BIOLOGY PAPER -2019

THEORY

(Maximum Marks:70)

(Time Allowed:3 hours)

Candidates are allowed additional 15 minutes for only reading the paper

They must NOT start writing during this time

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*This paper contains **TWO PARTS**-Part I and part ii*

Answer All questions .

*Part 1 consists of one question of **20** marks having subparts*

Part 2 consists of sections A, B, and C

*Section –A consists of seven questions o**f two** marks each.*

*Section –B consists of seven questions **of three marks** each*

*Section –c consists of three questions **of five** marks*

Internal choices have been provided in two questions in Section-A, in two questions in Section-B, in all questions in Section-C.

The intended marks for all the question has been given in[ ]

……

PART – I (20 Marks)

Answer all questions

Question I

a) Answer the following questions briefly to the point.[8×1]

i) Name the antibody which is more effective in allergies.

The antibody which is most effective in allergies is IgE type.

ii) What is the function of GEAC?

GEAC is the Genetic Engineering Approval research and the safety committee. It is setup for making decisions regarding the validity of Genetic Modified(GM) research and the safety of introducing GM organisms for public services.

iii) What is a clone?

Clones are the organisms that are exact genetic copies .Their DNA are identical Clones can happen naturally as identical twins.They are made in the lab by the technique of Genetic Engineering.

iv) What does Detritus food chain begin with?

Detritus food chain starts from dead organic matter of decaying animals and plant bodies to microorganisms and then to organism feeding on detritus and their predators.

v) **Give the full form of EFB**.

EFB stands for European Federation Of Biotechnology.

vi) How many chromosomes are present in the meiocytes of a fruit fly?

In the meiocyte of a fruit fly 8 chromosomes after present.

vii) Name the common ancestor of Apes and Man.

Dryopethecus was ancestor of Apes and Ramapethicus was ancestor of Man

viii) Give the scientific term used for the preservation of germ palm at very low temperature.

Cryopreservqtion is the term used for preservation of germplasm at very low temperature.

B) Each of the following sub parts I to iv have four choices. Choose the best option in each case. [4 x 1]

i) Eyelid in human fetus separates in

1)14 week

2)16 week

(3) 24 week

(4) 40 week

Ans – 16 weeks

ii) Study the given monohybrid cross

P_1 = TT X tt

F_1 = Tt

A test cross for this F1 will be

1) Tt x TT

2) Tt x tt

3)Tt x Tt

4) TT x tt

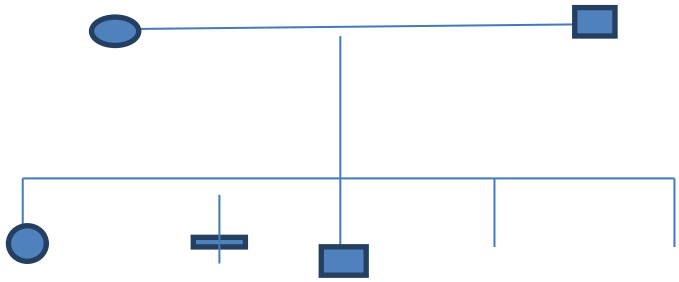
Ans- Tt x tt

iii) Montreal protocol aims at:

1) Reduction of ozone depleting substances
2) Biodiversity Conservation
3) Control of water pollution
4) Control of CO_2 emission

Ans - Reduction of ozone depleting substances.

iv) In the given Pedigree chart the trait shown is



1) Autosomal Dominant

2) Autosomal Recessive

3) X-linked

4) Y-linked

Ans – Autosomal Dominant

c) Give one significant contribution of each of the following scientist: [4× 1]

i) AlfredRussel

Wallace formed the theory of natural selection. He wrote the idea and send it to Charles Darwin who contemplates a similar theory of evolution. Page no-377

Ii) R. Mishra-

R. Mishra is known as the father of Ecology in India .His research laid the foundation of understanding of tropical community and their succession environmental responses of plant populations and productivity and nutrient cycling in tropical forests and grassland ecosystem.

