SECTION A

1. Write the two pre- fertilization events from the list given below:

Syngamy, Gametogenesis, Embryogenesis, Pollination

Ans. Gametogenesis , Pollination (½ x 2=1)

2. Name an IUD that you would recommend to promote the cervix hostility to the sperms.

Ans. LNG-20 /progestasert (Any one) 1

3. What is "saltation" according to de Vries?

Ans. Single- step large mutation 1

4. Identify the <u>two</u> correct statements from the following:

i. Apiculture means apical meristem culture.
ii. Spinach is iron –enriched.
iii. Green revolution has resulted in improved pulse-yields.
iv. Aphids cannot infest rapeseed mustard.

Ans. ii, iv (½ x2=1)

5. A boy has been diagnosed with ADA deficiency. Suggest any one possible treatment.

Ans. Bone marrow transplant / enzyme replacement therapy/gene therapy (any two) (½ x2=1)

6. What does 'R' represent in the given equation for productivity in an ecosystem?
GPP-R=NPP

Ans. Respiratory losses 1

7. Where is good ozone present? Why is it called so?

Ans. Stratosphere; shield against UV radiation of sun (½ x2=1)

8. How many kinds of phenotypes would you expect in F_2 generation in a monohybrid cross exhibiting co-dominance?

Ans. Three 1

SECTION B

9. Banana crop is cultivated by farmers without sowing of seeds. Explain how the plant is propagated.

Ans. Vegetative propagation, rhizome (½ x2=1)

10. List the different parts of the human oviduct though which the ovum travels till it meets the sperm for fertillsation.

Ans. Fimbriae, infundibulum, ampulla, isthmus (½ x 4=2)

11. Explain amino-acylation of t-RNA.

Ans. Amino acid activated ,by ATP, linked to another cognate t RNA, charging of tRNA (½ x4=2)

12. Name an allergen and write the response of the human body when exposed to it.

Ans. Pollen, dander , dust(any two)

Release of serotonin and histamine, from mast cells (½ x 4=2)

13. How are morphine and heroin related? Mention the effect each one of them has on the human body.

Ans. Opium from latex of *Papaver somniferum*(opium);acetylation of morphine results in heroin;

Depression, slows down body functions (½ x 4=2)

14. Explain the importance of inbreeding in cattle.

Ans. maintaining purelines , inbreeding exposes harmful recessive genes that are eliminated by selection, helps in accumulation of superior genes, and elimination of less desirable genes.(any two)

(1x2=2)

15. Why is 'starter' added to set the milk into curd? Explain.

Ans. Acts as an innoculum; contains LAB, at suitable temperature, coagulates milk to curd (½ x4=2)

16. Explain mutualism with the help of an example.

Ans. Both species benefitted ; example-lichens(algae –fungi association) pollinator – flower

(any other suitable example) (1x2=2)

17. List four causes of biodiversity loss.

OR

Name two metals used in a catalytic converter. How do they help in keeping the environment clean?

Ans. Habitat loss , fragmentation, overexploitation, alien species invasion ,co-extinction (any four) (½ x4=2)

OR

Platinum- Palladium ,Rhodium,

The catalyst converter changes unburnt hydrocarbons → CO_2+H_2O/ CO→CO_2/ nitric oxide → N_2
(any two) (½ x 4=2)

18. A potato plant is infected with a virus .Name and explain a method to obtain virus-free potato plants form it.

Ans. Apical meristem culture, (1)

Micropropagation /producing thousands of plants, through tissue culture/*in vitro* (½ x 2=1)

SECTION C

19. A few residents in your locality , for business gains, have established small –scale industrial /commercial activities such as pathological labs and fabric dyeing centers without obtaining 'No objection certificates' from municipal authorities. Would you support these activities? Give any three reasons in support of your answer.

Ans. No (Any 3 appropriate reasons)

Yes(Any 3 appropriate reasons) (1 x 3=3)

20. Name the two end products of double fertilization in angiosperms. How are they formed? Write their fate during the development of seed.

