

Reproduction in Organisms

ONE MARK QUESTIONS

1. Mention two inherent characteristics of Amoeba and yeast that enable them to reproduce asexually.
2. Why do we refer to offspring formed by asexual method of reproduction as clones?
3. Although potato tuber is an underground part, it is considered as a stem. Give two reasons.
4. Between an annual and a perennial plant, which one has a shorter juvenile phase?
Give one reason.
5. Rearrange the following events of sexual reproduction in the sequence in which they occur in a flowering plant: embryogenesis, fertilisation, gametogenesis, pollination.
6. The probability of fruit set in a self-pollinated bisexual flower of a plant is far greater than a dioecious plant. Explain.
7. Is the presence of large number of chromosomes in an organism a hindrance to sexual reproduction? Justify your answer by giving suitable reasons.
8. Is there a relationship between the size of an organism and its life span?
Give two examples in support of your answer.
9. Give reasons as to why cell division cannot be a type of reproduction in multicellular organisms.
10. Why do gametes produced in large numbers in organisms exhibit external fertilisation?

TWO/THREE MARK QUESTIONS

1. In haploid organisms that undergo sexual reproduction, name the stage in the life cycle when meiosis occurs. Give reasons for your answer.
2. The number of taxa exhibiting asexual reproduction is drastically reduced in higher plants (angiosperms) and higher animals (vertebrates) as compared with lower groups of plants and animals. Analyse the possible reasons for this situation.
3. Honeybees produce their young ones only by sexual reproduction. In spite of this, in a colony of bees we find both haploid and diploid individuals. Name the haploid and diploid individuals in the colony and analyse the reasons behind their formation.
4. With which type of reproduction do we associate the reduction division? Analyse the reasons for it.
5. Is it possible to consider vegetative propagation observed in certain plants like Bryophyllum, water hyacinth, ginger etc., as a type of asexual reproduction? Give two/three reasons.
6. 'Fertilisation is not an obligatory event for fruit production in certain plants'. Explain the statement.
7. In a developing embryo, analyse the consequences if cell divisions are not followed by cell differentiation.
8. List the changes observed in an angiosperm flower subsequent to pollination and fertilisation.
9. Suggest a possible explanation why the seeds in a pea pod are arranged in a row, whereas those in tomato are scattered in the juicy pulp.
10. Draw the sketches of a zoospore and a conidium. Mention two dissimilarities between them and at least one feature common to both structures.

11. Justify the statement 'Vegetative reproduction is also a type of asexual reproduction'.

FIVE MARK QUESTIONS

1. Enumerate the differences between asexual and sexual reproduction.
Describe the types of asexual reproduction exhibited by unicellular organisms.
2. Do all the gametes formed from a parent organism have the same genetic composition (identical DNA copies of the parental genome)? Analyse the situation with the background of gametogenesis and provide or give suitable explanation.
3. Although sexual reproduction is a long drawn, energy-intensive complex form of reproduction, many groups of organisms in Kingdom Animalia and Plantae prefer this mode of reproduction. Give atleast three reasons for this.
4. Differentiate between (a) oestrus and menstrual cycles; (b) ovipary and vivipary.
Cite an example for each type.
5. Rose plants produce large, attractive bisexual flowers but they seldom produce fruits. On the other hand a tomato plant produces plenty of fruits though they have small flowers. Analyse the reasons for failure of fruit formation in rose.
Both these plants – rose and tomato – both selected by human beings for different characteristics, the rose for its flower and tomato for its fruit. Roses, being vegetatively propagated do not need to produce seeds.

Sexual Reproduction in Flowering Plants

ONE MARK QUESTIONS

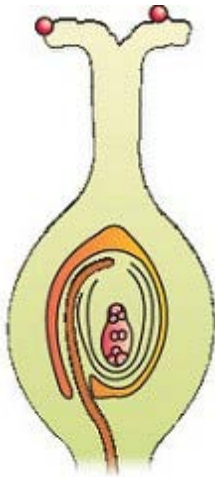
1. Name the component cells of the 'egg apparatus' in an embryo sac.
2. Name the part of gynoecium that determines the compatible nature of pollen grain.
3. Name the common function that cotyledons and nucellus perform.
4. Complete the following flow chart



5. Indicate the stages where meiosis and mitosis occur (1, 2 or 3) in the flow chart.

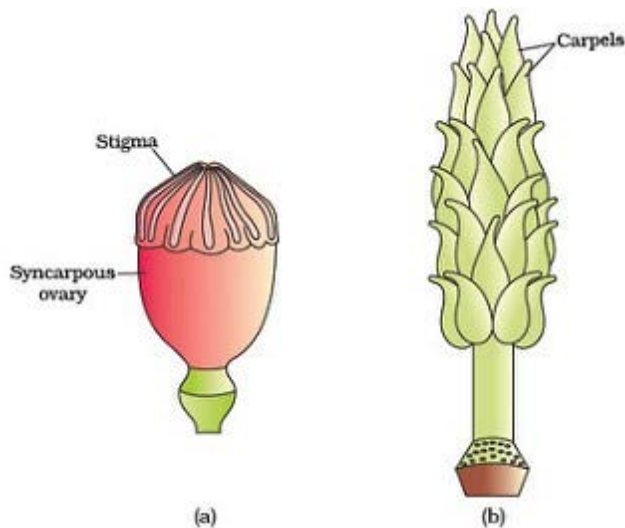


6. In the diagram given below, show the path of a pollen tube from the pollen on the stigma into the embryo sac. Name the components of egg apparatus.



7. Name the parts of pistil which develop into fruit and seeds.
8. In case of polyembryony, if an embryo develops from the synergid and another from the nucellus which is haploid and which is diploid?
9. Can an unfertilised, apomictic embryo sac give rise to a diploid embryo? If yes, then how?

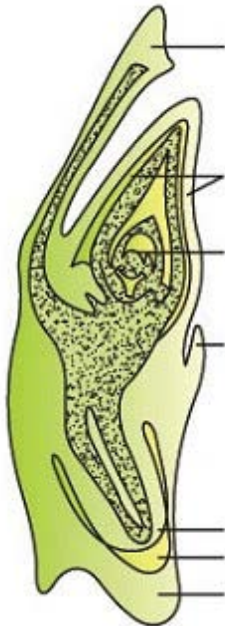
10. Which are the three cells found in a pollen grain when it is shed at the three celled stage?
11. What is self-incompatibility?
12. Name the type of pollination in self-incompatible plants.
13. Draw the diagram of a mature embryo sac and show its 8-nucleate, 7-celled nature.
Show the following parts: antipodals, synergids, egg, central cell, polar nuclei.
14. Which is the triploid tissue in a fertilised ovule? How is the triploid condition achieved?
15. Are pollination and fertilisation necessary in apomixis? Give reasons.
16. Identify the type of carpel with the help of diagrams given below:



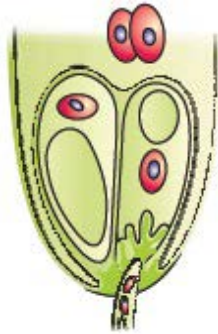
17. How is pollination carried out in water plants?
18. What is the function of the two male gametes produced by each pollen grain in angiosperms.

TWO/THREE MARK QUESTIONS

1. List three strategies that a bisexual chasmogamous flower can evolve to prevent self pollination (autogamy).
2. Given below are the events that are observed in an artificial hybridization programme. Arrange them in the correct sequential order in which they are followed in the hybridisation programme.
 - (a) Re-bagging
 - (b) Selection of parents
 - (c) Bagging
 - (d) Dusting the pollen on stigma
 - (e) Emasculation
 - (f) Collection of pollen from male parent.
3. Vivipary automatically limits the number of offsprings in a litter. How?
4. Does self incompatibility impose any restrictions on autogamy? reasons and suggest the method of pollnation in such plants.
5. In the given diagram, write the names of parts shown with lines.



6. What is polyembryony and how can it be commercially exploited?
7. Are parthenocarpy and apomixis different phenomena? Discuss their benefits.
Hint: Yes, they are different. Parthenocarpy leads to development of seedless fruits. Apomixis leads to embryo development.
8. Why does the zygote begin to divide only after the division of Primary endosperm cell (PEC)?
9. The generative cell of a two-celled pollen divides in the pollen tube but not in a three-celled pollen. Give reasons.
10. In the figure given below label the following parts: male gametes, egg cell, polar nuclei, synergid and pollen tube



FIVE MARK QUESTIONS

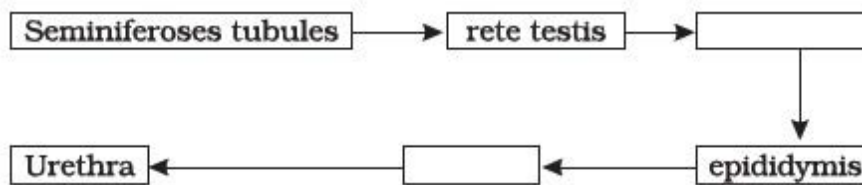
1. Starting with the zygote, draw the diagrams of the different stages of embryo development in a dicot.
2. What are the possible types of pollinations in chasmogamous flowers. Give reasons.
3. With a neat, labelled diagram, describe the parts of a mature angiosperm embryo sac. Mention the role of synergids.
4. Draw the diagram of a microsporangium and label its wall layers. Write briefly on the role of the endothecium.

5. Embryo sacs of some apomictic species appear normal but contain diploid cells.
Suggest a suitable explanation for the condition.