iii) G.Gamow–

Hewas famous physicist suggested that in order to cod3e for all the 20 amino acids , the code should be made of three nucleotides.

iv)Sanger

Frederick Sanger was an English biochemist and molecular biologist who twice received Noble Prize. In 1958 for his discovery for these structure of insulin molecule and in 1980 for his collaborative work on base sequences in nucleic acids.

d) Define the following **[2 × 1]**

i) Carrying Capacity-

Ans- In the early stages resources are abundant, the death rate is minimal and the reproduction can take place as fast as possible allowing the individual to attain their intrinsic rate of increase. The population increases geometrically until the maximum number of individual is approached that an environment can sustainably support. This number is called the carrying capacity.. It is denoted by K.

ii) Homologous Chromosome-

Homologous chromosomes are chromosome pairs received one from each parent. They are similar in length, geneposition, and centromere location. The position of the genes on each homologous chromosome is the same but they contain different alleles.

e) Give reason for each of the following.[2× 1]

i) Bagging is necessary in artificial hybridization.

In the process of artificial hybridization it is important that desired pollen grains are used for pollination. The stigma is protected from contamination by unwanted pollen by emasculation and bagging technique.Emasculated flowers are covered with a bag of suitable size generally made of butter paper to prevent contamination of its stigma with unwanted pollen called bagging.

ii) Climax stage is achieved quickly in secondary succession as compared to primary succession.

When an area is colonized by organism for first time the succession is called primary succession .The process starts from bare area. Secondary succession starts an area previously colonized but has been cleared off and destroyed by fire , tornado, flood or by human activities. This is the reason why climax stage is achieved quickly in secondary succession.

Part – II

SECTION - A (14 Marks)

(Answer all questions)

Question 2: Enumerate any two four good and effective Poultry farm management practices [2]

Ans - Different methods of effective poultry farming are following:

a) Selection of eggs should be done very carefully as the quality of chick produced depends upon the quality of eggs
b) A well ventilated and illuminated, dry fowl house is essential in plains. The house and shed should be cleaned daily.
c) The quality and balanced quantity of food material are the backbone of poultry. The feed given to poultry birds should contain all the essential nutrients like carbohydrates, protein, fats, minerals and vitamins.
d) The poultry industry is centered around the fowls so the selection of good breed of bird is essential.

Question 3: What is a single cell protein? How is it significant for Human Welfare? [2]

Ans- Single cell Protein are a source of proteins which are extracted from microbial both from unicellular and multicellular bacteria ,yeast, filamentous fungi or algae . A conventional method of production of cereals, pulses, vegetables, fruits etc may not be able to meet the demand of food in growing human and animal population .This is a alternative source of protein for animals and human nutrition.

Question 4 (a) List any four reasons for drug addictions. [2]

Ans: There are many reasons of drug addiction. Some of them are following.

1) Generally young people start using alcohol and drugs out of their curiosity for experimenting. When it seems harmless experiment with drugs become addiction.
2) Addiction starts when an individual feels lonely or isolated from the friends and family.
3) Peer pressure is also one of the reason for addiction.
4) Depression , anxiety can put individual at high risk of developing an addiction

Or

(b) List any four effects of alcoholism on human health. [2]

Ans: The effects of alcoholism are followings-

1) Alcoholism affect four areas of people's life. Mental, physical, professional, domestic and social.
2) Alcoholism are anti depressants, lowering the activity of brain.
3) Some sufferers develop Korsakoff''s syndrome in which drinker suffers loss of memory.
4) The central Nervous system and the part of liver are parts of the body frequently damaged by alcohol.

Question 5: List any four features of flower pollinated by insects. [2]

Ans: Four features of flower pollinated by insects are followings-

1) The flower develops large and brightly coloured petals, scent and nectar.
2) Small flowers like those of Asteracae are grouped into conspicuous inflorescences to attract insects.
3) The pollen grains of insect pollinated flowers are sticky which cause the pollen to adhere to the body of insect. Like those of Anagallis.
4) The position of anthers and stigma is suitable for insect pollination.

