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**SECTION-A**

- Q.1 Pollination through air is called: [1]  
(a) Hydrophily (b) Entomophily (c) Anemophily (d) Myrmecophily  
Ans. (c) Anemophily
- Q.2 Alternate forms of a gene is called [1]  
(a) Allele (b) Genome (c) Chiasma (d) Exon  
Ans. (a) Allele
- Q.3 The study of fossil is: [1]  
(a) Gerontology (b) Ohycology (c) Palynology (d) Palaeontology  
Ans. (d) Palaeontology
- Q.4 The root fungs association is [1]  
(a) Coleorrhiza (b) Rhizomorphs (c) Mycorrhiza (d) None of these  
Ans. (c) Mycorrhiza
- Q.5 Kaziranga National Park is located in  
(a) Assam (b) Kerla (c) H.P (d) W.Bengal  
Ans. (a) Assam

**SECTION-B**

- Q.6 Expand the terms [1  $\frac{1}{2}$ ]

GIFT, VD, AID

Or

Write a short note on egg apparatus.

Ans. **GIFT** :- Gamate intra fallopian transfer (GIFT)

**VD**:- Venereal diseases

**AID**:- Artificial Insemination Donar.

Or

Egg Apparatus:

**Egg Appartus** – It includes

- (i) One Egg Cell
- (ii) Two Synergids

Q.7 Give atleast three differences between asexual and sexual reproduction.  $\left[1\frac{1}{2}\right]$

Ans. **Differences between asexual and sexual reproduction**

Sr. No	Asexual Reproduction	Sr. No	Sexual Reproduction
1.	It is uniparental	1.	It is biparental
2.	No formation of gametes	2.	Male and female gametes are formed.
3.	No fusion of gametes	3.	Fusion of gametes
4.	No Meiosis	4.	Meiosis takes place.

Q.8 What are the pathogens of following diseases?  $\left[1\frac{1}{2}\right]$

- (a) Amoebiasis
- (b) AIDS
- (c) Pneumonia

Ans. **(a) Amoebiasis** - *Entamoeba histolytica*

**(b) AIDS** – *Human Immuno Deficiency Virus*

**(c) Pneumonia** – *Streptococcus Pneumonia & Haemophilos influenza.*

Q.9 Write a short note on biofortification.  $\left[1\frac{1}{2}\right]$

Ans. **Biofortification:** Breeding crops with higher levels of vitamins and minerals, or higher protein and healthier fats is the most practical means to improve public health.

- (i) Protein content and quality
- (ii) Oil content and quality
- (iii) Vitamin content
- (iv) Micronutrient and mineral content.

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- Q.10 Define the following terms [1  $\frac{1}{2}$ ]
- (a) Parasitism
- (b) Aestivation (w.r.to animals not plants)
- (c) Amensalism
- Ans. **(a) Parasitism:** It is an interaction between the two living organism in which one obtain nourishment (Parasite) from another organism called host and spending a part or whole of its life on and inside the body of hast.
- (b) Aestivation:** Summer sleep. e.g., Insects, spider, fish.
- (c) Amensalism:** One species is harmed, where as other remains un affected.
- Q.11 What is genetic code? Give its two characteristics. [1  $\frac{1}{2}$ ]
- Ans. The genetic information present in the nucleotide sequences of DNA with three consecutive nucleotide functioning as a codon in a non-over lapping fashion.
- Two Cahracteristics:** The genetic code are triplet in nature.
- Non overlapping:** Genetic code do not overlap e.g., sequence CCUCAG read as CCU, CAG.
- Q.12 Explain Atavism with example. [1  $\frac{1}{2}$ ]
- Ans. **Atavism:** It is the sudden appearance of ancestral characters. e.g., Appearance of tail in new born babies.
- Q.13 Write a short note on Klinefelter's Syndrome. [1  $\frac{1}{2}$ ]
- Ans. **Klinefelter's Syndrome:** Klinefelter's syndrome is an aneuploid condition with 3 sex chromosomes (trisomy)
- Cause:** It is caused by XXY genotype.
- Symptoms:** Sterile male with small testis, long legs, obesity, sparse body hair, many female characteristics, normal lintelligence.
- Q.14 What is Biomagnification? [1  $\frac{1}{2}$ ]
- Ans. **Biomagnification:** Biomagnification is the phenomemon through which certain pollutant get accumulated in tissue increasing conc. Along with food chain. e.g., Biomagnification & DDT in aquatic food.