Ans. Syngamy- male gamete+ female gamete = zygote

triple fusion- male gamete + polar nuclei=Primary Endosperm Nucleus;

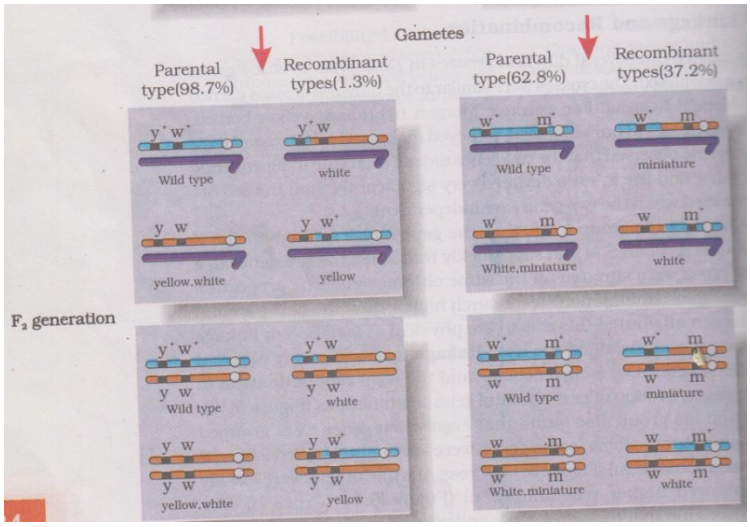
zygote give rise to embryo ,PEN forms endosperm (½ x 6=3)

21. Morgan carried out several crosses in *Drosophila* and found F_2-ratios deviated very significantly from the expected Mendelian ratio. Explain his findings with the help of an example.

Ans. Morgan's findings differ from Mendel's because of the phenomena of

Linkage (genes present on the same chromosome) and Recombination; (½ x 2=1)

Example : Cross A Cross B



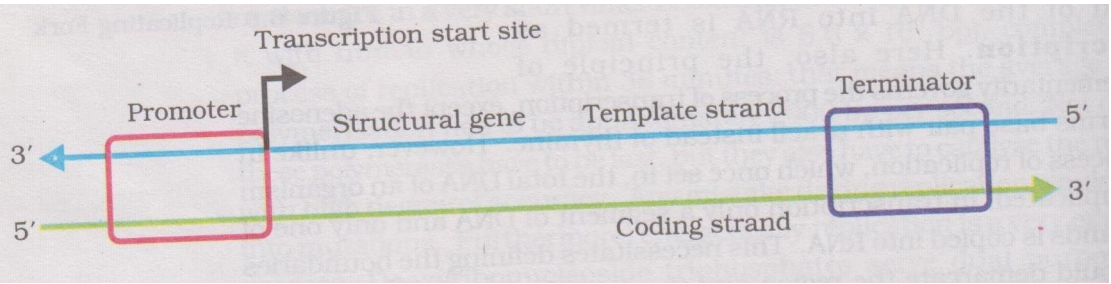
F_2 generation(any one cross) ; (½ x 2=1)

Genes are closely linked- less recombinants, genes are far apart- more recombinants(½ x 2 =1)

22. With the help of a schematic diagram, explain the location and the role of the following in a transcription unit:

Promoter, Structural gene, Terminator.

Ans. Structure (three labels as asked)



Function-

Promotor- RNA polymerase binds to it starter

Structural gene- functional genes

Terminator- transcription ends here (½ X 6= 3)

23. According to the Darwinian theory, the rate of appearance of new forms is linked to their life cycles. Explain.

Ans. Microbes divide fast/ they produce million within hours.

Easy to see variant population in less span of time

But in higher organism life span is long so variations are not visible fast (1X3=3)

24. Draw a labeled sketch of a typical biogas plant.

OR

(a) Name the causative organisms for the following diseases:

