DEHRADUN PUBLIC SCHOOL
ASSIGNMENT (2022-23)
SUBJECT-BIOLOGY (044)
CLASS -XII

Chapter 2: Sexual Reproduction in Flowering Plants

Case Based Questions:

Q1. Read the paragraph given below and answer the questions that follow:

The pollen grains or microspores are the male reproductive bodies of a flower and are contained in a pollen sac or microsporangia. Each pollen grain consists of a single microscopic cell, possessing two coats: the exine and the intine. The exine of a pollen grain is made up of chemically stable material. Because of this, pollen grains are often very well preserved for thousands of years in soil and sediments.

i. One of the most resistant biological material present on the exine of pollen grain is _____.
   a. pectocellulose b. suberin c. sporopollenin d. cellulose

ii. The exine possesses one or more thin places known as _____.
   a. placenta b. germ pore c. hilum d. endothecium

iii. What is the function of germ pore?
   a. Emergence of radicle
   b. Absorption of water for seed germination
   c. Initiation of pollen tube
   d. All of these

iv. The number of germ pore in dicots and monocots respectively are _____.
   a.one and three b. three and two c. two and three d. three and one

v. What is the key advantage to the plant for having such strong pollen grain walls?
   a. It protects the vital genetic material in the pollen grain.
   b. It allows pollen to serve as a valuable fossil record for the study of ancient plants.
   c. It prevents the pollen tube from getting out before the pollen grain reaches the stigma of a compatible species.
   d. It gives weight to the pollen grain.

Objective type questions:

Q2. Cleistogamous flowers are self-pollinated because:
   a. they are bisexual flowers which do not open at all.
   b. they are bisexual and open flowers.
   c. they are unisexual.
   d. their stigma matures before the anthers dehisce.

Q3. The function of tapetum is:
   a. dehiscence b. mechanical c. protection d. nutrition

Q4. The phenomenon wherein, the ovary develops into a fruit without fertilization is called_____.
   a. Parthenocarpy b. Apomixis c. Bagging d. Emasculation

Q5. ASSERTION: In angiosperms, the first fertilization is called syngamy and involves the fusion of egg nucleus with sperm nucleus.
REASON: Second fertilization is called vegetative fertilization.

Q6. ASSERTION: All angiosperms reproduce sexually.
REASON: All angiosperms produce seeds.

Short Answer Type Questions:

Q7. Why do the integuments of an ovule harden and the water content gets highly reduced as the seed matures?

Q8. Differentiate between endosperm and perisperm, by giving one example of each.

Q9. How are parthenocarpic fruits produced by some plants and apomictic seeds by some other? Explain.

Q10. List the different types of pollination depending upon the source of pollen grain.
Q11. In a flowering plant, a microspore mother cell produces four male gametophyte where a megaspore mother cell forms only one female gametophyte. Explain.

Long Answer Type Questions:

Q12. Differentiate between microsporogenesis and megasporogenesis. Which type of cell division occurs during these events? Name the structures formed at the end of these two events.
Q13. Draw a diagram of pistil showing pollen tube growth in angiosperms and label- stigma, male gametes, micropyle and ovule.
Q14. What is bagging technique? How is it helpful in a plant breeding programme?
Q15. Flowering plants have developed many devices to discourage self-pollination and to encourage cross-pollination. Explain three such devices.
Q16. Define the following terms:
i. Polyembryony
ii. Artificial hybridization
iii. Emasculation

Chapter 3: Human Reproduction

Case Based Questions:

Q1. Read the paragraph given below and answer the questions that follow:
Oogenesis is the process of formation of ovum in ovaries. The production of eggs in females begins before birth i.e. during the embryonic development stage but is completed only after fertilization. It consists of three phases- multiplication, growth and maturation. Oogenesis is controlled by hormones like GnRH, LH and FSH. GnRH secreted by the hypothalamus stimulates the anterior lobe of pituitary gland to secrete LH and FSH.

i. What is the function of hormone FSH?
   a. It inhibits the formation of estrogen.
   b. It induces the release of secondary oocyte.
   c. It stimulates the growth of graafian follicles.
   d. It causes ovulation.
ii. The cell division involved in the formation of secondary oocyte _____.
   a. mitosis b. meiosis I c. amitosis d. meiosis II
iii. Antrum is present in _____.
   a. primary oocyte b. tertiary follicle c. corpus luteum d. graafian follicle
iv. Name the membranous cover of the ovum at ovulation.
v. Give the name of the hormone which is secreted by corpus luteum.