Water  $\rightarrow$  Zooplankton  $\rightarrow$  Small fish  $\rightarrow$  large fish  $\rightarrow$  Finsh eating Bird  
.003 PPb      0.04PPM      0.5 PPM      2PPM      25PPM

Q.15 What are National Parks?

$\left[1\frac{1}{2}\right]$

Ans. **National Parks:**

It is a tract of land reserved and maintained by a national government for the welfare of entire wild life in it. e.g.,

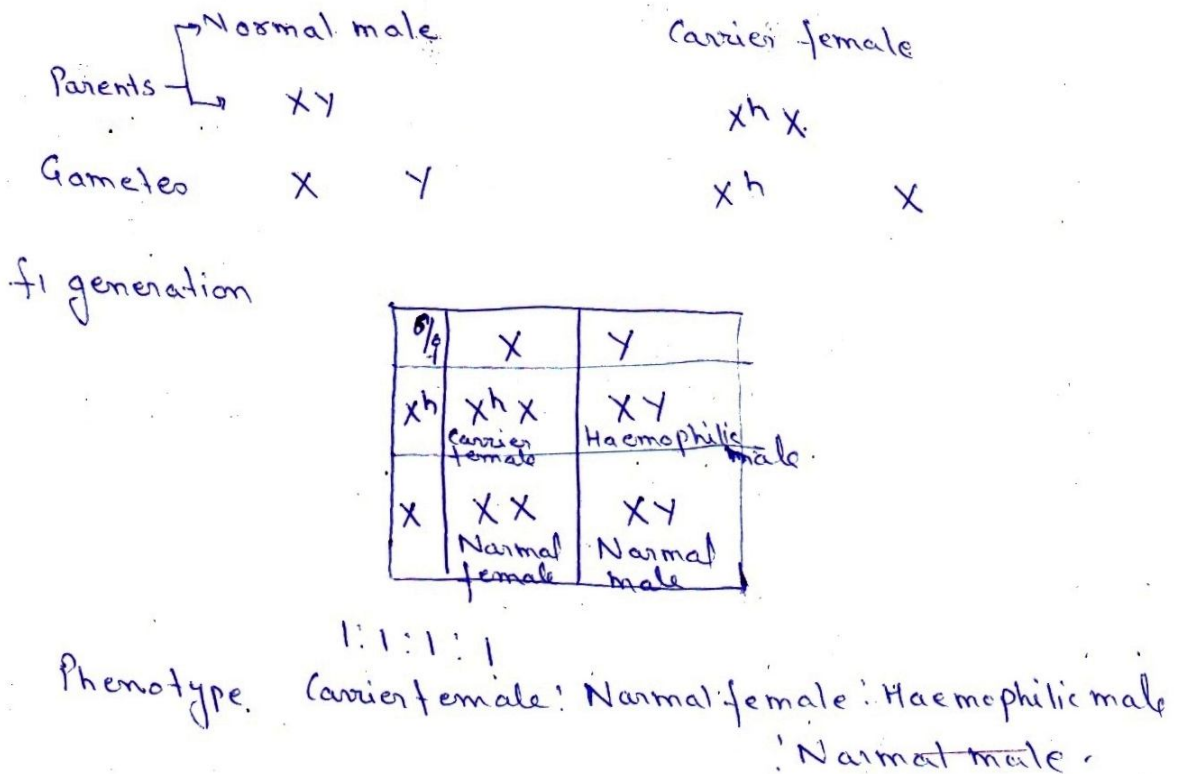
(1) Kaziranga National Park in Assam

(2) Gir National Park Gujarat.

**SECTION-C**

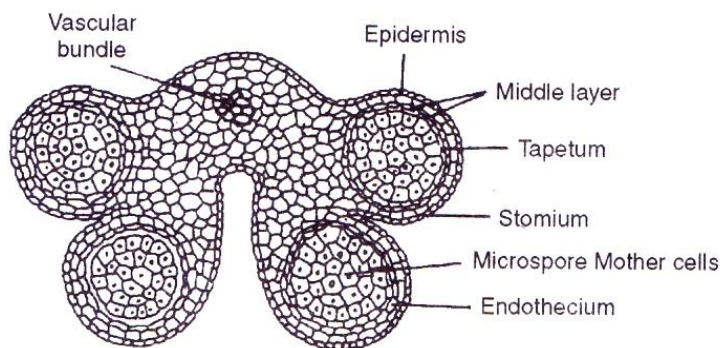
Q.16 What will be the phenotype of  $F_1$  generation when a normal man (XY) marries a carrier women ( $X^hX$ ) for haemophilia?  $\left[2\frac{1}{2}\right]$

Ans. Normal man (XY) marries carries woman ( $X^hX$ ) for haemophilia:



Q.17 Draw a well labelled diagram of T.S Anther. [2½]

Ans. T.S. Anther.