HUMAN REPRODUCTION

ONE MARK QUESTIONS

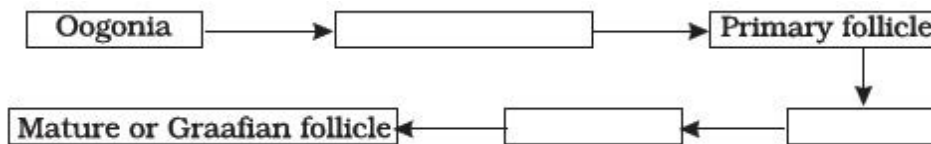
1. Given below are the events in human reproduction. Write them in correct sequential order. Insemination, gametogenesis, fertilisation, parturition, gestation, implantation
2. The path of sperm transport is given below. Provide the missing steps in blank boxes.



3. What is the role of cervix in the human female reproductive system?
4. Why are menstrual cycles absent during pregnancy.
5. Female reproductive organs and associated functions are given below in column A and B. Fill the blank boxes.

Column A	Column B
Ovaries	Ovulation
Oviduct	a
b	Pregnancy
Vagina	Birth

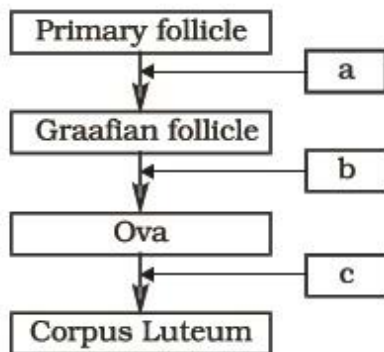
- From where the parturition signals arise-mother or foetus? Mention the main hormone involved in parturition.
- What is the significance of epididymis in male fertility?
- Give the names and functions of the hormones involved in the process of spermatogenesis. Write the names of the endocrine glands from where they are released.
- The mother germ cells are transformed into a mature follicle through series of steps. Provide the missing steps in the blank boxes.



- During reproduction, the chromosome number ($2n$) reduces to half (n) in the gametes and again the original number ($2n$) is restored in the offspring, What are the processes through which these events take place?
- What is the difference between a primary oöcyte and a secondary oöcyte?
- What is the significance of ampullary–isthmic junction in the female reproductive tract?
- How does zona pellucida of ovum help in preventing polyspermy?
- Mention the importance of LH surge during menstrual cycle.
- Which type of cell division forms spermatids from the secondary spermatocytes?

TWO/THREE MARK QUESTIONS

1. A human female experiences two major changes, menarche and menopause during her life. Mention the significance of both the events.
2. a. How many spermatozoa are formed from one secondary spermatocyte?
b. Where does the first cleavage division of zygote take place?
3. Corpus luteum in pregnancy has a long life. However, if fertilisation does not take place, it remains active only for 10-12 days. Explain.
4. What is foetal ejection reflex? Explain how it leads to parturition?
5. Except endocrine function, what are the other functions of placenta.
6. Why doctors recommend breast feeding during initial period of infant growth?
7. What are the events that take place in the ovary and uterus during follicular phase of the menstrual cycle.
8. Given below is a flow chart showing ovarian changes during menstrual cycle. Fill in the spaces giving the name of the hormones responsible for the events shown.



9. Give a schematic labelled diagram to represent oögenesis (without descriptions)
10. What are the changes in the oogonia during the transition of a primary follicle to Graafian follicle?

FIVE MARK QUESTIONS

1. What role does pituitary gonadotropins play during follicular and ovulatory phases of menstrual cycle? Explain the shifts in steroidal secretions.
2. Meiotic division during oogenesis is different from that in spermatogenesis. Explain how and why?
3. The zygote passes through several developmental stages till implantation, Describe each stage briefly with suitable diagrams.
4. Draw a neat diagram of the female reproductive system and label the parts associated with the following (a) production of gamete, (b) site of fertilisation (c) site of implantation and, (d) birth canal.
5. With a suitable diagram, describe the organisation of mammary gland.

REPRODUCTIVE HEALTH

ONE MARK QUESTIONS

1. Reproductive health refers only to healthy reproductive functions. Comment.
2. Comment on the Reproductive and Child Health Care programme of the government to improve the reproductive health of the people.
3. The present population growth rate in India is alarming. Suggest ways to check it.
4. STDs can be considered as self-invited diseases. Comment.
5. Suggest the reproduction-related aspects in which counselling should be provided at the school level.
6. Mention the primary aim of the “Assisted Reproductive Technology” (ART) programme.
7. What is the significance of progesterone-estrogen combination as a contraceptive

measure?

8. Strict conditions are to be followed in medical termination of pregnancy (MTP) procedures. Mention two reasons.
9. Males in whom testes fail to descend to the scrotum are generally infertile. Why?
10. Mention two advantages of lactational amenorrhea as a contraceptive method.

TWO/THREE MARK QUESTIONS

1. Suggest some important steps that you would recommend to be taken to improve the reproductive health standards in India.
2. The procedure of GIFT involves the transfer of female gamete to the fallopian tube. Can gametes be transferred to the uterus to achieve the same result? Explain.
3. Copper ions-releasing IUDs are more efficient than non-medicated methods. Why?
4. What are the probable factors that contributed to population explosion in India?
5. Briefly explain IVF and ET. What are the conditions in which these methods are advised?
6. What are the advantages of natural methods of contraception over artificial methods?
7. What are the conditions in which medical termination of pregnancy is advised?
8. Comment on the essential features required for an ideal contraceptive.
9. All reproductive tract infections RTIs are STDs, but all STDs are not RTIs. Justify with example.

FIVE MARK QUESTIONS

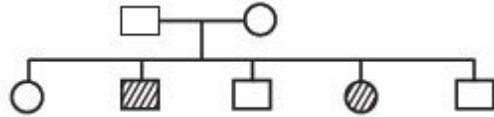
1. What are the Assisted Reproductive Techniques practised to help infertile couples?

- Describe any three techniques.
2. Discuss the mode of action and advantages/disadvantages of hormonal contraceptives.
 3. STDs are a threat to reproductive health. Describe any two such diseases and suggest preventive measures.
 4. Do you justify the statutory ban on aminocentesis in our country? Give reasons.
 5. Enumerate and describe any five reasons for introducing sex education to school-going children.

PRINCIPLES OF INHERITANCE AND VARIATION

ONE MARK QUESTIONS

1. What is the cross between the progeny of F_1 and the homozygous recessive parent called? How is it useful?
2. Do you think Mendel's laws of inheritance would have been different if the characters that he chose were located on the same chromosome.
3. Enlist the steps of controlled cross pollination. Would emasculation be needed in a cucurbit plant? Give reasons for your answer.
4. A person has to perform crosses for the purpose of studying inheritance of a few traits / characters. What should be the criteria for selecting the organisms?
5. The pedigree chart given below shows a particular trait which is absent in parents but present in the next generation irrespective of sexes. Draw your conclusion on the basis of the pedigree.



6. In order to obtain the F_1 generation Mendel pollinated a pure-breeding tall plant with a pure breeding dwarf plant. But for getting the F_2 generation, he simply self-pollinated the tall F_1 plants. Why?
7. Genes contain the information that is required to express a particular trait.” Explain.
8. How are alleles of particular gene differ from each other? Explain its significance.
9. In a monohybrid cross of plants with red and white flowered plants, Mendel got only red flowered plants. On self-pollinating these F_1 plants got both red and white flowered plants in 3:1 ratio. Explain the basis of using RR and rr symbols to represent the genotype of plants of parental generation.
10. For the expression of traits genes provide only the potentiality and the environment provides the opportunity. Comment on the veracity of the statement.
11. A, B, D are three independently assorting genes with their recessive alleles a, b, d, respectively. A cross was made between individuals of Aa bb DD genotype with aa bb dd. Find out the type of genotypes of the offspring produced.
12. In our society a woman is often blamed for not bearing male child. Do you think it is right? Justify.
13. Discuss the genetic basis of wrinkled phenotype of pea seed.
14. Even if a character shows multiple allelism, an individual will only have two alleles for that character. Why?
15. How does a mutagen induce mutation? Explain with example.

TWO/THREE MARK QUESTIONS

1. In a Mendelian monohybrid cross, the F_2 generation shows identical genotypic and phenotypic ratios. What does it tell us about the nature of alleles involved? Justify your answer.
2. Can a child have blood group O if his parents have blood group 'A' and 'B'. Explain.
3. What is Down's syndrome? Give its symptoms and cause. Why is it that the chances of having a child with Down's syndrome increases if the age of the mother exceeds forty years?
4. How was it concluded that genes are located on chromosomes?
5. A plant with red flowers was crossed with another plant with yellow flowers. If F_1 showed all flowers orange in colour, explain the inheritance.
6. What are the characteristic features of a true-breeding line?
7. In peas, tallness is dominant over dwarfness, and red colour of flowers is dominant over the white colour. When a tall plant bearing red flowers was pollinated with a dwarf plant bearing white flowers, the different phenotypic groups were obtained in the progeny in numbers mentioned against them:
Tall, Red = 138
Tall, White = 132
Dwarf, Red = 136
Dwarf, White = 128
Mention the genotypes of the two parents and of the four offspring types.
8. Why is the frequency of red-green colour blindness is many times higher in males than that in the females?
9. If a father and son are both defective in red-green colour vision, is it likely that the son inherited the trait from his father? Comment.
10. Discuss why *Drosophila* has been used extensively for genetical studies.

11. How do genes and chromosomes share similarity from the point of view of genetical studies?
12. What is recombination? Discuss the applications of recombination from the point of view of genetic engineering.
13. What is artificial selection? Do you think it affects the process of natural selection? How?
14. With the help of an example differentiate between incomplete dominance and co-dominance.
15. It is said, that the harmful alleles get eliminated from population over a period of time, yet sickle cell anaemia is persisting in human population. Why?