Question 6: What is reproductive fitness? Explain it with the help of an example. [2]

Ans: According to Darwin fitness ultimately refers to reproductive fitness. Those who best fit in an environment reproduce and survive. He called it as natural selection Giraffe with longer neck and legs got more food and left more offsprings. Thus giraffe with longer neck and legs become abundant and with shorter neck become extinct.

Question 7: Give one significant difference between primary lymphoid organs and secondary lymphoid organs. Give one examples each. [2]

Ans: The thymus and bone marrow are the primary lymphoid organs in mammals .They are place where the B and T lymphocytes differentiate from the stem cells. Secondary lymphocytes organ include the lymphoid nodes, Peyer's patches , spleen, tonsils and adenoids .They are the sites for the interaction of lymphocytes with the antigens.

Question 8 (a) Explain the term Bio-fortification. How is this technique useful in production of Golden rice? [2]

Ans: To increase the nutritional value of crops and plants through breeding by application of biotechnology a process is used called as Biofortification. Breeding of Crops are done with high levels of vitamins , minerals or high protein and healthier fats. Several strains of golden rice has been developed with sufficient vitamin A.

OR

b) Write short notes on Electrophoresis. **[2]**

Ans: The motion of particles in a gel or fluid within a relatively uniform electric field is called Electrophoresis. It is used to separate molecules based on charge, size and binding capacity. This technique is applied to separate and analyze biomolecules such as DNA, RNA, proteins, nucleic acids, plastids and fragments of the macromolecules.

SECTION- B (21 MARKS)

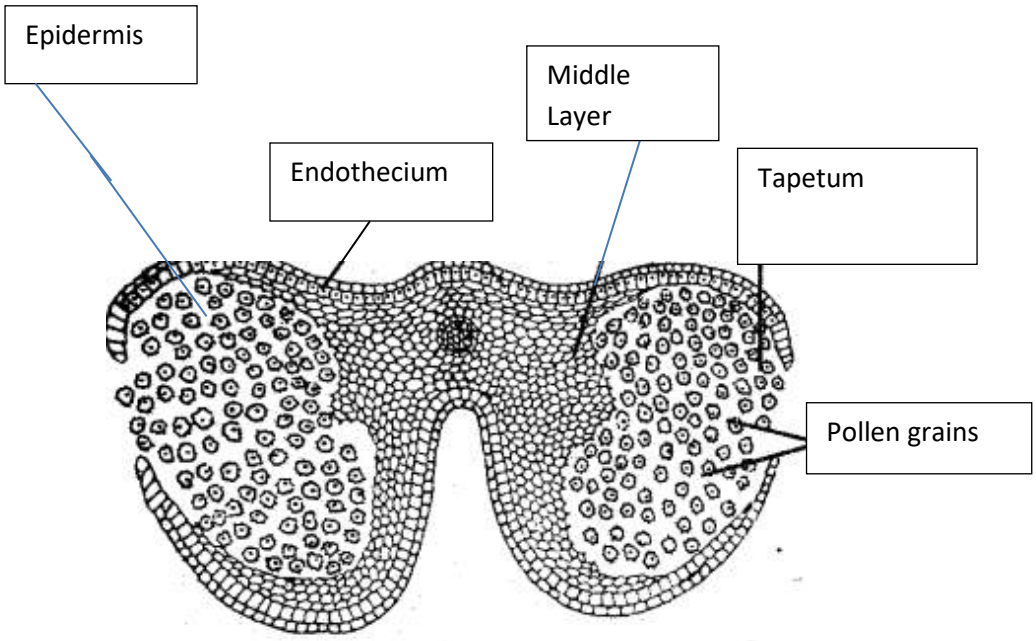
Answer all questions

Question 9 Explain the Evolution of long neck of Giraffe according to Charles Darwin. [3]

Ans: Darwin illustrated the survival of fittest by taking the example of Giraffe having variable neck length. In the population of giraffes those who could not reach the leaves on tall trees did

not get enough food to survive and reproduce. Giraffe with long neck get more food and left more offspring and become abundant. Those with shorter neck gradually become extinct. The most successful organism is those which have several adaptions.