Q.18 Describe Codominance with suitable example. [2½]

Ans. **Codominance:** The alleles which do not show dominant recessive relationship and are able to express themselves independently when present together are called codominant alleles. e.g., Human blood group: The human blood group is of four types A, B, AB, O. These human blood group controlled by glycoprotein or antigen present on surface RBC.  $I^A, I^B$  and  $I^o$ . The process having A blood group contain  $I^A$  antigen, B blood group contain  $I^B$ , AB blood group have both antigen  $I^A I^B$ , O blood group have  $I^o$  antigen.

Sr. No	Blood Group	Genotype
1.	A	$I^A I^A, I^A I^o$
2.	B	$I^B I^B, I^B I^o$
3.	AB	$I^A I^B$
4.	O	$I^o I^o$

Alleles for blood group A ( $I^A$ ) and blood group B ( $I^B$ ) are codominant so that when they come together in an individual, they produce blood group AB.

Q.19 How Monoclonal Antibodies are produced? [2½]

Or

Define the following terms:

Callus, Embryoid, Pisciculture; Explant, Germplasm.

Ans. **Monoclonal Antibodies:** The technique of producing monoclonal antibody – producing cells with cells from cancerous tumours was introduced by Georges Kohler and Cesar Milstein in 1970. The major steps in the production of monoclonal antibodies with hybridomas (hybrid cultures) are as follows:-

(i) First of all a mouse, rat or some other animal is injected with specific antigen.

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- (ii) The animal starts developing antibodies against the antigen in B-lymphocyte cells in spleen.
  - (iii) The spleen of animal is removed and its B-lymphocyte cells are isolated.
  - (iv) Similarly, the cells producing bone marrow cancer (myeloma cells) are isolated. These cells should not be able to synthesise their own nutrients.
  - (v) The two types of cells (i.e., myeloma cells and antibody-producing cells) are made to fuse in cultures. The fused cells are called hybridomas.
  - (vi) The entire culture is shifted to a medium deficient in the nutrient needed by the myeloma cells where myeloma cells cannot survive. In this medium all the unfused myeloma cells die and only hybridoma cells survive.
  - (vii) The surviving hybridoma cells are allowed to multiply separately and each clone is tested for its ability to produce a desired antibody.
  - (viii) The clones which show positive results are isolated and cultured for large scale production of the antibody.

Or

**Callus:** An unorganised mass of cells called callus.

**Embryoid:** Differentiation of somatic tissues to produce artificial embryos is called embryoid.

**Pisciculture:** It is culturing of fishes.

**Explant:** Any part of plant taken & grown in test tube.

**Germplasm:** The genetic material **present inside the reproductive cells.**

Q.20 What is the role of microbes in sewage treatment plants? [2  $\frac{1}{2}$ ]

Ans. **Role of microbes in sewage treatment are:**

- (i) Primary effluent is mechanically agitated and aerated in large aeration tanks to allow growth of aerobic microbes into flocs (which is interwoven mass of bacteria and fungi filament).
- (ii) Microbes grow and consume organic matter thus reducing BOD (Biological Oxygen Demand).
- (iii) Now effluent is passed to settling tank where flocs sediment. This sediment is called activated sludge.

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(iv) Activated sludge sediment is sent back to aeration tank as inoculums. Rest part is pumped into anaerobic sludge digester.

(v) In digester anaerobic bacteria digest the other bacteria, fungi and gases like methane, Hydrogen sulphide and  $CO_2$  are evolved.

(vi) Gases released are used as biogas and treated effluent is released into natural water bodies.

Q.21 what is drug addiction? How it begins? [2  $\frac{1}{2}$ ]

Ans. **Drug addiction:** Repeated use of certain drugs on a periodic or continuous basis may make the body dependent on them. This is called drug addiction.

**Stages Leading to Drug Addiction:-**

A person becomes drug-addiction through following stages:-

(i) Experimental Use: He first takes a drug for curiosity.

(ii) Recreational Use: Then he starts using the drug for the so called pleasure.

(iii) Situational Use: After this, he joins the company of drug abusers and begins to take drug more often.

(iv) Compulsive Use: Now the use of drug becomes compulsory for him.