FIVE MARK QUESTIONS

1. In a plant tallness is dominant over dwarfness and red flower is dominant over white. Starting with the parents work out a dihybrid cross. What is standard dihybrid ratio? Do you think the values would deviate if the two genes in question are interacting with each other?
2. a. In humans, males are heterogametic and females are homogametic. Explain. Are there any examples where males are homogametic and females heterogametic?
b. Also describe as to, who determines the sex of an unborn child? Mention whether temperature has a role in sex determination.
3. A normal visioned woman, whose father is colour blind, marries a normal visioned man. What would be probability of her sons and daughters to be colour blind? Explain with the help of a pedigree chart.
4. Discuss in detail the contributions of Morgan and Sturvant in the area of genetics.

5. Define aneuploidy. How is it different from polyploidy? Describe the individuals having following chromosomal abnormalities.
6. a. Trisomy of 21st Chromosome
b. XXY
c. XO

MOLECULAR BASIS OF INHERITANCE

ONE MARK QUESTIONS

1. What is the function of histones in DNA packaging?
2. Distinguish between heterochromatin and euchromatin. Which of the two is transcriptionally active?
3. The enzyme DNA polymerase in E.coli is a DNA dependent polymerase and also has the ability to proof-read the DNA strand being synthesised. Explain. Discuss the dual polymerase.
4. What is the cause of discontinuous synthesis of DNA on one of the parental strands of DNA? What happens to these short stretches of synthesised DNA?
5. Given below is the sequence of coding strand of DNA in a transcription unit
3 'A A T G C A G C T A T T A G G – 5'
write the sequence of
 - a) its complementary strand
 - b) the mRNA
6. What is DNA polymorphism? Why is it important to study it?
7. Based on your understanding of genetic code, explain the formation of any abnormal hemoglobin molecule. What are the known consequences of such a change?

8. Sometimes cattle or even human beings give birth to their young ones that are having extremely different sets of organs like limbs/position of eye(s) etc. Comment.
9. In a nucleus, the number of ribonucleoside triphosphates is 10 times the number of deoxy x10 ribonucleoside triphosphates, but only deoxy ribonucleotides are added during the DNA replication. Suggest a mechanism.
10. Name a few enzymes involved in DNA replication other than DNA polymerase and ligase. Name the key functions for each of them.
11. Name any three viruses which have RNA as the genetic material.

TWO/THREE MARK QUESTIONS

1. Define transformation in Griffith's experiment. Discuss how it helps in the identification of DNA as the genetic material.
2. Who revealed biochemical nature of the transforming principle? How was it done?
3. Discuss the significance of heavy isotope of nitrogen in the Meselson and Stahl's experiment.
4. Define a cistron. Giving examples differentiate between monocistronic and polyeistronic transcription unit.
5. Give any six features of the human genome.
6. During DNA replication, why is it that the entire molecule does not open in one go? Explain replication fork. What are the two functions that the monomers (d NTPs) play?
7. Retroviruses do not follow central Dogma. Comment.
8. In an experiment, DNA is treated with a compound which tends to place itself amongst the stacks of nitrogenous base pairs. As a result of this, the distance

- between two consecutive base increases. from 0.34nm to 0.44 nm calculate the length of DNA double helix (which has 2×10^9 bp) in the presence of saturating amount of this compound.
9. What would happen if histones were to be mutated and made rich in acidic amino acids such as aspartic acid and glutamic acid in place of basic amino acids such as lysine and arginine?
 10. Recall the experiments done by Frederick Griffith, Avery, MacLeod and McCarty, where DNA was speculated to be the genetic material. If RNA, instead of DNA was the genetic material, would the heat killed strain of Pneumococcus have transformed the R-strain into virulent strain? Explain.
 11. You are repeating the Hershey-Chase experiment and are provided with two isotopes: ^{32}P and ^{15}N (in place of ^{35}S in the original experiment). How do you expect your results to be different?
 12. There is only one possible sequence of amino acids when deduced from a given nucleotides. But multiple nucleotides sequence can be deduced from a single amino acid sequence. Explain this phenomena.
 13. A single base mutation in a gene may not 'always' result in loss or gain of function. Do you think the statement is correct? Defend your answer.
 14. A low level of expression of lac operon occurs at all the time. Can you explain the logic behind this phenomena.
 15. How has the sequencing of human genome opened new windows for treatment of various genetic disorders. Discuss amongst your classmates.
 16. The total number of genes in humans is far less ($< 25,000$) than the previous estimate (upto 1,40,000 gene). Comment.

17. Now, sequencing of total genomes getting is getting less expensive day by the day. Soon it may be affordable for a common man to get his genome sequenced. What in your opinion could be the advantage and disadvantage of this development?
18. Would it be appropriate to use DNA probes such as VNTR in DNA finger printing of a bacteriophage?
19. During in vitro synthesis of DNA, a researcher used 2', 3' – dideoxy cytidine triphosphate as raw nucleotide in place of 2'-deoxy cytidine. What would be the consequence?
20. What background information did Watson and Crick have made available for developing a model of DNA? What was their contribution?
21. What are the functions of (i) methylated guanine cap, (ii) poly-A “tail” in a mature on RNA?
22. Do you think that the alternate splicing of exons may enable a structural gene to code for several isoproteins from one and the same gene? If yes, how? If not, why so?
23. Comment on the utility of variability in number of tandem repeats during DNA finger printing.

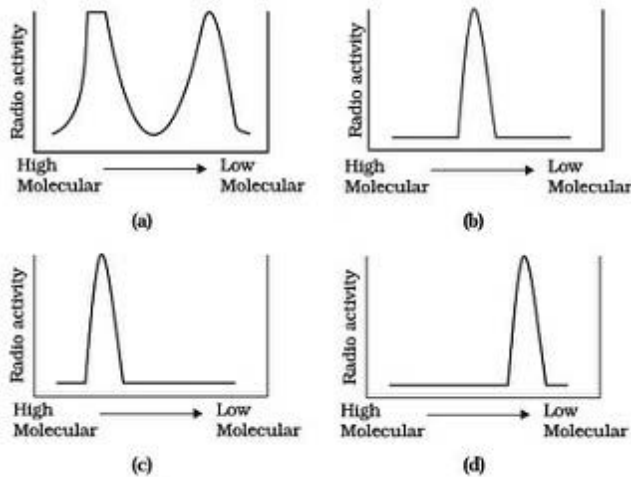
FIVE MARK QUESTIONS

1. Give an account of Hershey and Chase experiment. What did it conclusively prove? If both DNA and proteins contained phosphorus and sulphur do you think the result would have been the same?
2. During the course of evolution why DNA was chosen over RNA as genetic material? Give reasons by first discussing the desired criteria in a molecule that can act as

genetic material and in the light of biochemical differences between DNA and RNA.

3. Give an account of post transcriptional modifications of a eukaryotic mRNA.
4. Discuss the process of translation in detail.
5. Define an operon. giving an example, explain an Inducible operon.
6. There is a paternity dispute for a child'. Which technique can solve the problem.
Discuss the principle involved.

7. Give an account of the methods used in sequencing the human genome.
8. List the various markers that are used in DNA finger printing.
9. Replication was allowed to take place in the presence of radioactive deoxynucleotides precursors in E.coli that was a mutant for DNA ligase. Newly synthesised radioactive DNA was purified and strands were separated by denaturation. These were centrifuged using density gradient centrifugation. Which of the following would be a correct result?



EVOLUTION

ONE MARK QUESTIONS

1. What were the characteristics of life forms that had been fossilised?
2. Did aquatic life forms get fossilised? If, yes where do we come across such fossils?
3. What are we referring to? When we say 'simple organisms' or 'complex organisms'.
4. How do we compute the age of a living tree?
5. Give an example for convergent evolution and identify the features towards which they are converging.
6. How do we compute the age of a fossil?
7. What is the most important pre-condition for adaptive radiation?
8. How do we compute the age of a rock?
9. When we talk of functional macromolecules (e.g. proteins as enzymes, hormones, receptors, antibodies etc), towards what are they evolving?
10. In a certain population, the frequency of three genotypes is as follows:

Genotypes:	BB	Bb	bb
frequency:	22%	62%	16%

11. What is the likely frequency of B and b alleles?
12. Among the five factors that are known to affect Hardy-Weinberg equilibrium, three factors are gene flow, genetic drift and genetic recombination. What are the other

- two factors?
13. What is founder effect?
 14. Who among the Dryopithecus and Ramapithecus was more man-like?
 15. By what Latin name the first hominid was known?
 16. Among Ramapithecus, Australopithecines and Homo habilis – who probably did not eat meat?

TWO/THREE MARK QUESTIONS

1. Louis Pasteur's experiments, if you recall, proved that life can arise from only pre-existing life. Can we correct this as life evolves from pre-existent life or otherwise we will never answer the question as to how the first forms of life arose? Comment.
2. The scientists believe that evolution is gradual. But extinction, part of evolutionary story, are 'sudden' and 'abrupt' and also group-specific. Comment whether a natural disaster can be the cause for extinction of species.
3. Why is nascent oxygen supported to be toxic to aerobic life forms?
4. While creation and presence of variation is directionless, natural selection is directional as it is in the context of adaptation. Comment.
5. The evolutionary story of moths in England during industrialisation reveals, that 'evolution is apparently reversible'. Clarify this statement.
6. Comment on the statement that "evolution and natural selection are end result or consequence of some other processes but themselves are not processes".
7. State and explain any three factors affecting allele frequency in populations.
8. Gene flow occurs through generations. Gene flow can occur across language barriers

- in humans. If we have a technique of measuring specific allele frequencies in different population of the world, can we not predict human migratory patterns in pre-history and history? Do you agree or disagree? Provide explanation to your answer.
9. How do you express the meaning of words like race, breed, cultivars or variety?
 10. When we say “survival of the fittest”, does it mean that
 - a. those which are fit only survive, or
 - b. those that survive are called fit? Comment.
 11. Enumerate three most characteristic criteria for designating a Mendelian population.
 12. Migration may enhance or blurr the effects of selection”. Comment.

