADA / Adenosine deaminase deficiency = 1

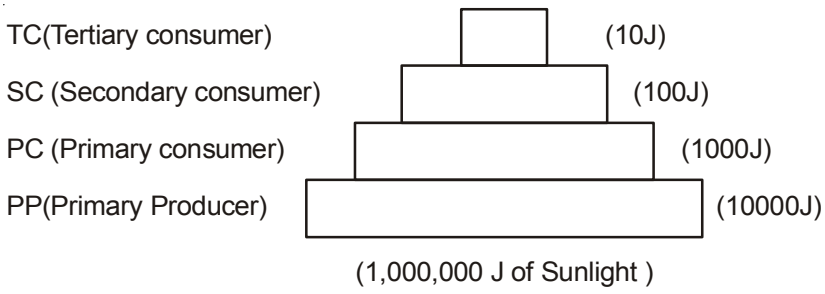
[3 Marks]

22. Draw a pyramid of biomass and pyramid of energy in sea. Give your comments on the type of Pyramids drawn.

Ans.



Pyramid of biomass in sea = 1



Pyramid of energy in sea = 1

The pyramid of biomass in sea is inverted = ½

The pyramid of energy in sea is upright = ½

[3 Marks]

OR

(a) Rearrange the following greenhouse gases in increasing order of their relative contribution to the total global warming:

N_2O; CFC; CO_2; C_2H_4.

(b) What is the effect of global warming on polar ice-caps? Comment on its possible ecological impact.

Ans. (a) $C_2H_4 \rightarrow N_2O \rightarrow CFC \rightarrow CO_2$ / $N_2O \rightarrow CFC \rightarrow CH_4 \rightarrow CO_2$ (Highest) = 1

Note - Ignore C_2H_4/CH_4 and give one mark for remaining three greenhouse gases if sequence is correct

(b) (Global warming) → Rise in Atmospheric temperature → polar ice melts → increase in sea level → coastal land mass submerge = ½ × 4 = 2

[3 Marks]

SECTION –D

Q No. 23 is of four mark

23. You have a friend whose parents are too indulgent in his/her daily affairs. They think him/her to be still young which makes him/her sad and is upset all the time. As he/she feels that the parents should give him/her opportunity to take independent decision on some issues.

(a) Would you support your friend and why ?

(b) Write the characteristics of this age group.

(c) List two curative measures.

Ans. (a) Yes , because of peer understanding = ½ + ½ =1

(b) Curious , adventurous , look for excitement , experimentation = ½ × 4 =2

(c) Avoid undue peer pressure / education & counselling / help from parents & peers / identifying the danger signs / professional and medical help or any other appropriate measures **(any two)** = ½ + ½ =1

[4 Marks]

SECTION –E

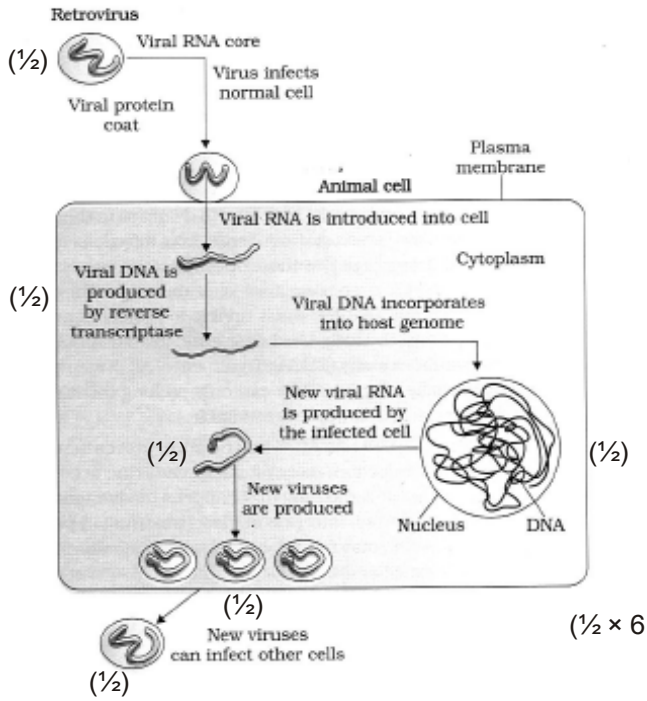
Q Nos. 24-26 are of five marks each

24. (a) How does a Human Immunodeficiency Virus(HIV) replicate in a host ?

(b) How does an HIV-infected patient lose immunity ?

(c) List any two symptoms of this disease.

Ans. (a)



(½ × 6 / explained)

(b) Loss of T-lymphocytes = 1

(c) Fever / diarrhoea / susceptibility to other diseases , prone to microbial infection **(any two)** = ½ + ½

[5 Marks]

OR

Describe the process of waste- water treatment under the following heads:

(a) Primary treatment.