Objective type questions:

Q2. Which one of the following events is correctly matched with the time period in a normal menstrual cycle?
a. Release of egg : 5 th day
b. Endometrium regenerates: 5 – 10 days
c. Endometrium secretes nutrients for implantation: 11 – 18 days
d. Rise in progesterone level: 1 – 15 days

Q3. The process of release of spermatozoa from Sertoli cells into cavity of the seminiferous tubules is called_____.
a. spermiogenesis b. spermatogenesis
c. spermiation d. spermatocyte

Q4. After birth, colostrum is released from mammary glands which are rich in _____.
a. fat and low in proteins
b. proteins and low in fat
c. proteins, antibodies and low in fat
d. proteins, fat and low in antibodies

Q5. ASSERTION: In morula stage, the cell divides without increase in size.
REASON: Zona pellucida remains till cleavage.

Q6. ASSERTION: Gametogenesis is the process by which gametes are formed in respective gonads.
REASON: Meiosis is important step towards formation of gametes in human beings.

Short Answer Type Questions:

Q7. Why are the human testes located outside the abdominal cavity? Name the pouch in which they are present.

Q8. List the different parts of human oviduct through which the ovum travels till it meets the sperm for fertilization.

Q9. Write the effect of the high concentration of LH on a mature graafian follicle.

Q10. Differentiate between blastulation and gastrulation.

Q11. On the basis of the functions mentioned below, identify each one correctly:
i. It helps in the movement of spermatozoan in a fluid medium.
ii. It contains hydrolytic enzymes and is used to contact and penetrate the egg during fertiliastion.

Long Answer Type Questions:

Q12. Draw a labelled diagram of human male reproductive system.

Q13. i. Explain the menstrual phase in a human female. State the level of ovarian and pituitary hormones during this phase.
ii. Why is follicular phase in the menstrual cycle also referred as proliferative phase?

Q14. List the names of the hormones, endocrine glands along with functions of the hormones that are crucial in causing spermatogenesis.

Q15. Explain in detail the various developmental stages of the zygote until implantation with suitable diagrams.

Q16. Describe the functions of the following:
i. Epididymis
ii. Vas deferens
iii. Seminiferous Tubules

Chapter 4: Reproductive Health

Objective type questions:

Q1. Increased IMR and decreased MMR in a population will:
a. Cause rapid increase in growth rate.
b. Result in decline in growth rate.
c. Not cause significant change in growth rate.
d. Result in an explosive population growth.

Q2. The method of directly injecting a sperm into ovum in assisted reproductive technology is called _____.
a. GIFT b. ZIFT c. ICSI d. ET

Q3. Emergency contraceptives are effective if used within _____.
a. 72 hrs of coitus b. 72 hrs of ovulation
c. 72 hrs of menstruation d. 72hrs of implantation

Q4. ASSERTION: Amniocentesis is often misused.
REASON: Amniocentesis is meant for determining the genetic disorders in the foetus, but it is being used to determine the sex of the foetus so that foetus may be aborted.

Q5. ASSERTION: Test tube baby has raised several legal problems.
REASON: It involves *in vitro* fertilization followed by embryo transfer.

Short Answer Type Questions:

Q6. Our government has intentionally imposed strict conditions for MTP in our country. Justify giving a reason.

Q7. What do you think is the significance of reproductive health in a society?

Q8. Mention two advantages of lactational amenorrhea as a contraceptive method.

Q9. Name the hormonal composition of the oral contraceptive used by human females.

Q10. List any four characteristics of an ideal contraceptive.

Q11. Which age group is more vulnerable to STDs?

Long Answer Type Questions:

Q12. All Reproductive Tract Infection are STDs but all STDs are not RTIs. Justify the statement with example.

Q13. i. Explain steps involved in *in vitro* fertilization popularly known as test tube baby programme.
ii. State the importance of this programme.

Q14. Name a terminal method to prevent pregnancy in humans. Describe the procedure of the terminal method carried in human male and female.

Q15. How do `implants` act as an effective method of contraception in human females? Mention its one advantage over contraceptive pills.

Q16. Name any two copper releasing IUDs. Explain how do they act as effective contraceptive in human females.