FIVE MARK QUESTIONS

1. Name the law that states that the sum of allelic frequencies in a population remains constant. What are the five factors that influence these values?
2. Explain divergent evolution in detail. What is the driving force behind it?
3. You have studied the story of Pepper moths in England. Had the industries been removed, what impact could it have on the moth population? Discuss.
4. What are the key concepts in the evolution theory of Darwin?
5. Two organisms occupying a particular geographical area (say desert) show similar adaptive strategies. Taking examples, describe the phenomenon.
6. We are told that evolution is a continuing phenomenon for all living things. Are humans also evolving? Justify your answer.
7. Had Darwin been aware of Mendel’s work, would he been able to explain the origin of variations. Discuss.

HUMAN HEALTH AND DISEASES

ONE MARK QUESTIONS

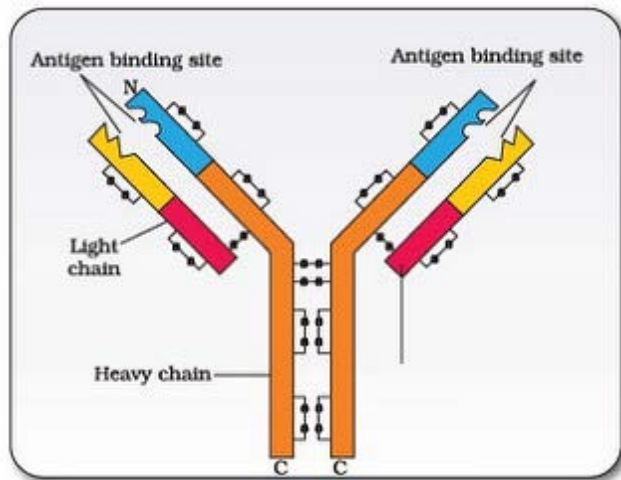
1. Certain pathogens are tissue/organ specific. Justify the statement with suitable examples.
2. The immune system of a person is suppressed. In the ELISA test, he was found positive to a pathogen.
 - a. Name the disease the patient is suffering from.
 - b. What is the causative organism?
 - c. Which cells of body are affected by the pathogen?
3. Where are B-cells and T -cells formed? How do they differ from each other?
4. Given below are the pairs of pathogens and the diseases caused by them. Which out of these is not a matching pair and why?

(a)	Virus	common cold
(b)	Salmonella	typhoid
(c)	Microsporium	filariasis
(d)	Plasmodium	malaria

5. What would happen to immune system, if thymus gland is removed from the body of a person?
6. Many microbial pathogens enter the gut of humans along with food. What are the preventive barriers to protect the body from such pathogens? What type of immunity do you observe in this case?

7. Why is mother's milk considered the most appropriate food for a new born infant?
8. What are interferons? How do interferons check infection of new cells?
9. In the figure, structure of an antibody molecule is shown. Name the parts A, B and C.

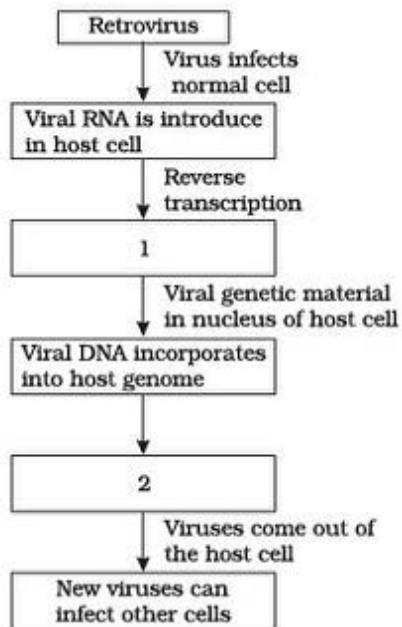
Show A, B and C in the diagram.



10. If a regular dose of drug or alcohol is not provided to an addicted person, he shows some withdrawal symptoms. List any four such withdrawal symptoms.
11. Why is it that during changing weather, one is advised to avoid closed, crowded and airconditioned places like cinema halls etc.?
12. The harmful allele of sickle cell anemia has not been eliminated from human population. Such afflicted people derive some other benefit. Discuss.
13. Lymph nodes are secondary lymphoid organs. Explain the role of lymph nodes in our immune response.
14. Why is an antibody molecule represented as H_2L_2 ?
15. What does the term 'memory' of the Immune system mean?
16. If a patient is advised Anti Retroviral Therapy, which infection is he suffering from?
Name the causative organism.

TWO/THREE MARK QUESTIONS

1. Differentiate between active immunity and passive immunity.
2. Differentiate between benign tumor and malignant tumor.
3. Do you consider passive smoking is more dangerous than active smoking? Why?
4. Prevention is better than cure”. Comment.
5. Explain any three preventive measures to control microbial infections.
6. In the given flow diagram, the replication of retrovirus in a host is shown. Observe and answer the following questions.
 - a. Fill in (1) and (2)
 - b. Why is the virus called retrovirus?
 - c. Can the infected cell survive while viruses are being replicated and released?

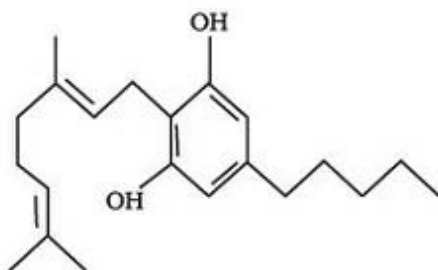


7. Maintenance of personal and public hygiene is necessary for prevention and control of many infectious diseases”. Justify the statement giving suitable examples.
8. The following table shows certain diseases, their causative organisms and symptoms.

Fill the gaps.

	Name of the Disease	Causative organism	Symptoms
(i)	Ascariasis	<i>Ascaris</i>	—
(ii)	—	<i>Trichophyton</i>	Appearance of dry, scaly lesions on various parts of the body
(iii)	Typhoid	—	High fever, weakness, headache, stomach pain, constipation.
(iv)	Pneumonia	<i>Streptococcus pneumoniae</i>	—
(v)	—	<i>Rhino viruses</i>	Nasal congestion and discharge, sorethroat, cough, headache
(vi)	Filariasis	—	Inflammation in lower limbs

9. The outline structure of a drug is given below.
- Which group of drugs does this represent?
 - What are the modes of consumption of these drugs?
 - Name the organ of the body which is affected by consumption of these drugs.



10. Give the full form of CT and MRI. How are they different from each other? Where are they used?
11. Many secondary metabolites of plants have medicinal properties. It is their misuse that creates problems. Justify the statement with an example.
12. Why cannabinoids are banned in sports and games?
13. What is secondary metabolism?
14. Drugs and alcohol give short-term 'high' and long-term 'damages', Discuss.

15. Diseases like dysentery, cholera, typhoid etc., are more common in over crowded human settlements. Why?
16. From which plant cannabinoids are obtained? Name any two cannabinoids. Which part of the body is effected by consuming these substances?
17. In the metropolitan cities of India, many children are suffering from allergy/asthma. What are the main causes of this problem. Give some symptoms of allergic reactions.
18. What is the basic principle of vaccination? How do vaccines prevent microbial infections? Name the organism from which hepatitis B Vaccine is produced.
19. What is cancer? How is a cancer cell different from the normal cell? How do normal cells attain cancerous nature?
20. A person shows strong unusual hypersensitive reactions when exposed to certain substances present in the air. Identify the condition. Name the cells responsible for such reactions. What precaution should be taken to avoid such reactions.
21. For an organ transplant, it is an advantage to have an identical twin. Why?
22. What are lifestyle diseases? How are they caused? Name any two such diseases.
23. If there are two pathogenic viruses, one with DNA and other with RNA, which would mutate faster? And Why?

FIVE MARK QUESTIONS

1. Represent schematically the life cycle of a malarial parasite.
2. Compare the life style of people living in the urban areas with those of rural areas and briefly describe how the life style affects their health.
3. Why do some adolescents start taking drugs. How can this be avoided?

4. In your locality, if a person is addicted to alcohol, what kind of behavioural changes do you observe in that person? Suggest measures to overcome the problem.
5. What are the methods of cancer detection? Describe the common approaches for treatment of cancer.
6. Drugs like LSD, barbiturates, amphetamines, etc., are used as medicines to help patients with mental illness. However, excessive doses and abusive usage are harmful. Enumerate the major adverse effects of such drugs in humans.
7. What is Pulse Polio Programme of Government of India? What is OPV? Why is it that India is yet to eradicate Polio?
8. What are recombinant DNA vaccines? Give two examples of such vaccines. Discuss their advantages.

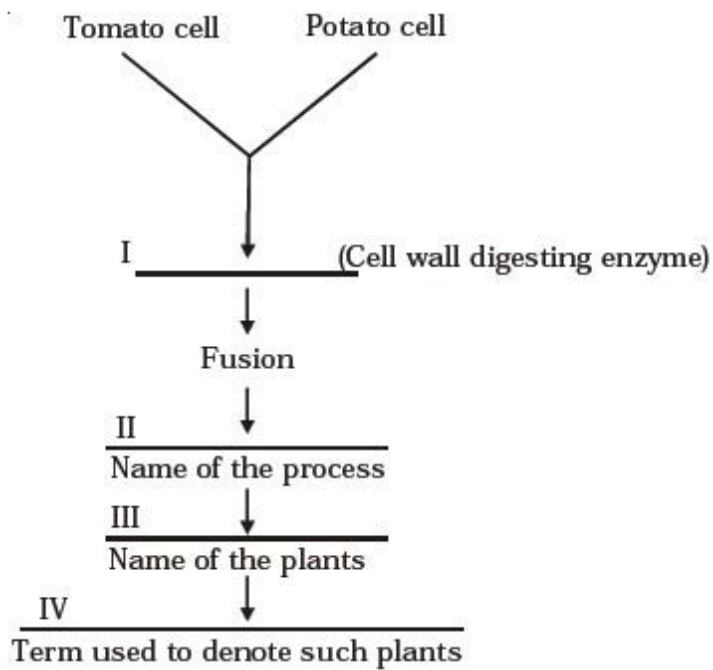
STRATEGIES FOR ENHANCEMENT IN FOOD PRODUCTION

ONE MARK QUESTIONS

1. Millions of chicken were killed in West Bengal, Assam, Orissa and Maharashtra

recently. What was the reason?