(v) Dependence: Finally, he becomes habitual to drug use and cannot leave it. His daily dose to get the desired effect increases with time.

Q.22 What is S.C.P also write its significance. [2  $\frac{1}{2}$ ]

Ans. **Single Cell Protein:** Single cell protein or SCP actually means a protein rich biomass of unicellular microorganisms. However, it includes biomass of multicellular microorganisms as well.

(i) SCP can be used as protein rich supplement of human diet.

(ii) This will bridge the gap between requirement and supply of protein for human diet and take off the pressure on agriculture system for increasing the protein content of food articles.

(iii) Use of organic wastes and industrial effluents in raising SCP will help in reducing environmental pollution.

e.g., (i) Spirulina can be grown on starch rich waste water of potato processing industries, straw molasses, animal manure and sewage. Spirulina is not only in protein, it also fats, minerals and vitamins.

Q.23 (a) What are Okazaki fragements?

$$\left[1 + 1\frac{1}{2} = 2\frac{1}{2}\right]$$

(b) Differentate between leading and lagging strands

Ans. **(a) Okazaki fragements:** During DNA replication, on second parental strand of DNA, 5' to 3' direction in complementary strand is formed in small stretches called Okazaki fragements.

(b) **Differentate between leading and lagging strands**

Sr. No	Leading Strand	Lagging Strand
1.	It grow continuously.	Its growth is discontinuous.
2.	Leading strand decelops as a single unbroken strand from the very beginning.	It develops in the form of a number of short segments called Okazaki fragement.
3.	DNA ligase is not required	DNA ligase is needed for joining Okazaki fragment.
4.	A single primer is require	A number of RNA primers are required, one for each Okazaki fragment.
5.	It grows rapidly.	Its development is slower.

Q.24 Write short notes on

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

(a) Electroporation

(b) Microinjection

Ans. **(a) Electroporation:** Electroporation is a microbiology technique in which an electrical field is the permeability of the cell membrane allowing chemicals drugs, or DNA to be introduced into the cell.

**(b) Microinjection:** Microinjection method, is also used to recombinant DNA is directly injected into the nucleus of an animal cell.

Microinjection is the use of a glass micropipette to inject a DNA at a microscopic level. It is a simple mechanical process usually involving an inverted microscope with a magnification power of around 200 ×. For process the target cell is poitioned under the microscope, this process is done.

Q.25 Define speciation. Discuss its types.

[3]

Ans. **Speciation:** The process of the formation of one or more new species form the existing one by evolutionary means is known as speciation.

**Type of Speciation:** Speciation is of 3 main types:



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**(I) Multiplicative Speciation:** A parent species buds off one or more species and itself continues to exist. The process is called multiplicative speciation as it increases the number of species. It is further of two types: gradual and instant.

**1. Gradual Speciation:** It occurs through population and spans over many generations. It is of 2 types:-

**(i) Allopatric Speciation:** It takes place with geographic isolation. It involves subdivision of original population with the formation of a geographical barrier, such as a mountain or land bridge (e.g., Isthmus of Panama) or ocean, across the species range.

**(ii) Sympatric<sup>1</sup> Speciation:** It occurs without geographic isolation, that is, by ecological or other isolation. It produces new species within a single population. It may result from polyploidy.

**(2) Instant Speciation:** It occurs through individuals and in a single generation by hybridization involving allopolyploidy.

Multiplicative speciation is also called cladogenesis.

**(II) Phyletic Speciation:** Replacement of one species by another without an increase in the number of species is termed phyletic speciation. Example: Eohippus evolved into Meshippus and itself became extinct.

#### **SECTION-D**

Q.26 Define water pollution. How it can be controlled? [4]

Or

Describe Nitrogen Cycle in detail.

Ans. **Water pollution:** Water pollution is defined as an addition of foreign substances to water, or a change in its physical property that constitutes a health hazard or otherwise makes it less fit or unfit for use.

**Control of Water Pollution:** Pollution of water can be checked, or at least minimised, by the following measures:-

(1) Taking bath and washing clothes directly in ponds, tanks and streams, which supply drinking water for humans, should be prohibited.

(2) Separate ponds and tanks should be reserved for the water supply to cattle and other animals.