Chapter 5: Principles of Inheritance and Variation

Case Based Questions:

Q1. Q1. Read the paragraph given below and answer the questions that follow:
ABO blood groups in human beings are controlled by the gene I. The gene I has three alleles- I^A, I^B and i. Since there are three different alleles six different genotypes are possible. If two persons with `AB` blood group marry and have sufficient large number of children, there children could be classified as `A` blood group: `AB` blood group: `B` blood group in 1: 2: 1 ratio. Modern technique of protein electrophoresis reveals presence of both `A` and `B` type of proteins in `AB` blood group individuals.

i. How many types of phenotypes can occur in ABO blood group?
a. six b. two c. three d. four

ii. ABO blood grouping in human beings cites the example of_____.
a. multiple allelism b. codominance c. incomplete dominance d. both b and c.

iii. If a man with A blood group marries a man with AB blood group. Which type of progeny indicates that man is heterozygous?
a. O b. B c. A d. AB

iv. The presence of both A and B type proteins in AB blood group individuals is an example of-
a. partial dominance b. incomplete dominance
c. complete dominance d. codominance

v. Complete the given table regarding different possibilities and their corresponding blood groups.

Genotypes	Blood groups
I^AI^B	(I)
I^Bi, (II)	B
(III)	O
I^AI^A, (IV)	I^A

	(I)	(II)	(III)	(IV)
a.	O	I^BI^B	I^Bi	I^Ai
b.	AB	I^A I	I^AI^B	I^Bi
c.	AB	I^BI^B	ii	I^Ai
d.	O	I^AI^A	ii	I^Ai

Objective type questions:

Q2. If there is a complete linkage in F_2 generation, the result will be:
a. Parental and recombinant both types appear in equal ratio.
b. Parental types are more than recombinant types.
c. All will be parental types.
d. Parental types are less than recombinant types.

Q3. Incomplete dominance was discovered by_____.
a. Bateson b. Johannson c. Corrans d. Mendel

Q4. In which of the following genetic disorders, the man has an extra X chromosome?
a. Klinefelter`s Syndrome b. Down`s Syndrome
c. Turner`s Syndrome d. Colour blindness

Q5. ASSERTION: XX-XY type of sex determination mechanism is an example of female heterogamety and is found in Drosophila.
REASON: Male heterogamety is seen in moths where males produce two different types of gametes.

Q6. ASSERTION: A genetist crossed two plants. He got 50% tall and 50% dwarf plants in the progeny.
REASON: One parent was heterozygous tall white the other was dwarf.

Short Answer Type Questions:

Q7. Give an example of polygenic trait in humans.

Q8. A cross was carried out between two pea plants showing contrasting traits of height of the plants. The result of the cross showed 50% parental characters.
i. Work out the cross with the help of a Punnett square.
ii. Name the type of the cross carried out.

Q9. What is the cause of frameshift mutation?

Q10. What happens when chromatids fail to segregate during cell division cycle? Explain your answer with an example.

Q11. Explain the following terms with example.
i. Codominace ii. Incomplete dominance

Long Answer Type Questions:

Q12. Write the scientific name of fruitfly. Why did Moragn prefer to work with fruitflies for his experiments? State any three reasons.

Q13. During a monohybrid cross involving a tall pea plant with a dwarf pea plant, the offsprings populations were tall and dwarf in equal ratio. Workout a cross to show how it is possible.

Q14. Differentiate between the following:
i. Homozygous and Heterozygous ii. Monohybrid and Dihybrid

Q15. Why is pedigree analysis done in the study of human genetics? State the conclusions that can be drawn from it.

Q16. i. In humans, males are heterogametic and females are homogametic, explain. Are there any examples where males are homogametic and females are heterogametic?
ii. Also describe as to, who determine the sex of an unborn child?