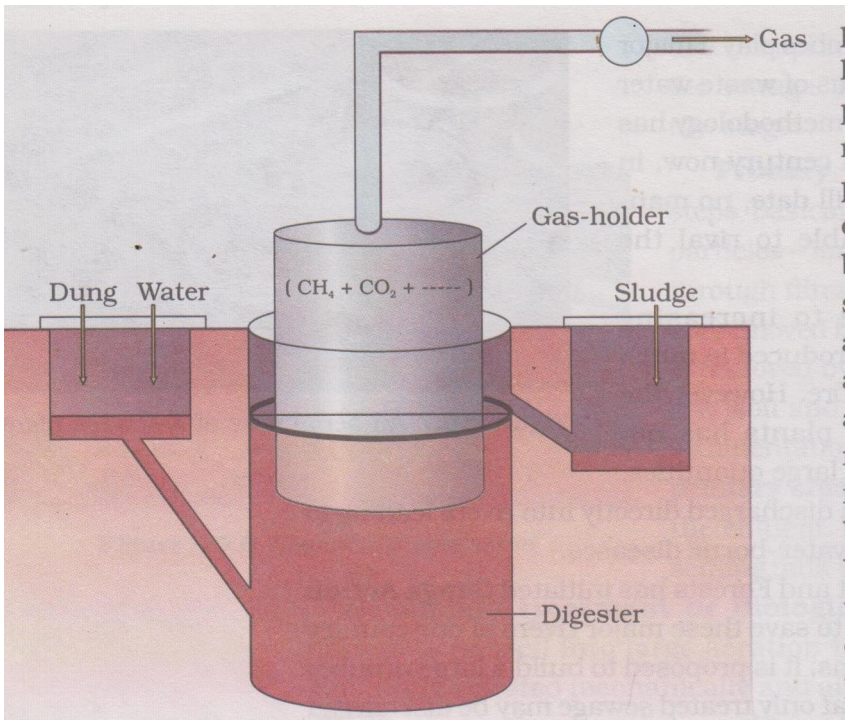
(i) Elephantiasis

(ii) Ringworm

(iii) Amoebiasis

(b) How can public hygiene help control such diseases?

Ans. Biogas plant



Proper diagram and labeling (½ x 6=3)

OR

(a) (i)Wuchereria ,

(ii) Microsporum / Epidermophyton/ Trichophyton

(iii)Entamoeba

(b) Proper disposal of waste/periodic cleaning/disinfection of water reservoirs, etc/standard practices of hygiene in public catering/eliminate vectors and their breeding placec(any three) (½ x 6=3)

25. **Following a severe accident, many charred –disfigured bodies are recovered from the site making the identification of the dead very difficult. Name and explain the technique that would help the authorities to establish the identity of the dead to be able to hand over the dead to their respective relatives.**

Ans. DNA fingerprinting -

Isolation of DNA and digestion of DNA by restriction endonucleases,separation of DNA fragments by electrophoresis,transferring(blotting) of separated DNA fragments to synthetic membranes,such as nitrocellulose or nylon,hybridization using labeled VNTR probe and,detection of hybridized DNA fragments by autoradiography. (½ x 6=3)

26. **What is a bioreactor used for? Name a commonly used bioreactor and any two of its components**.

Ans. Making recombinant protein on a large scale

Simple – stirred tank bioreactor

Foam braker/impeller/stirrer/pH control/motor/agitator system/O2 delivery system/temperature control system/sampling ports(any two) (1+1+1/2+1/2=3)

27. **Name the host plant and that *Meloidogyne incognitia* infects. Explain the role of *Agrobacterium* in the production of ds-RNA in the host plant.**

Ans. Tobacco, Roots of tobacco plant

Using *Agrobacterium* vectors, nematode specific genes were introduced into the host plant ,

because of introduction of DNA both sense & antisense RNA are produced in host cell,the 2 RNAs being complimentary form a ds RNA (that initiated RNAi) (½ x 6 = 3)

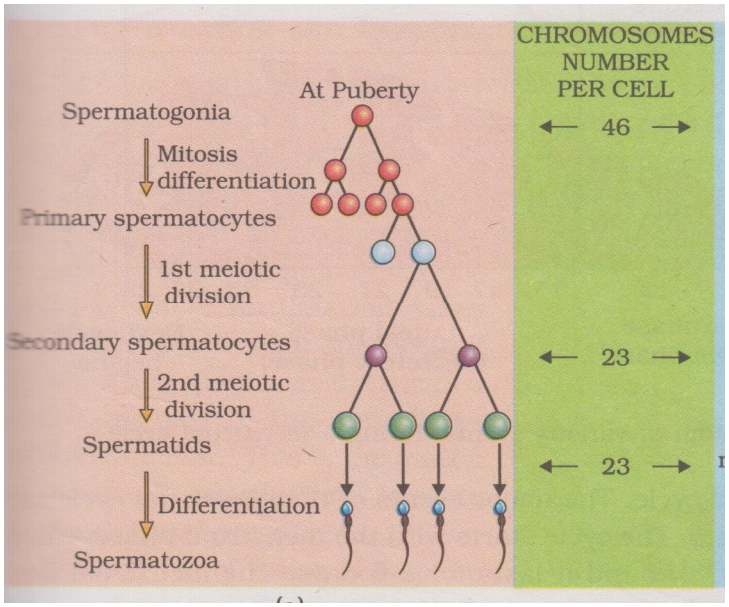
SECTION D

28. **Schematically represent and explain the events of spermatogenesis in humans.**

OR

Angiosperm flowers may be monoecious, cleistogamous or show self-incompatibility. Describe the characteristic features of each one of them and state which one of these flowers promotes inbreeding and out-breeding respectively.