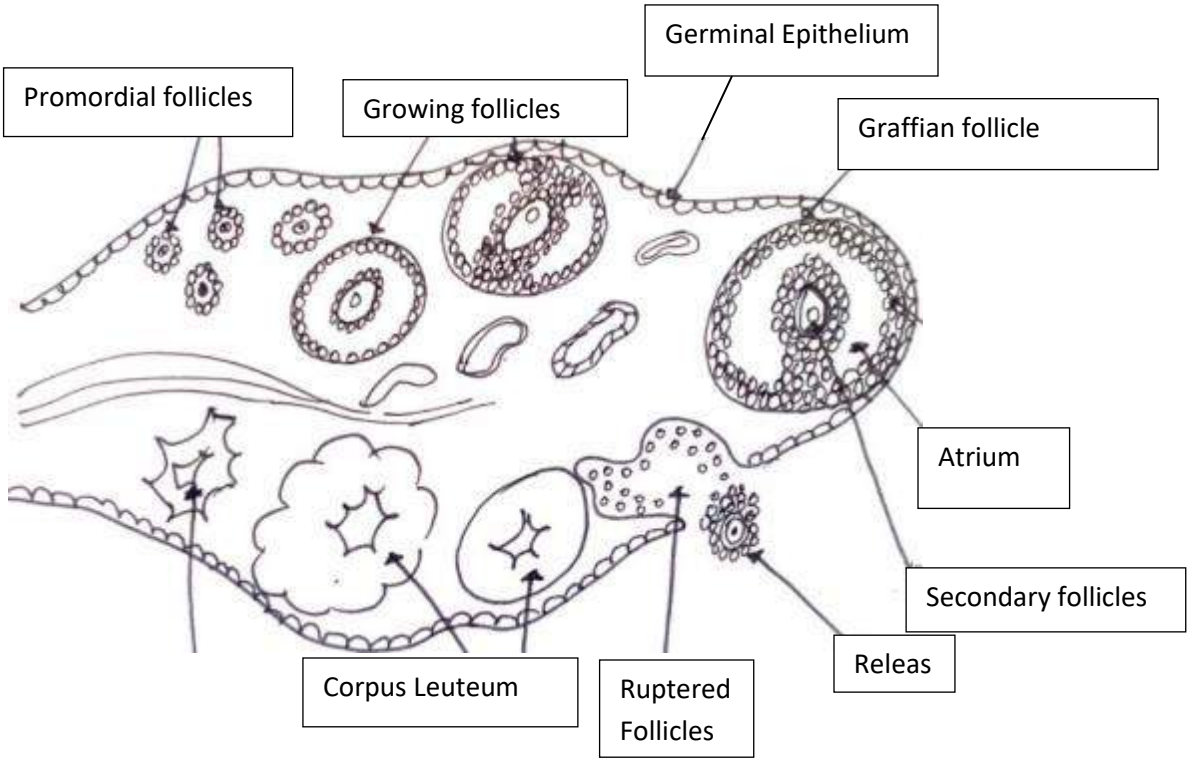
Question 10 a) Draw a labeled diagram of the T.S. of a mature anther. [3]



T. S. of Mature Anther

OR

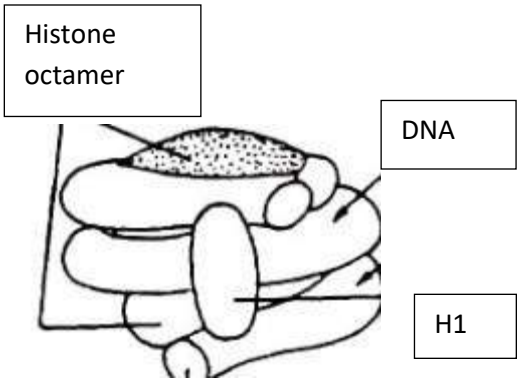
b) Draw the labeled diagram of the internal structure of Human Ovary [3]