Chapter 6: Molecular Basis of Inheritance

Case Based Questions:

Q1. Read the paragraph given below and answer the questions that follow:
The genes in a cell are expressed to perform a particular function or a set of functions. For example, if an enzyme called beta-galactosidase is synthesized by *E.coli,* it is used to catalyse the hydrolysis of a disaccharide, lactose into galactose and glucose; the bacteria used them as a source of energy. Hence, if the bacteria do not have lactose around themto be utilized for energy source, they would no longer require the synthesis of the enzyme beta- galactosidase. The development and differentiation of embryo into adult organism are also a result of the coordinated regulation of expression of several sets of genes.

i. Which one is not a part of transcription unit in DNA?
a. The inducer b. promoter
c. terminator d. structural gene

ii. The correct option regarding the lac operon in *E.coli* from the following is:
a. lac operon is switched on in the absence of lactose
b. lac repressor binds to the lac promoter
c. beta- galactosidase is the only enzyme produced in large quantities when lac operon is turned on
d. lac operon messenger RNA is a polycistronic mRNA

iii. In a cell, as per the operon concept governs the, the regulator gene governs the chemical reactions by-
a. inhibiting the substrate in the reaction.
b. mRNA transcription inhibited
c. enzyme-reaction inactivation
d. none of the above

iv. In *E.coli* when does the lac operon gets switched on?

v. Which enzyme will be produced in a cell in which there is a nonsense mutation in the lac Y gene?

Objective type questions:

Q2. Replication of DNA is_____.
a. Conservative b. semi-conservative c. transcriptive d. dispersive

Q3. Which of the following is true with respect to AUG?
a. It codes for methionine only.
b. It is an initiation codon.
c. It codes for methionine in both prokaryotes and eukaryotes.
d. All of the above.

Q4. Find out the statement which holds correct for sickle-cell anaemia:
a. It cannot be treated with iron supplements.
b. It is a molecular disease.
c. It confers resistance to acquiring malaria.
d. None of the above.

Q5. ASSERTION: For transmission of genetic information RNA is better.
REASON: RNA is more stable than DNA.

Q6. ASSERTION: One codon may code one or more than one amino acid.
REASON: A codon is degenerate and ambiguous.

Short Answer Type Questions:

Q7. If the base adenine constitutes 31 percent of an isolated DNA fragment, then what is the expected percentage of the base cytosine in it?

Q8. Draw a labelled diagram of a nucleosome. Where is it found in a cell?

Q9. Give an example of codon having dual function.

Q10. i. How many codons code for amino acids and how many are unable to do so?
ii. Why are codes said to be degenerate and unambiguous?

Q11. Name the transcriptionally active region of chromatin in a nucleus.

Long Answer Type Questions:

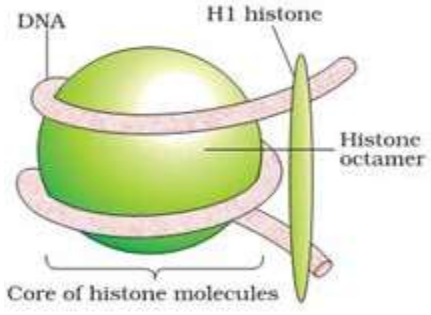
Q12. Show DNA replication with the help of a diagram only.

Q13. State the aim of the Messelson and Stahl's experiment. Describe the experiment briefly.

Q14. Name the enzyme that catalyses the transcription of hnRNA. Why does the hnRNA need to undergo changes? Also list the changes.

Q15. What do 'Y' and 'B' stands for in 'YAC' and 'BAC' used in Human Genome Project (HGP). mention their role in the project. Expand SNPs identified by scientists in HGP.

Q16. The length of DNA in an eukaryotic cell is N 2.2 m How can such a huge DNA be packaged in a nucleus of micrometer in diameter?



Chapter 7: Evolution

Objective type questions:

Q1. Animal husbandry and plant breeding programmes are the examples of _____.
a. Reserve evolution
b. Artificial selection
c. Mutation
d. Natural selection

Q2. Analogous organs arise due to _____.
a. Divergent evolution
b. Random mechanism
c. Genetic drift
d. Convergent evolution

Q3. Viviparity is considered to be more evolved because:
a. The young ones are left on their own.
b. The young ones are protected by a big shell.
c. The young ones are protected inside the mother`s body and are looked after when they are born leading to more chances of survival.
d. The embryo takes a long time to develop.

Q4. ASSERTION: There is an everlasting competition between individuals having similar requirements.
REASON: Populations tend to multiply arithmetically while food and space increase geometrically.

Q5. ASSERTION: The mechanism of origin and evolution can be suggested.
REASON: Evidences of origin and evolution of life are available.

Short Answer Type Questions:

Q6. State the significance of study of fossils in evolution.

Q7. Why analogous structures are considered a result of convergent evolution?