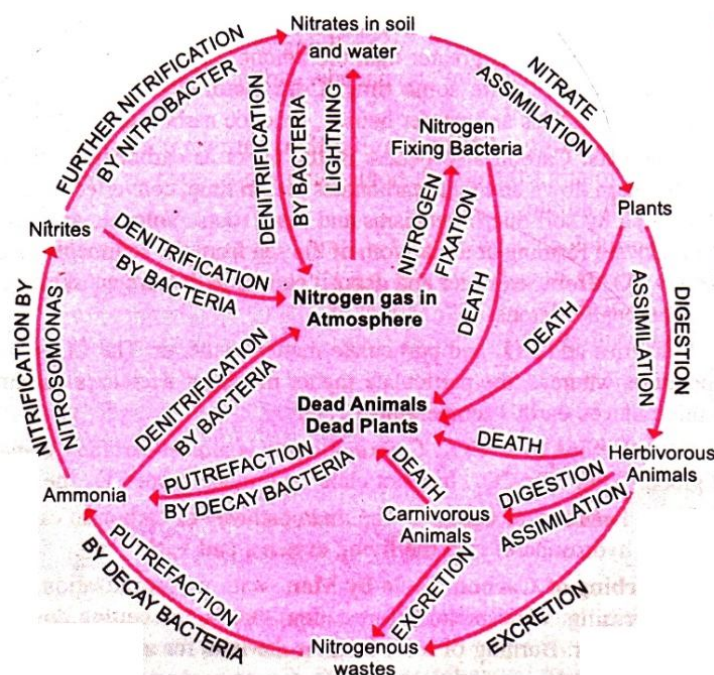
(3) Domestic and farmyard sewage and industrial waste should be suitably “treated” before releasing them into water. This process can reduce the harmful effect of the wastes. It is discussed ahead.

(4) Overuse of fertilizers and pesticides should be avoided. As far as possible less stable pesticides should be used.

(5) Hot water should be cooled before release from factories.

(6) Solid wastes should be recycled wherever possible.

Or



Nitrogen cycle in nature

27. (a) What is Biopiracy? What are its impacts? [2+2+1=5]

(b) How Transgenic Plants are useful to mankind?

(c) Expand GMO.

Ans. (a) **Biopiracy**: It is use of bioresources by multinational companies and other organisations without proper authorization and payment to countries and people concerned. Traditional knowledge related to bioresources can be exploited to develop modern applications and can be used to save expenditure and time.

(b) (i) Can produce pharmaceutically important compounds such as human insulin, interferons, hormones, blood-clotting factors, etc.

(ii) Can synthesize antibodies and vaccines and their fruits, when eaten, may give immunity against diseases in children.

(iii) Can fix atmospheric nitrogen and exclude the need for using costly fertilizers.

(iv) May bear flowers with new colours and long life for better ornamental prospects.

(v) May yield slow ripening fruits for longer shelf life.

**(c) GMO:** genetically modified organisms.

Q.28 (a) Draw a well labelled diagram of Graafian follicle.

[2+2+1=5]

(b) Write a short note on Vasectomy.

(c) The enzyme that correct the mismatched bases:

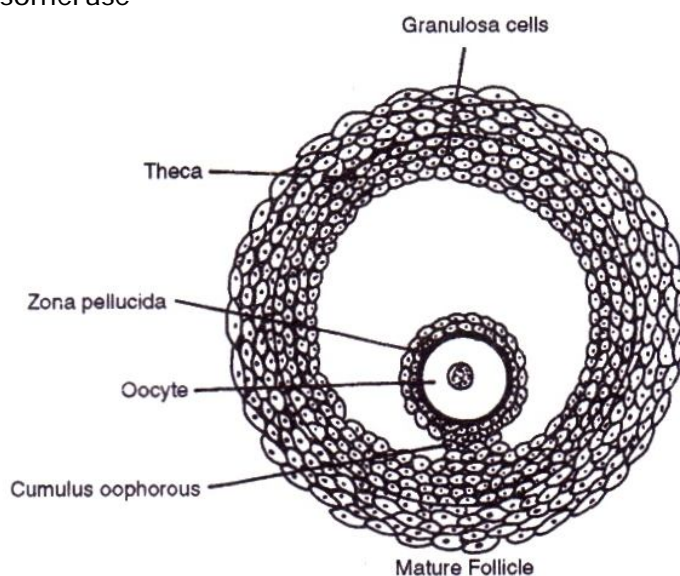
(i) Gyases

(ii) Primase

(iii) DNA Polymerase-I

(iv) Topoisomerase

Ans. (a)



**(b) Vasectomy:** It is a method of sterilisation in males. In this method, small part of vas deferens is surgically removed or tied by incision so that gametes transport is inhibited from, males.

(c) DNA Polymerase-I.