INTERNAL STRUCTURE OF A MATURE OVARY

Question 11: Describe the structure of a nucleosome with the help of a well labelled diagram. [3]

Ans:



NUCLEOSOME

Structure of Nucleosome - Each nucleosome consists of a spiral of DNA wrapped around the octomer of histone molecules forming core particles. The octomer of protein consists of two molecules each of the four different histones (tetramers). These histones are H_2A. H_2B, $H_3$and H_4. The core particles are linked by DNA, which in turn is associated with only one type of histone H_1.

Question 12: (a) Explain the Rivet Popper Hypothesis. [3]

Ans: Rivet Popper Hypothesis – Rivet Popper Hypothesis was given by a Stanford ecologist Paul Ehrlich. It says that the natural ecological system of earth which supplies important vital services are analogous to the parts of an airplane that make it suitable vehicle for human beings . In an airplane which represent ecosystem all parts are joined together using thousands of rivets which are species. Asthe more rivet (species) are removed the airplane (ecosystem) becomes dangerously weak over a period of time.

OR

(b) Define **[3]**

(i) Standing Crops

The amount of living material at different tropical levels or in a component population or in a component population is known as standing crop. The standing crop is usually expressed in terms of biomass.

(ii) Stenothermal Organism-

Animal which have ability to tolerate only a narrow range of temperature are called stenothermal animals. For example: Penguin, Crocodile .

(iii) Niche

Niche is a complete description of how organism is related to its physical and biological environment .Niche includes not only the physical space occupiedby an organism but also its functional role in the community.

Question 13

Give the biological names for the following: [3]

i) **The Mould from which Penicillin is obtained.**
ii) **Baker's Yeast**
iii) **Microbes used to control the insect larvae growing on cotton.**
iv) **Microbes used to produce Swiss Cheese.**
v) **The fungus is being grown as biocontrol agent.**
vi) **A symbiotic Nitrogen fixing bacterium found in the root nodules**

Ans:

i) The Mould from which Penicillin is obtained – PenicillumNotatum

ii) Baker's Yeast **–** Saccharomyces Cerevisiae.
iii) Microbes used to control the insect larvae growing on cotton – Pseudomonas
iv) Microbes used to produce Swiss Cheese – Propionibacterium shermanii
v) The fungus is being grown as biocontrol agent – Trichoderma
vi) A symbiotic Nitrogen fixing bacterium found in the root nodules – Rhizobium .

Question 14: Explain the different types of endosperm in angiosperm. [3]

Ans: There are three types of Endosperm on the basis of development.

a) Nuclear Endosperm- This occurs in about 50 % of the angiosperm. First few division are not accompanied by cell wall formation. Nuclei produced remain free in the cytoplasm of the embryo sac. Cocus nucifera is an example.

b) Cellular Endosperm- In the development of cellular endosperm wall formation is the first division of primary endosperm nucleus .This commonly occurs in gamopetalous dicotyledons example -Adoxa, Verbascum.

c) Helobial endosperm -This endosperm is intermediate between the nuclear endosperm and cellular endosperm .The first division is accompanied by the formation of a transverse wall. Example- asphodelus.

Question 15: A homozygous pea plant with round seed soat and yellow cotyledon is crossed with another pea planthaving wrinkled seed coat and green cotyledon [3]

i) Give the types of gametes produced by plants of F1 generation
ii) Give the dyhybrid phenothypic Ratio with the corresponding Phenotypes
iii) State the Mendel's Principle involved in this cross.

Ans: Pea plant with Homozygous round and Yellow cotyledon RRYY is crossed with another pea plant having wrinkled seed coat and green cotyledon rryy.