2. Can gamma rays used for crop improvement programmes prove to be harmful for health? Discuss.
3. In animal husbandry, if two closely related animals are mated for a few generations, it results in loss of fertility and vigour. Why is this so?
4. In the area of plant breeding, it is important not only to preserve the seeds of the variety being cultivated, but also to preserve all its wild relatives. Explain with a suitable example.
5. Name a man-made cereal? Trace how it was developed and where is it used?
6. Fill in the blanks



7. A few statements are given below followed by a set of terms in a box. Pick the correct term and write it against the appropriate statement
- a. Mating of closely related individuals within the same breed
 - b. Mating of animals of same breed but having no common ancestors on

either side for 4-6 generations

- c. Mating of animals of two different species
- d. Breeding of animals belonging to different breeds

**(i) Cross breeding, (ii) Inter-specific hybridization,
(iii) Out breeding, (iv) Out crossing, (v) Inbreeding**

8. What is meant by 'hidden hunger'?
9. Why are plants obtained by protoplast culture called somatic hybrids?
10. What is protoplast fusion?
11. Why is it easier to culture meristems compared to permanent tissues?
12. Why are proteins synthesised from Spirulina called single cell proteins?
13. A person who is allergic to pulses was advised to take a capsule of Spirulina daily.
Give the reasons for the advise.
14. What is aquaculture? Give example of an animal that can be multiplied by aquaculture.
15. What are the duties of a veterinary doctor in management of a poultry farm?
16. Would it be wrong to call plants obtained through micro-propagation as 'clones'?
Comment.
17. How is a somatic hybrid different from a hybrid?
18. What is emasculation? Why and when is it done?
19. Discuss the two main limitations of plant hybridization programme.
20. Interspecific crosses are rare in nature and intergeneric crosses almost unknown.
Why?
21. Differentiate between pisciculture and aquaculture.
22. Give two important contributions of Dr. M. S. Swaminathan.

23. The term 'desirable trait' can mean different things for different plants. Justify the statement with suitable examples.

TWO/THREE MARK QUESTIONS

1. You are planning to set up a Dairy Farm. Describe the various aspects you would consider before you start the venture.
2. It is said, that diseases are spreading faster due to globalisation and increased movement of people. Justify the statement taking the example of H5N1 virus.
3. Explain the concept of the Blue Revolution.
4. A farmer was facing the problem of low yield from his farm. He was advised to keep a beehive in the vicinity. Why? How would the beehive help in enhancing yield?
5. Life style diseases are increasing alarmingly in India. We are also dealing with large scale malnutrition in the population. Is there any method by which we can address both of these problems together?
6. How can we improve the success rate of fertilisation during artificial insemination in animal husbandry programmes?
7. What is meant by germplasm collection? What are its benefits?
8. Name the improved characteristics of wheat that helped India to achieve green revolution.
9. Suggest some of the features of plants that will prevent insect and pest infestation
10. It is easier to culture plant cells in vitro as compared to animal cells. Why?
11. The culture medium (nutrient medium) can be referred to as a 'highly enriched laboratory soil. Justify the statement.
12. Is there any relationship between dedifferentiation and the higher degree of success

- achieved in plant tissue culture experiments?
13. Give me a living cell of any plant and I will give you a thousand plants of the same type” Is this only a slogan or is it scientifically possible? Write your comments and justify them.
 14. What is the difference between a breed and a species? Give an example for each category.
 15. Plants raised through tissue cultures are clones of the ‘parent’ plant. Discuss the utility of these plants.
 16. Discuss the importance of testing of new plant varieties in a geographically vast country like India.
 17. Define the term ‘stress’ for plants. Discuss briefly the two types of stress encountered by plants.
 18. Discuss natural selection and artificial selection. What are the implications of the latter on the process of evolution?
 19. Discuss briefly how pure lines are created in animal husbandry.
 20. What are the physical barriers of a cell in the protoplast fusion experiment? How are the barriers overcome?
 21. Give few examples of biofortified crops. What benefits do they offer to the society?

FIVE MARK QUESTIONS

1. 1. You are a Botanist working in the area of plant breeding. Describe the various steps that you will undertake to release a new variety.
2. a) The shift from grain to meat diets creates more demands for cereals. Why?
(b) A 250 kg cow produces 200 g of protein per day but 250 g of Methylophillus

- methylothrophus can produce 25 tonnes of protein Name this emerging area of research. Explain its benefits.
3. What are the advantages of tissue culture methods over conventional method of plant breeding in crop improvement programmes?
 4. Modern methods of breeding animals and plants can alleviate the global food shortage'. Comment on the statement and give suitable examples.
 5. Does apiculture offer multiple advantages to farmers? List its advantages if it is located near a place of commercial flower cultivation.
 6. a) Mutations are beneficial for plant breeding. Taking an example, justify the statement.

(b) Discuss briefly the technology that made us self-sufficient in food production.
 7. Discuss how the property of plant cell totipotency has been utilised for plant propagation and improvement
 8. What are three options to increase food production? Discuss each giving the salient features, merits and demerits.

Microbes in Human Welfare

ONE MARK QUESTIONS

1. Why does 'Swiss cheese' have big holes?
2. What are fermentors?
3. Name a microbe used for statin production. How do statins lower blood cholesterol level?
4. Why do we prefer to call secondary waste water treatment as biological treatment?
5. What for Nucleopolyhydro viruses are being used now a days?
6. How has the discovery of antibiotics helped mankind in the field of medicine?
7. Why is distillation required for producing certain alcoholic drinks?
8. Write the most important characteristic that *Aspergillus niger*, *Clostridium butylicum*, and *Lactobacillus* share.
9. What would happen if our intestine harbours microbial flora exactly similar to that found in the rumen of cattle?
10. Give any two microbes that are useful in biotechnology.
11. What is the source organism for ECORI, restriction endonuclease?
12. Name any genetically modified crop.
13. Why are blue green algae not popular as biofertilisers?
14. Which species of *Penicillium* produces Roquefort cheese?
15. Name the states involved in Ganga action plan.

16. Name any two industrially important enzymes.
17. Name an immune immunosuppressive agent?
18. Give an example of a rod shaped virus.
19. What is the group of bacteria found in both the rumen of cattle and shidge of sewage treatment?
20. Name a microbe used for the production of Swiss cheese.

TWO/THREE MARK QUESTIONS

1. Why are flocs important in biological treatment of waste water?
2. How has the bacterium *Bacillus thuringiensis* helped us in controlling caterpillars of insect pests?
3. How do mycorrhizal fungi help the plants harbouring them?
4. Why are cyanobacteria considered useful in paddy fields?
5. How was penicillin discovered?
6. Name the scientists who were credited for showing the role of Penicillin as an antibiotic?
7. How do bioactive molecules of fungal origin help in restoring good health of humans?
8. What roles do enzymes play in detergents that we use for washing clothes? Are these enzymes produced from some unique microorganisms?
9. What is the chemical nature of biogas. Name an organism which is involved in biogas production?
10. How do microbes reduce the environmental degradation caused by chemicals?
11. What is a broad spectrum antibiotic? Name one such antibiotic.

12. What are viruses parasitising bacteria called? Draw a well labelled diagram of the same.
13. Which bacterium has been used as a clot buster? What is its mode of action.
14. What are biofertilisers? Give two examples.

FIVE MARK QUESTIONS

1. Why is aerobic degradation more important than anaerobic degradation for the treatment of large volumes of waste waters rich in organic matter. Discuss.
2. a) Discuss about the major programs that the Ministry of Environment and Forests, Government of India, has initiated for saving major Indian rivers from pollution.
(b) Ganga has recently been declared the national river. Discuss the implication with respect to pollution of this river.
3. Draw a diagrammatic sketch of biogas plant, and label its various components given below: Gas Holder, Sludge Chamber, Digester, Dung+water chamber.
4. Describe the main ideas behind the biological control of pests and diseases.
5. a) What would happen if a large volume of untreated sewage is discharged into a river?
(b) In what way anaerobic sludge digestion is important in sewage treatments?
6. Which type of food would have lactic acid bacteria. Discuss their useful application.