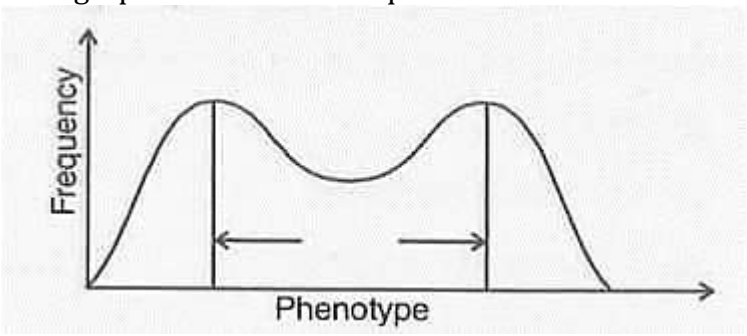
Q8. Name the placental mammals corresponding to the Australian spotted cuscus and Tasmanian tiger cat.

Q9. Differentiate between homology and analogy. Give one example of each.

Q10. What role does an individual organism play as per Darwin`s theory of natural selection?

Long Answer Type Questions:

Q11. Refer the graph and answer the questions that follow:



i. The graph depicts which type of natural selection?
ii. Explain the other two effects/ types of natural selection

Q12. With the help of any two suitable example explain the effect of anthropogenic actions on organic evolution.

Q13. i. List any four evidences of evolution.
ii. How did Darwin explain adaptive radiation? Give another example exhibiting adaptive radiation.

Q14. $p^2 + 2pq + q^2 = 1$. Explain this algebraic equation on the basis of Hardy-Weinberg`s principle.

Q15. Explain the interpretation of Charles Darwin when he observed a variety of small back birds on Galapagos Island.

Chapter 8: Human Health and Diseases

Case Based Questions:

Q1. Read the paragraph given below and answer the questions that follow:
Everyday we are exposed to large number of infectious agents. However, only a few of these exposures result in diseases. Why? This is due to the fact that the body is able to defend itself

from most of these foreign agents. This overall ability of body to fight against disease-causing microorganisms is termed as immunity. Immunity is of two types- Innate and acquired. Innate Immunity is non-specific type of defence that is present since birth. This is accomplished by providing different types of barriers to the entry of the foreign agents into our body. Innate immunity consists of four types of barriers namely – physical, physiological, cellular, cytokine.

i. A skin barrier that protects our body from entering microorganisms is _____.
   a. Cellular b. Physical c. Physiological d. both a and c
ii. When the host is able to fight against disease-causing organisms, then the ability is known as_____.
   a. microbial growth b. immunity c. barriers d. interferons
iii. The two types of cells that acts as cellular barriers to provide innate immunity in humans_____.
   a. Leucocytes and natural killer cells
   b. B-lymphocytes and T- lymphocytes
   c. B-lymphocytes and B-cells
   d. None of the above
iv. Write any one difference between innate and acquired immunity.
v. Expand CMI and AMI.

Objective type questions:

Q2. The substance produced by a cell in viral infection that can protect other cells from further infection is _____.
   a. serotonin b. colostrum c. interferon d. histamine

Q3. Which of the following is not a lymphoid tissue?
   a. spleen b. tonsils c. pancreas d. thymus

Q4. Humoral immunity is associated with_____.
   a. T-cells b. B-cells c. macrophages d. both a and b

Q5. ASSERTION: Some diseases that attack in childhood do not attack again.
REASON: Memory cells play an important role.

Q6. ASSERTION: Skin forms the first line of defence.
REASON: It is a non-specific defence.

Short Answer Type Questions:

Q7. Explain what is meant by metastasis?

Q8. What are lifestyle diseases? How are they caused?

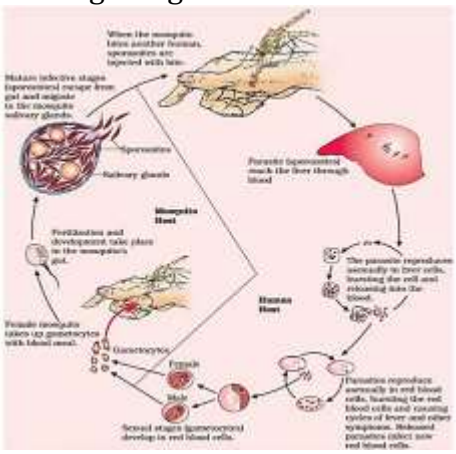
Q9. Indiscriminate diagnostic practices using X-rays, etc., should be avoided. Give one reason.