Round and yellow colour is dominant over wrinkled and green colour.

i) Gametes produced by plants of F1 generation are RY and ry.

ii) Phenotypic ratio is 3 : 1 with all Round and yellow seeds.

iii) Mendel's Law of independent assortment is demonstrated in this dihybrid cross.

iv) According to Law of Independent Assortment when two pairs of Independent Alleles are brought together in the hybrid F1, they show independent dominant effects .In the formation of gametes the Law of Segregation operates , but the factors assort themselves independently at random and freely.

Section- C (15 Marks)

Attempt the entire question

Question 16 (a) Describe the physiochemical events that takes place during fertilization in Humans. [5]

Ans: Fertilization includes a series of physiochemical events which sets the ovum in the path of development of a new individual.

- CLEAVAGE- this is a series of mitotic cell division that increase the number of cells but does not change the size of the original mass.

- MORULA- by repeated mitotic divisions the ovum forms a solid mass of cells called Morula. Embyryo is propelled in the uterus.

- BLASTOCYTES- Morula develops a cavity around which the cells are arranged. This structure is called Blastocytes.

- GASTRULATION AND FORMATION OF GERM LAYERS- germ layers are differentiated. It gives rise to tissues and organs .

OR

(b) [5]

i) Define and give the role of Aminocentesis.

Ans: Aminocentesis is a technique used to diagnose fetal abnormalities by drawing a sample of aminiotic fluid by a hypodermic needle inserted into the uterus.

ii) Name the causative agent andgive any one symptom ofGonorrhoea.

Ans: Gonorrhoea is sexually transmitted disease caused by gonococcus bacterium , Neisseria Gonorrhoea.In males burning in the penis starts after 3 to 10 days after intercourse.

iii) What is the significance of dispersal of seeds . Give any two points.

Ans: The fruit protect the seed s and help in the dispersal to distant places. Seeds dispersal helps the species to colonise in other area and do not compete with their parents plants.

iv) What are seasonal breeders? Give one example.

Ans: Seasonal breeders are those animals that breed only in favourable seasons. For.Females receive male only at certain period of the year. Example sheep ,dogs

v) How is chromosome number maintained in sexually reproducing organism.

Ans: The diploid parent body undergoes meiotic division to produce gametes which are haploid structure having only one set of chromosome. During the process of fertilization male and female gametes fuse to form diploid zygote.

Question 17 [5]

(a)(i) What is restriction endonuclease? Give the rules of their nomenclature?

Ans: Restriction endonucleases area protein produced by a bacterium called bacteriophages. It cleaves DNAat specific sitesalong the molecule.Each restriction endonuclease functions by inspecting the length of a DNA sequence. Once it finds the specific recognition sequence , it will bind to the DNA and cut each of the two strands ofthe double helix structure at specific point. The convention for naming these enzymes is the first letter of the name comes from the genus and thee second two letter come from the species of the prokaryotic cell from which they have been isolated. Example-Eschericia coli RY13.

(ii) Explain the mechanism of action of restriction endonuclease that makes them suitable for genetic engineering.

Ans: Restriction endonuclease are used to form recombinant molecule of DNA. This involves manipulation of two DNAs involved and this technique is called as genetic engineering. Recombinant DNA technology involves isolation of DNA, fragmentation of DNA by restriction endonuclease , isolation of a desired DNA fragment , ligation of DNA fragment into a vector, transferring the recombinant DNA into host and culturing it to get desired product.

OR

b (i) Explain what are the desirable characteristics of an ideal cloning vector used in rDNA technology.

Ans: An ideal vector should possess following properties:

1) It should have single restriction site for a number of endonucleases where foreign genes can be inserted.
2) It should carry markers allowing its selection within the organism used for cloning.
3) It should be capable of amplification and easy to isolate.
4) It should have the ability to integrate into the host genome and exists as a independent replicon.
5) It should have the ability to confer on the host cells, some readily selectable traits.