Ans.



(½ x10=5)

OR

Monoecious-male and female flowers are present on the same plant,
Cleistogamous-flowers do not open
Self-incompatibility-genetic mechanism by which self- pollination does not take place (1x3=3)
Inbreeding is promoted by monoecious and cleistogamous flowers (½ +1/2=1)

Outbreeding is promoted by flower showing self-incompatibility (1)

29. **(a) Draw a simplified model of phosphorus cycling in a terrestrial ecosystem.**

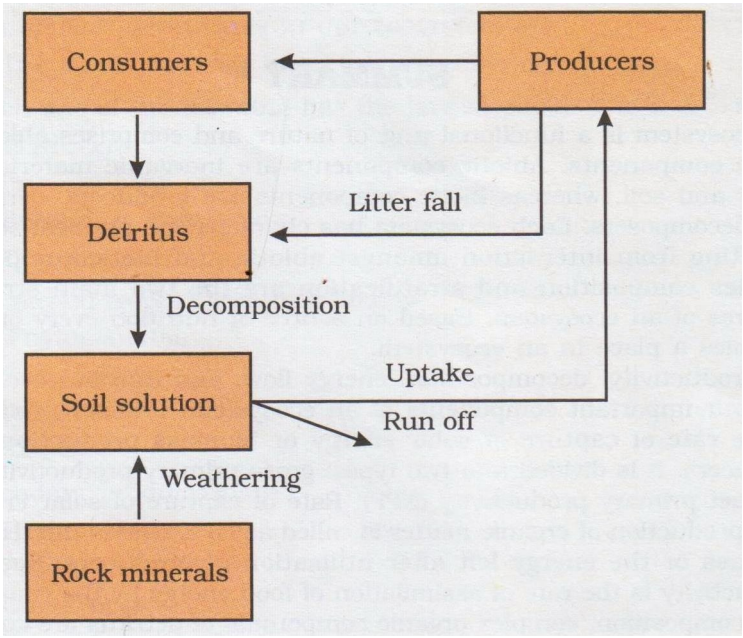
(b)Write the importance of such cycles in ecosystems.

OR

(a) Explain the narrowly utilitarian, broadly utilitarian and ethical arguments in favors of conservation of biodiversity.

(b) How is designation of certain areas as hotspots a step towards biodiversity conservation? Name any two hotspots in India.

Ans. (a)



(any 8 labels) (½ x 8 = 4)

(b) Recycling of nutrients time & again [1]

OR

(a)Narrowly utilitarian – Humans derive countless economic benefits from nature-food,firewood,fibre,construction material,industrial products(tannins,lubricants,dyes,rennin,perfumes) medicines

Broadly utilitarian – Role in many ecosystem services that nature provides eg – 20% O2 from Amazon forest, pollination (any other ecosystem service)

Ethical argument – what humans owe to the millions of organisms with whom we share this planet

eg philosophically/spiritually – every species has an intrinsic value [½ x 6 = 3]

(b) As these regions have very high levels of species richness & high degree of endemism, they need to be identified for maximum protection. [½ x 2 = 1]

Hotspots – Western Ghats & Sri Lanka, Indo- Burma, Himalayas (Any two) [½ x 2 = 1]

30. **(a) How is sex determined in humans?**

(b) How does it differ from sex determination in birds and honey bees?

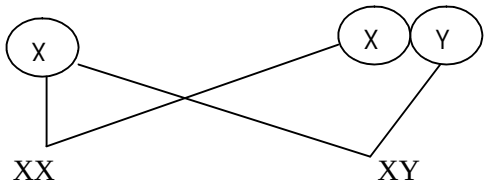
OR

(a) What is a genetic code?

(b) Explain the following:

Degenerate code; Unambiguous code; Universal code; Initiator code.

Ans. 30. (a) XX x XY [1]



[1]

[1]

Female Male

(b) In Birds:

Female is Heterogametic / ZW

Male is Homogametic / ZZ [½ x 2 = 1]

In honey bees:

Females – Diploid (2n)

Males – haploid (n) //

Females- X^aX^m / X^zX^m

Male - X^mX^m

(½ x 2 = 1)

OR

(a) A triplet on mRNA that codes for a particular amino acid , 61 codons + 3 stop codons (1/2+1/2)

(b) Degenerate code- Some amino acids are coded by more than one codon

,Unambigious code- One codon codes for a specific amino acid

Universal code- From bacteria to human UUU codes for phenylalanine

Initiator code- AUG – codes for methionine(also) (1x4=4)