Biotechnology: Principles and Processes

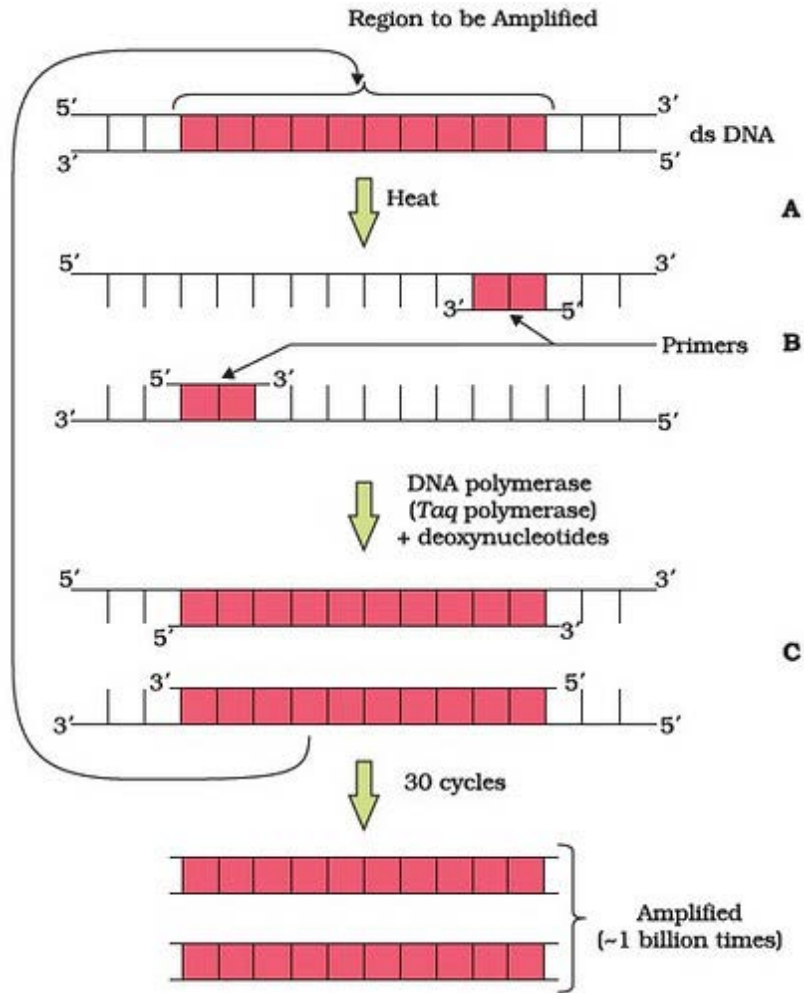
ONE MARK QUESTIONS

1. How is copy number of the plasmid vector related to yield of recombinant protein?
2. Would you choose an exonuclease while producing a recombinant DNA molecule?
3. What does H in 'd' and 'III' refer to in the enzyme Hind III?
4. Restriction enzymes should not have more than one site of action in the cloning site of a vector. Comment.
5. What does 'competent' refer to in competent cells used in transformation experiments?
6. What is the significance of adding proteases at the time of isolation of genetic material (DNA).
7. While doing a PCR, 'denaturation' step is missed. What will be its effect on the process?
8. Name a recombinant vaccine that is currently being used in vaccination program.
9. Do biomolecules (DNA, protein) exhibit biological activity in anhydrous conditions?
10. What modification is done on the Ti plasmid of *Agrobacterium tumefaciens* to convert it into a cloning vector?

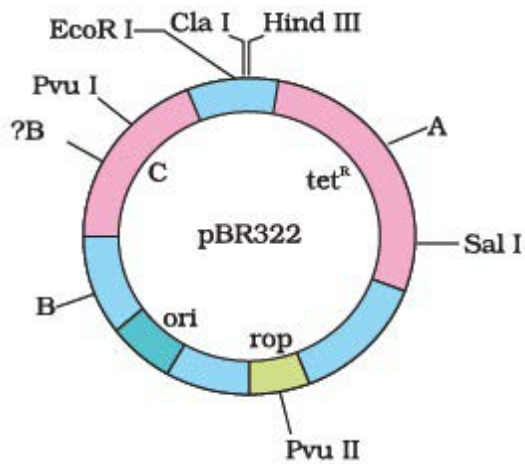
TWO/THREE MARK QUESTIONS

1. What is meant by gene cloning?
2. Both a wine maker and a molecular biologist who had developed a recombinant

- vaccine claim to be biotechnologists. Who in your opinion is correct?
3. A recombinant DNA molecule was created by ligating a gene to a plasmid vector. By mistake, an exonuclease was added to the tube containing the recombinant DNA. How does this affect the next step in the experiment i.e. bacterial transformation?
 4. Restriction enzymes that are used in the construction of recombinant DNA are endonucleases which cut the DNA at 'specific-recognition sequence'. What would be the disadvantage if they do not cut the DNA at specific-recognition sequence?
 5. A plasmid DNA and a linear DNA (both are of the same size) have one site for a restriction endonuclease. When cut and separated on agarose gel electrophoresis, plasmid shows one DNA band while linear DNA shows two fragments. Explain.
 6. How does one visualise DNA on an agarose gel?
 7. A plasmid without a selectable marker was chosen as vector for cloning a gene. How does this affect the experiment?
 8. A mixture of fragmented DNA was electrophoresed in an agarose gel. After staining the gel with ethidium bromide, no DNA bands were observed. What could be the reason?
 9. Describe the role of CaCl_2 in the preparation of competent cells?
 10. What would happen when one grows a recombinant bacterium in a bioreactor but forget to add antibiotic to the medium in which the recombinant is growing?
 11. Identify and explain steps 'A', 'B' and 'C' in the PCR diagram given below.



12. Name the regions marked A, B and C.



FIVE MARK QUESTIONS

1. For selection of recombinants, insertional inactivation of antibiotic marker has been superceded by insertional inactivation of a marker gene coding for a chormogenic substrate. Give reasons.
2. Describe the role of *Agrobacterium tumefaciens* in transforming a plant cell.
3. Illustrate the design of a bioreactor. Highlight the difference between a flask in your laboratory and a bioreactor which allows cells to grow in a continuous culture system.

Biotechnology and its Applications

ONE MARK QUESTIONS

1. In view of the current food crisis, it is said, that we need another green revolution.

Highlight the major limitations of the earlier green revolution.

2. Expand GMO. How is it different from a hybrid?
3. Differentiate between diagnostics and therapeutics. Give one example and for each category.
4. Give the full form of ELISA. Which disease can be detected using it? Discuss the principle underlying the test.
5. Can a disease be detected before its symptoms appear? Explain the principle involved.
6. Write a short note on Biopiracy highlighting the exploitation of developing countries by the developed countries.
7. Many proteins are secreted in their inactive form. This is also true of many toxic proteins produced by micro organisms. Explain how the mechanism is useful for the organism producing the toxin?
8. While creating genetically modified organisms, genetic barriers are not respected. How can this be dangerous in the long run?
9. Why has the Indian Parliament cleared the second amendment of the country's patents bill?
10. Give any two reasons why the patent on Basmati should not have gone to an American Company.
11. How was Insulin obtained before the advent of rDNA technology? What were the problems encountered?
12. With respect to understanding diseases, discuss the importance of transgenic animal models.
13. Name the first transgenic cow. Which gene was introduced in this cow?
14. PCR is a useful tool for early diagnosis of an infectious disease. Elaborate.

15. What is GEAC and what are its objectives?
16. For which variety of Indian rice, the patent was filed by a USA Company?
17. Discuss the advantages of GMO.

TWO/THREE MARK QUESTIONS

1. Gene expression can be controlled with the help of RNA. Explain the method with an example.
2. Ignoring our traditional knowledge can we prove costly in the area of biological patenting. Justify.
3. Highlight any four areas where genetic modification of plants has been useful.
4. What is a recombinant DNA vaccine? Give two examples.
5. Why is it that the line of treatment for a genetic disease is different from infectious diseases?
6. Discuss briefly how a probe is used in molecular diagnostics.
7. Who was the first patient who was given gene therapy? Why was the given treatment recurrent in nature?
8. Taking examples under each category, discuss upstream and downstream processing.
9. Define Antigen and Antibody. Name any two diagnostic kits based upon them.
10. ELISA technique is based on the principles of antigen-antibody interaction. Can this technique be used in the molecular diagnosis of a genetic disorder, such as phenylketonuria?
11. How is a mature, functional insulin hormone different from its prohormone form?
12. Gene therapy is an attempt to correct a genetic defect by providing a normal gene into the individual. By this the normal function can be restored. An alternate method

- would be to provide the gene product (protein/enzyme) known as enzyme replacement therapy, which would also restore the function. Which in your opinion is a better option? Give reason for your answer.
13. Transgenic animals are the animals in which a foreign gene is expressed. Such animals can be used to study the fundamental biological process, phenomenon as well as for producing products useful for mankind. Give one example for each type.
 14. When a foreign DNA is introduced into an organism, how is it maintained in the host and how is it transferred to the progeny of the organism?
 15. Bt cotton is resistant to pest, such as lepidopteron, dipterans and coleopterans. Is Bt cotton also resistant to other pests as well?

FIVE MARK QUESTIONS

1. A patient is suffering from ADA deficiency. Can he be cured? How?
2. Define transgenic animals. Explain in detail any four areas where they can be utilised.
3. You have identified a useful gene in bacteria. Make a flow chart of the steps that you would follow to transfer this gene to a plant.
4. Highlight five areas where biotechnology has influenced our lives.
5. What are the various advantages of using genetically modified plants to increase the overall yield of the crop?
6. Explain with the help of one example how genetically modified plants can:
 - (a) Reduce usage of chemical pesticides
 - (b) Enhance nutritional value of food crops
7. List the disadvantages of insulin obtained from the pancreas of slaughtered cows and

pigs:

8. List the advantages of recombinant insulin.
9. What is meant by the term bio-pesticide? Name and explain the mode of action of a popular bio-pesticide.
10. Name the five key tools for accomplishing the tasks of recombinant DNA technology. Also mention the functions of each tool.

ORGANISMS AND POPULATION

ONE MARK QUESTIONS

1. Species that can tolerate narrow range of temperature are called .
2. What are Eurythermic species?
3. Species that can tolerate wide range of salinity are called .
4. Define stenohaline species.
5. What is the interaction between two species called?
6. What is commensalism?