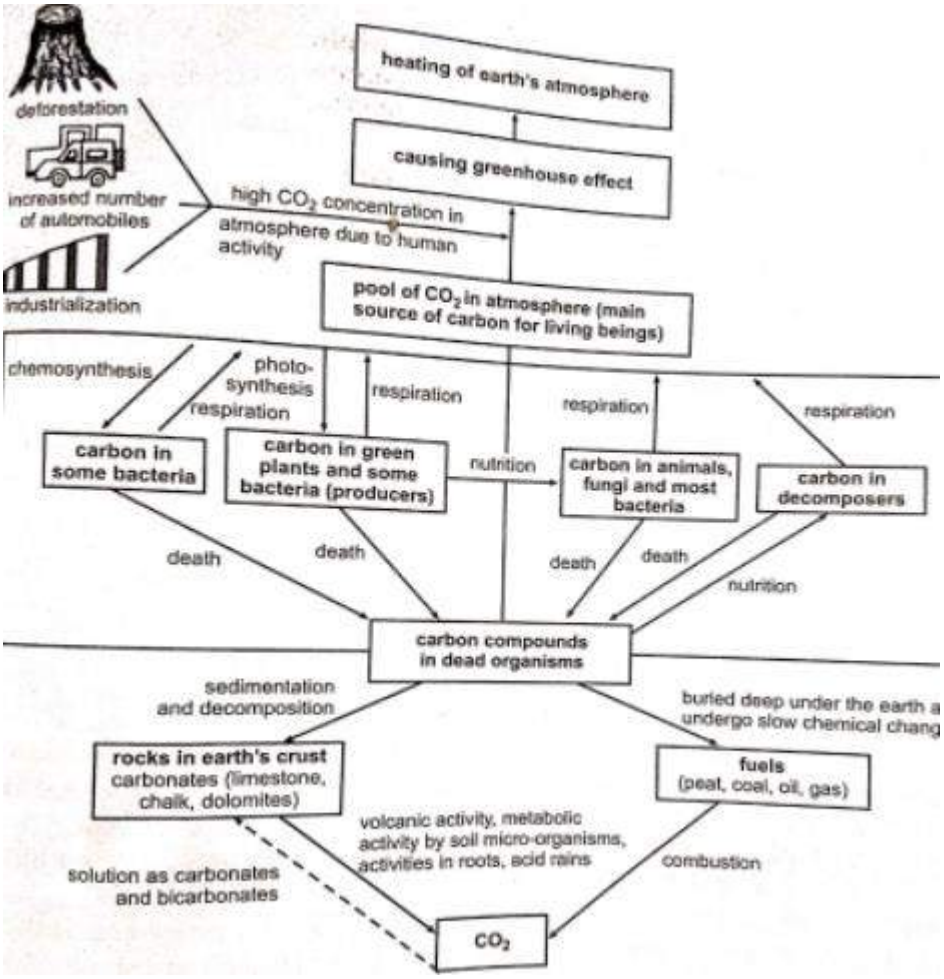
ii) Describe two vector less method used in gene transfer in rDNA technology.

Foreign DNA can be transferred without involving biological vectors. This is accomplished by following methods.

i) Direct gene method- In this method the uptake of genes into the protoplasts takes place through the naked plasma membrane followed by its functional integration. It was applied to several graminceous plants.