(b) Secondary treatment.

Ans. (a) Primary treatment

1. Physical removal of particles through filtration , sedimentation in stages = ½ +½

2. Solids settle to form primary sludge , the supernatants form the effluent = ½ +½

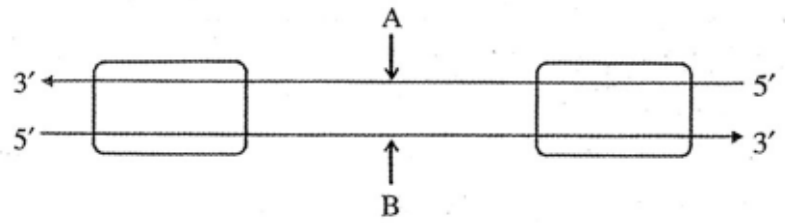
(b) Secondary Treatment

- Effluent passed into aeration tanks = ½
- Vigorous growth of useful aerobic microbes into flocs = ½
- Significant reduction of BOD = ½
- Effluent passed on to settling tanks where bacterial flocs settle to form activated sludge = ½
- Activated sludge is passed on to anaerobic sludge digester , where bacteria and fungi are anaerobically digested = ½ + ½

  = ½ × 10

[5 Marks]

25.



(a) Identify strands 'A' and 'B' in the diagram of transcription unit given above and write the basis on which you identified them.

(b) State the functions of Sigma factor and Rho factor in the transcription process in a bacterium.

(c) Write the functions of RNA polymerase-I and RNA polymerase-III in eukaryotes.

Ans. (a) A - Template strand = 1

B - Coding strand = 1

Template strand has polarity 3' →5'= ½

Coding strand has polarity 5' →3'= ½

On the basis of polarity with respect to promoter = ½ + ½

(b) In initiation sigma factor associates with RNA polymerase to initiate transcription , Rho factor gets associated to RNA polymerase to terminate transcription = ½ + ½

(c) RNA polymerase I - Transcribes rRNAs = ½

RNA polymerase III - Transcribes tRNA / 5srRNA / SnRNA = ½

[5 Marks]

OR

Describe the packaging of DNA helix in a prokaryotic cell and an eukaryotic nucleus.

Ans. Prokaryotes : Negatively charged DNA , is held with positively charged proteins , in nucleoid , DNA in nucleoid is organised in large loops held by protein = ½ × 4

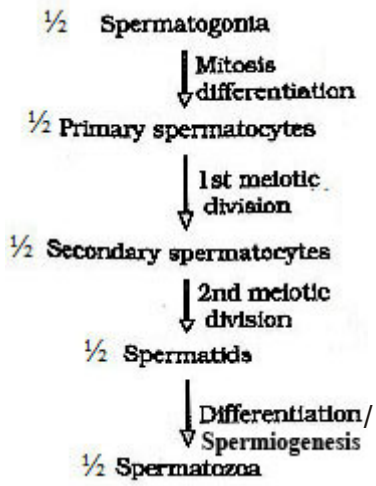
Eukaryotes :In nucleus the negatively charged DNA , is wrapped around positively charged histone octamer , to form nucleosome , nucleosomes are repeated , to constitute chromatin , at higher level additional set of non-histone chromosomal protein gets associated with chromatin = ½ × 6

[5 Marks]

26. (a) Where does spermatogenesis occur in human testes ? Describe the process of spermatogenesis upto the formation of spermatozoa.

(b) Trace the path of spermatozoa from the testes upto the ejaculatory duct only.

Ans. (a) Seminiferous tubules = ½



½ × 5= 2½

½ ½ ½ ½

(b) Seminiferous tubules → rete testis → Vasa efferentia → Epididymis → vas deferens → (ejaculatory duct)

[5 Marks]

OR

Explain the events upto fertilization that occur in a flower after the pollen grain has landed on its compatible stigma.

Ans. The pollen grain germinates , on the stigma to produce a pollen tube through one of the germ pores , the content of the pollen grain move into the pollen tube , pollen tube grows through the tissues of the stigma and style and reaches the ovary , the generative cell divides and forms two male gametes during the growth of pollen tube (in the stigma) , the pollen tube enters the ovule through micropyle, and then enters one of the synergids (through filiform apparatus) , the pollen tube releases the two male gametes (in the cytoplasm of synergids) , one of the male gamete fuses with egg cell to form zygote (2n) (syngamy) , the other male gamete fuses with two polar nuclei (in central cell) to form primary endosperm nucleus (PEN-3n)/PEC = ½ × 10

[5 Marks]