7. Name the association in which one species produces poisonous substance or a change in environmental conditions that is harmful to another species.
8. What is Mycorrhiza?
9. Emergent land plants that can tolerate the salinities of the sea are called.
10. Why do high altitude areas have brighter sunlight and lower temperatures as compared to the plains?
11. What is homeostasis?
12. Define aestivation.
13. What is diapause and its significance?
14. What would be the growth rate pattern, when the resources are unlimited?
15. What are the organisms that feed on plant sap and other plant parts called?
16. What is high altitude sickness? Write its symptoms.
17. Give a suitable example for commensalism.
18. Define ectoparasite and endoparasite and give suitable examples.
19. What is brood parasitism? Explain with the help of an example.

TWO/THREE MARK QUESTIONS

1. Why are coral reefs not found in the regions from west Bengal to Andhra Pradesh but are found in Tamil Nadu and on the east coast of India?
2. If a fresh water fish is placed in an aquarium containing sea water, will the fish be able to survive? Explain giving reasons.
3. Why do all the fresh water organisms have contractile vacuoles whereas majority of marine organisms lack them?
4. Define heliophytes and sciophytes. Name a plant from your locality that is either

heliophyte or sciophyte.

5. Why do submerged plants receive weaker illumination than exposed floating plants in a lake?
6. In a sea shore, the benthic animals live in sandy, muddy and rocky substrata and accordingly developed the following adaptations.
 - a. Burrowing
 - b. Building cubes
 - c. Holdfasts / peduncle
 - Find the suitable substratum against each adaptation.
7. Categorise the following plants into hydrophytes, halophytes, mesophytes and xerophytes. Give reasons for your answers.
 - a. Salvinia
 - b. Opuntia
 - c. Rhizophora
 - d. Mangifera

	Plant Name	Type
a.	Hydrilla	_____
b.	Typha	_____
c.	Nymphaea	_____
d.	Lemna	_____
e.	Vallisneria	_____

8. In a pond, we see plants which are free-floating; rooted–submerged; rooted emergent; rooted with floating leaves. Write the type of plants against each of them.

9. The density of a population in a habitat per unit area is measured in different units.

Write the unit of measurement against the following:

- a. Bacteria _____
- b. Banyan _____
- c. Deer _____
- d. Fish _____



10.

- a. Label the three tiers 1, 2, 3 given in the above age pyramid.
- b. What type of population growth is represented by the above age pyramid?

11. In an association of two animal species, one is a termite which feeds on wood and the other is a protozoan *Trichonympha* present in the gut of the termite. What type of association they establish?

12. Lianas are vascular plants rooted in the ground and maintain erectness of their stem by making use of other trees for support. They do not maintain direct relation with those trees. Discuss the type of association the lianas have with the trees.

13. Give the scientific names of any two microorganisms inhabiting the human intestine.

14. What is a tree line?

15. Define 'zero population growth rate'. Draw a age pyramid for the same.

16. List any four characters that are employed in human population census.

17. Give one example for each of the following types.

a) Migratory animal

- b) Camouflaged animal
- c) Predator animal
- d) Biological control agent
- e) Phytophagous animal
- f) Chemical defense agent

18. 18. Fill in the blanks

Species A	Species B	Type of Interaction	Example
+	-	_____	_____
+	+	_____	_____
+	_____	Commensalism	_____

LONG ANSWERS

1. Discuss the various types of positive interactions between species.
2. In an aquarium two herbivorous species of fish are living together and feeding on phytoplanktons. As per the Gause's Principle, one of the species is to be eliminated in due course of time, but both are surviving well in the aquarium. Give possible reasons.
3. While living in and on the host species, the animal parasite has evolved certain adaptations. Describe these adaptations with examples.
4. Do you agree that regional and local variations exist within each biome? Substantiate your answer with suitable example.
5. Which element is responsible for causing soil salinity? At what concentration does the soil become saline?

ECOSYSTEM

ONE MARK QUESTIONS

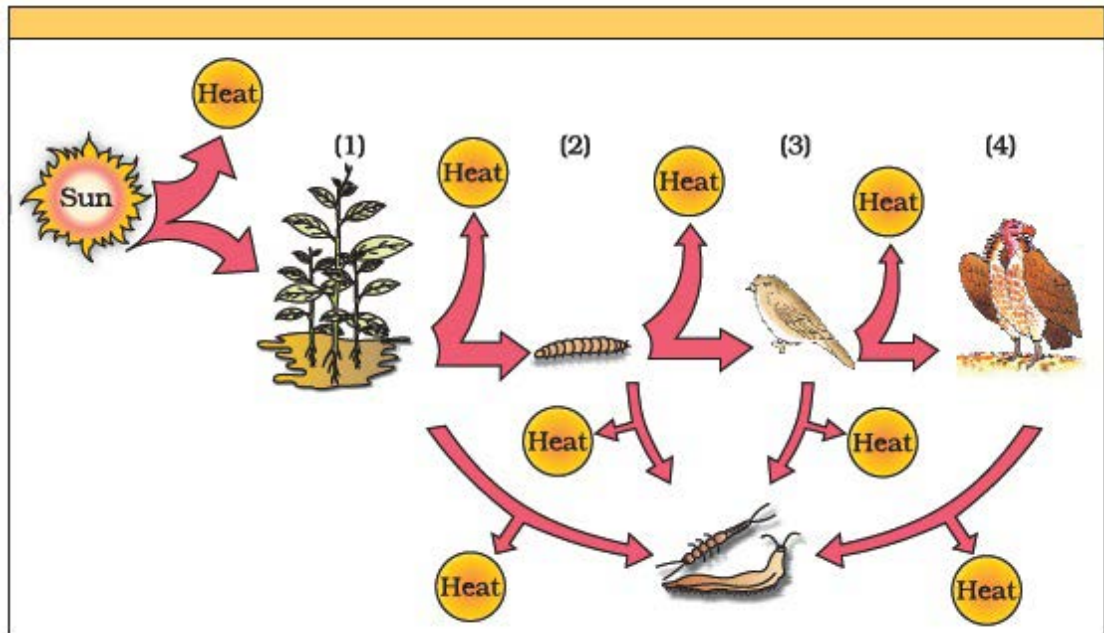
1. Name an organism found as secondary carnivore in an aquatic ecosystem.
2. What does the base tier of the ecological pyramid represent?
3. Under what conditions would a particular stage in the process of succession revert back to an earlier stage?
4. Arrange the following as observed in vertical stratification of a forest: Grass, Shrubby plants, Teak, Amaranths.
5. Name an omnivore which occurs in both grazing food chain and the decomposer food chain.
6. Justify the pitcher plant as a producer.

7. Name any two organisms which can occupy more than one trophic level in an ecosystem.
8. In the North East region of India, during the process of jhum cultivation, forests are cleared by burning and left for regrowth after a year of cultivation. How would you explain the regrowth of forest in ecological term?
9. Climax stage is achieved quickly in secondary succession as compared to primary succession. Why?
10. Among bryophytes, lichens and fern which one is a pioneer species in a xeric succession?
11. What is the ultimate source of energy for the ecosystems?
12. Is the common edible mushroom an autotroph or a heterotroph?
13. Why are oceans least productive?
14. Why is the rate of assimilation of energy at the herbivore level called secondary productivity?
15. Why are nutrient cycles in nature called biogeochemical cycles?
16. Give any two examples of xerarch succession.
17. Define self sustainability.
18. What is common to earthworm, mushroom, soil mites and dung beetle in an ecosystem.

TWO/THREE MARK QUESTIONS

1. Organisms at a higher trophic level have less energy available. Comment.
2. The number of trophic levels in an ecosystem are limited. Comment.
3. Is an aquarium a complete ecosystem?

4. What could be the reason for the faster rate of decomposition in the tropics?
5. Human activities interfere with carbon cycle. List any two such activities.
6. Flow of energy through various trophic levels in an ecosystem is unidirectional and non-cyclic. Explain.
7. Apart from plants and animals, microbes form a permanent biotic component in an ecosystem. While plants have been referred to as autotrophs and animals as heterotrophs, what are microbes referred to as? How do the microbes fulfil their energy requirements?
8. Poaching of tiger is a burning issue in today's world. What implication would this activity have on the functioning of the ecosystem of which the tigers are an integral part?
9. In relation to energy transfer in ecosystem, explain the statement "10kg of deer's meat is equivalent to 1 kg of lion's flesh".
10. Primary productivity varies from ecosystem to ecosystem. Explain?
11. Sometimes due to biotic/abiotic factor the climax remain in a particular seral stage (pre climax) without reaching climax. Do you agree with this statement. If yes give a suitable example.
12. What is an incomplete ecosystem? Explain with the help of suitable example.
13. What are the shortcomings of ecological pyramids in the study of ecosystem?
14. How do you distinguish between humification and mineralisation?
15. Fill in the trophic levels (1, 2, 3 and 4) in the boxes provided in the figure.



16. The rate of decomposition of detritus is affected by the abiotic factors like availability of oxygen, pH of the soil substratum, temperature etc. Discuss.

FIVE MARK QUESTIONS

1. A farmer harvests his crop and expresses his harvest in three different ways.
 - a. I have harvested 10 quintals of wheat.
 - b. I have harvested 10 quintals of wheat today in one acre of land.
 - c. I have harvested 10 quintals of wheat in one acre of land, 6 months after sowing.