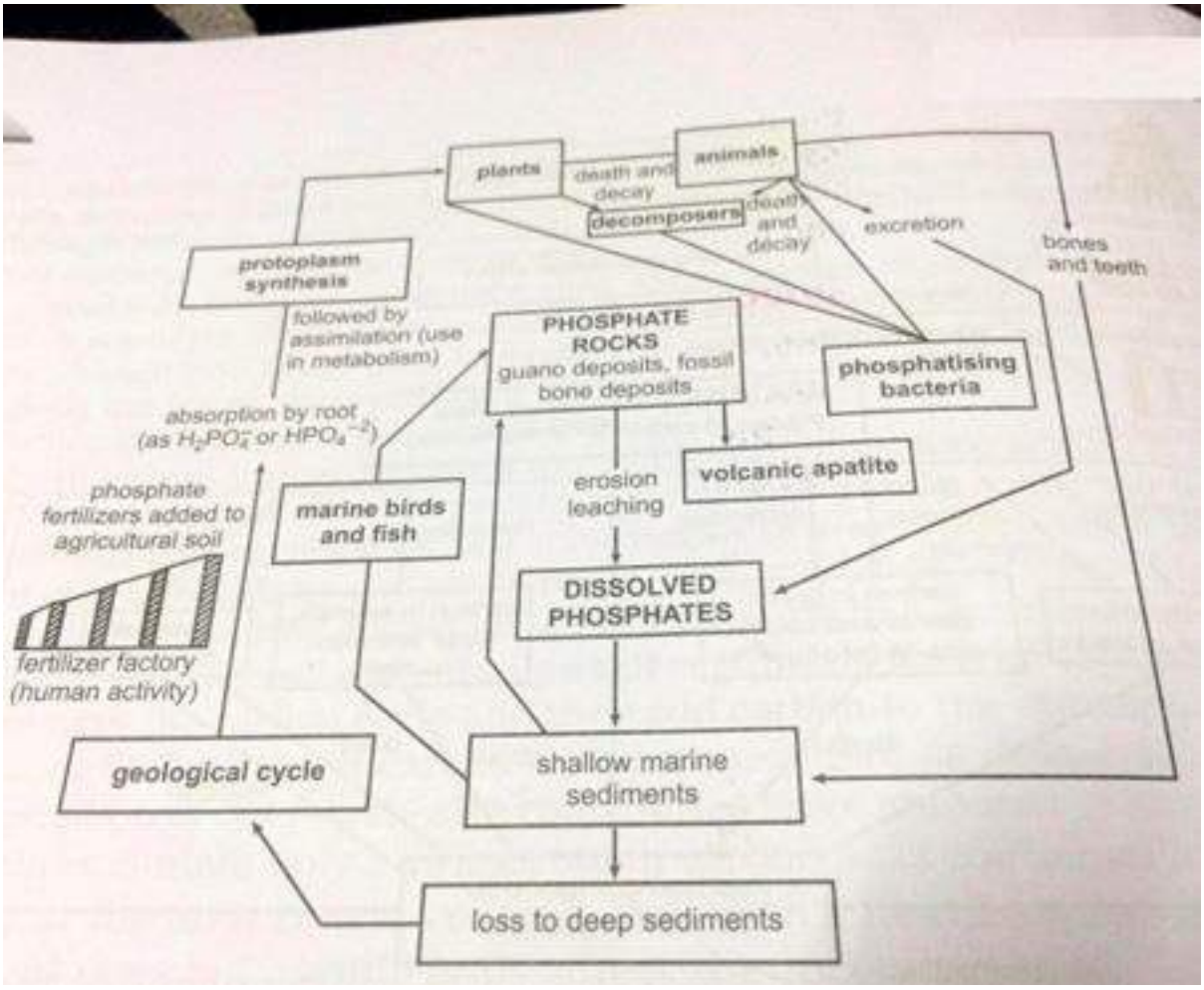
ii) BY electroporation-It is a process where electrical pulses of high field strength are used to reversibly permeabilize cell membranes to facilitate uptake of foreign DNA. It has been achieved in tobacco, petunia.

Q 18(a) Give a graphic representation of Carbon Cycle in Nature. [5]



OR

(b) Give a graphic representation of Phosphorus Cycle in Nature


plants
animals
death and decay
decomposers
death and decay
excretion
bones and teeth
protoplasm synthesis
followed by assimilation (use in metabolism)
absorption by root (as $H_2PO_4^-$ or HPO_4^{-2})
PHOSPHATE ROCKS
guano deposits, fossil bone deposits
phosphatising bacteria
volcanic apatite
erosion leaching
phosphate fertilizers added to agricultural soil
marine birds and fish
DISSOLVED PHOSPHATES
fertilizer factory (human activity)
geological cycle
shallow marine sediments
loss to deep sediments