Do the above statements mean one and the same thing. If your answer is yes, give reasons. And if your answer is 'no' explain the meaning of each expression.
2. Justify the following statement in terms of ecosystem dynamics. "Nature tends to increase the gross primary productivity, while man tends to increase the net primary productivity".
3. Which of the following ecosystems will be more productive in terms of primary

- productivity? Justify your answer. A young forest, a natural old forest, a shallow polluted lake, alpine meadow.
4. What are the three types of ecological pyramids. What information is conveyed by each pyramid with regard to structure, function and energy in the ecosystem.
 5. Write a short note on pyramid of numbers and pyramid of biomass.
 6. Given below is a list of autotrophs and heterotrophs. With your knowledge about food chain, establish various linkages between the organisms on the principle of 'eating and being eaten'. What is this inter-linkage established known as? Algae, hydrilla, grasshopper, rat, squirrel, crow, maize plant, deer, rabbit, lizard, wolf, snake, peacock, phytoplankton, crustaceans, whale, tiger, lion, sparrow, duck, crane, cockroach, spider, toad, fish, leopard, elephant, goat, Nymphaea, Spirogyra.
 7. The energy flow in the ecosystem follows the second law of thermodynamics." Explain.
 8. What will happen to an ecosystem if:
 - a. All producers are removed;
 - b. All organisms of herbivore level are eliminated; and
 - c. All top carnivore population is removed
 9. Give two examples of artificial or man made ecosystems. List the salient features by which they differ from natural ecosystems.
 10. The biodiversity increases when one moves from the pioneer to the climax stage. What could be the explanation?
 11. What is a biogeochemical cycle. What is the role of the reservoir in a biogeochemical cycle. Give an example of a sedimentary cycle with reservoir located in earth's crust.

12. What will be the P/R ratio of a climax community and a pioneer community. What explanation could you offer for the changes seen in P/R ratio of a pioneer community and the climax community.

BIODIVERSITY AND CONSERVATION

ONE MARK QUESTIONS

1. What characteristics make a community stable?
2. What could have triggered mass extinctions of species in the past?
3. What accounts for the greater ecological diversity of India?
4. According to David Tilman, greater the diversity, greater is the primary productivity.
Can you think of a very low diversity man-made ecosystem that has high productivity?
5. What does 'Red' indicate in the IUCN Red list (2004)?

6. Explain as to how protection of biodiversity hot spots alone can reduce up to 30% of the current rate of species extinction.
7. What is the difference between endemic and exotic species?
8. How does species diversity differ from ecological diversity?
9. Why is genetic variation important in the plant *Rauwolfia vomitoria*?
10. What is Red Data Book?
11. Define gene pool.
12. What does the term 'Frugivorous' mean?
13. What is the expanded form of IUCN?
14. Define the terms (i) Bioprospecting (ii) Endemism

TWO/THREE MARK QUESTIONS

1. How is the presently occurring species extinction different from the earlier mass extinctions?
2. Of the four major causes for the loss of biodiversity (Alien species invasion, habitat loss and fragmentation, over-exploitation and co-extinctions which according to you is the major cause for the loss of biodiversity? Give reasons in support.
3. Discuss one example, based on your day-to-day observations, showing how loss of one species may lead to the extinction of another.
4. A species-area curve is drawn by plotting the number of species against the area. How is it that when a very large area is considered the slope is steeper than that for smaller areas?
5. Is it possible that productivity and diversity of a natural community remain constant over a time period of, say one hundred years?

6. There is greater biodiversity in tropical /subtropical regions than in temperate region. Explain.
7. Why are the conventional methods not suitable for the assessment of biodiversity of bacteria?
8. What criteria should one use in categorizing a species as threatened?
9. What could be the possible explanation for greater vulnerability of amphibians to extinction as compared to other animal groups?
10. How do scientists extrapolate the total number of species on Earth?
11. Humans benefit from diversity of life. Give two examples.
12. List any two major causes other than anthropogenic causes of the loss of biodiversity.
13. What is an endangered species? Give an example of an endangered plant and animal species each?
14. What are sacred groves and their role in biodiversity conservation?
15. Suggest a place where one can go to study coral reefs, mangrove vegetation and estuaries.
16. Is it true that there is more solar energy available in the tropics? Explain briefly.
17. What is co-extinction? Explain with a suitable example?

FIVE MARK QUESTIONS

1. Elaborate how invasion by an alien species reduces the species diversity of an area.
2. How can you, as an individual, prevent the loss of biodiversity?
3. Can you think of a scientific explanation, besides analogy used by Paul Ehrlich, for the direct relationship between diversity and stability of an ecosystem?

4. Though the conflict between humans and wildlife started with the evolution of man, the intensity of conflict has increased due to the activities of modern man. Justify your answer with suitable examples.
5. What is an ecosystem service? List any four important ecosystem services provided by the natural ecosystems. Are you in favour or against levying a charge on the service provided by the ecosystem?
6. Describe the consumptive use value of biodiversity as food, drugs and medicines, fuel and fiber with suitable examples.
7. Species diversity decreases as we move away from the equator towards the poles. What could be the possible reasons?
8. Explain briefly the 'rivet popper hypothesis' of Paul Ehrlich.
9. The relation between species richness and area for a wide variety of taxa turns out to be a rectangular hyperbola. Give a brief explanation.

ENVIRONMENTAL ISSUES

ONE MARK QUESTIONS

1. Use of lead-free petrol or diesel is recommended to reduce the pollutants emitted by automobiles. What role does lead play?
2. In which year was the Air (Prevention and Control of Pollution) Act amended to include noise as air pollution.
3. Name the city in our country where the entire public road transport runs on CNG.
4. It is a common practice to undertake desilting of the overhead water tanks. What is the possible source of silt that gets deposited in the water tanks?
5. What is cultural eutrophication?
6. List any two adverse effects of particulate matter on human health.

7. What is the raw material for polyblend?
8. Blends of polyblend and bitumen, when used, help to increase road life by a factor of three. What is the reason?
9. Mention any two examples of plants used as wind breakers in the agricultural fields.
10. Name an industry which can cause both air and thermal pollution and as well as eutrophication.
11. What is an algal bloom?
12. What do you understand by biomagnification?
13. What are the three major kinds of impurities in domestic wastewater?
14. What is reforestation?
15. What is the best solution for the treatment of electronic wastes?

TWO/THREE MARK QUESTIONS

1. Is it true that carpets and curtains/drapes placed on the floor or wall surfaces can reduce noise level. Explain briefly?
2. What is hybrid vehicle technology?. Explain its advantages with a suitable example?
3. Is it true that if the dissolved oxygen level drops to zero, the water will become septic. Give an example which could lower the dissolved oxygen content of an aquatic body.
4. Name any one green house gas and its possible source of production on a large scale. What are the harmful effects of it?
5. It is a common practice to plant trees and shrubs near the boundary walls of buildings. What purpose do they serve?
6. Why has the National Forest Commission of India recommended a relatively larger

forest cover for hills than for plains?

7. How can slash and burn agriculture become environment friendly?
8. What is the main idea behind “Joint Forest Management Concept” introduced by the Government of India?
9. What do you understand by Snow-blindness?
10. How has DDT caused decline in bird population?

FIVE MARK QUESTIONS

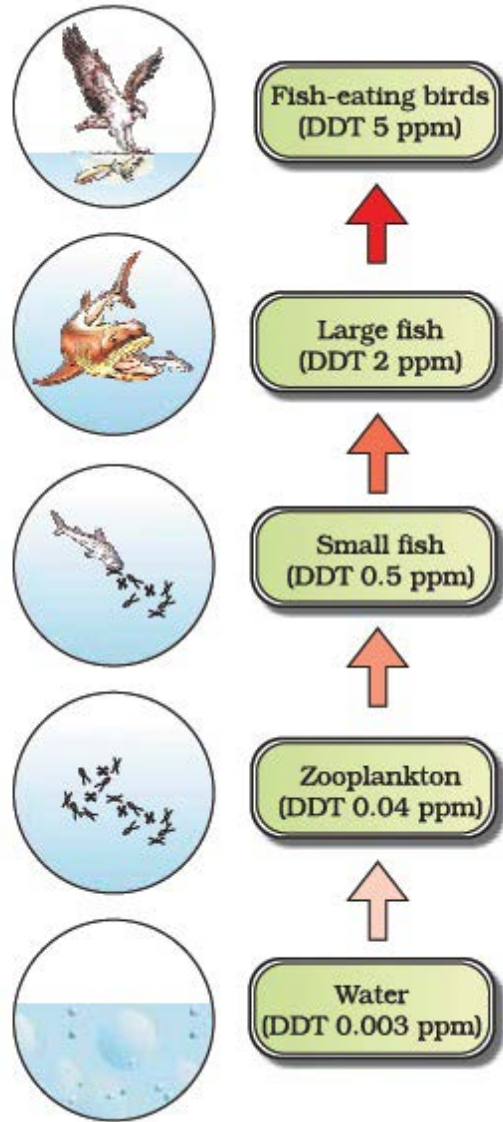
1. Write a short note on electronic waste. List the various sources of e- wastes and the problems associated with its disposal.
2. What is organic farming? Discuss the benefits of organic farming as a viable practise in the context of developing nations like India.
3. Water logging and soil salinity are some of the problems that have come in the wake of the Green Revolution. Discuss their causes and adverse effects to the environment.
4. What are multipurpose trees? Give the botanical and local names of any two multipurpose trees known to you and list their uses.
5. What are the basic characteristics of a modern landfill site. List any three and also mention the reasons for their use.

Ans. Characteristics of a modern landfill include:

- i. methods to contain leachate such as lining clay or plastic liners.
- ii. compaction and covering of the waste to prevent it from being blown by wind.
- iii. installation of a landfill gas extraction system to extract the gas for

use in generation of power.

6. How does an electrostatic precipitator work?
7. Observe figure and answer the following questions.



- i. What ecological term is used to describe the DDT accumulation at different trophic levels?
- ii. List any one effect of DDT accumulation on birds
- iii. Will DDT accumulation lead to eutrophication?
- iv. Does it affect the BOD?

v. Name disease caused by accumulation of any heavy metal.