Q10. Retroviruses have no DNA. However, the DNA of the infected host cell does possess viral DNA. How is it possible?

Q11. Why adolescents are especially advised not to smoke? How do smoking affect the functioning of the body?

Long Answer Type Questions:

Q12. Refer to the diagram given below and answer the questions that follow:



i. The parasite reproduces in human host by which method?
ii. Where does the fertilization and development of parasites take place in human body?
iii. What is the cause of cycles of fever during malaria?

Q13. How is a cancerous cell different from a normal cell? Give three points of differences for each one of them.

Q14. What is the mechanism by which AIDS virus causes deficiency of immune system of the infected person?

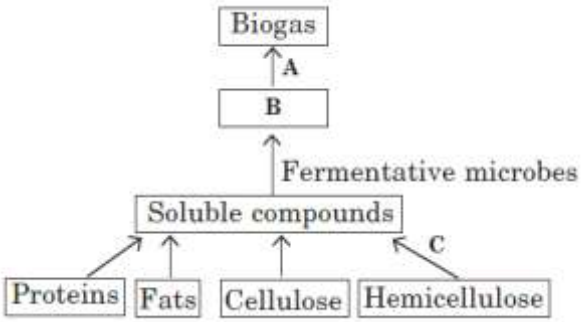
Q15. i. It is generally observed that the children who had suffered from chickenpox in their childhood may not contract the same disease in their adulthood. Explain giving reasons the basis of such an immunity in an individual. Name this kind of immunity.
ii. What are interferons? Mention their role.

Q16. What happens to an individual when a regular dose of drugs/ alcohol is abruptly discontinued? What characteristics manifest in the individual under such a condition?

Chapter 10: Microbes in Human Welfare

Case Based Questions:

Q1. Read the paragraph given below and answer the questions that follow:
Villagers in a place near Chambur started planning to make power supply for agricultural purposes from cow dung. They have started a biogas plant for the purpose. Study the flow chart for biogas production given below.



i. Biogas is composed of majorly _____.
a. methane, CO_2 and O_2
b. CO_2, H_2S and H_2O
c. methane, CO_2 and H_2S
d. H_2S, H and O_2

ii. In the given flow chart, 'A' denotes
a. aerobic bacteria
b. methanogenic bacteria
c. cellulose degrading bacteria
d. yeast and protozoa.

iii. What is represented by 'B' in the flow chart?
a. carbohydrates b. protein polymers c. organic acids d. fat globules

iv. 'C' in the given flow chart causes
a. aerobic breakdown of complex organic compounds
b. anaerobic digestion of complex organic compounds
c. fermentation of organic compounds
d. fermentation of monomers.

v. If 'A' is not added in the procedure
a. methane will not be formed
b. CO_2 will not be formed
c. organic compounds will not be converted to H_2S
d. O_2 will not be formed.

Objective type questions:

Q2. The primary treatment of waste water involves the removal of_____.
a. dissolved impurities
b. stable particles
c. toxic substances
d. harmful bacteria

Q3. Methanogens growing anaerobically on cellulosic material, produce _____.
a. methane gas
b. methane and carbon dioxide
c. methane and hydrogen
d. methane, carbon dioxide and oxygen

Q4. _____ are organisms which enrich the nutrient quality of the soil.
a. pesticides b. fungal hyphae c. biofertilizers d. both a and c

Q5. ASSERTION: Newer antibiotics are required to be produced regularly.
REASON: Pathogens often develop resistance to existing antibiotics.

Q6. ASSERTION: Cyclosporin A is an immunosuppressive medicine.
REASON: It stimulates the activation of T-cells and prevents rejections.

Short Answer Type Questions:

Q7. Explain the consequence if the oxygen availability to activated sludge flocs is reduced.

Q8. Name the microbes that help in the production of the following products commercially.
i. Statin ii. Citric acid iii. Penicillin iv. Butyric acid

Q9. What is the key difference between primary and secondary sewage treatment?

Q10. Name a species of virus used in biological control.

Q11. How does the application of bacteria help to improve agricultural output?

Long Answer Type Questions:

Q12. Determination of Biological Oxygen Demand (BOD) can help in suggesting the quality of a water body. Explain.

Q13. i. How do organic farmers control pests? Give two examples.
ii. State the difference in their approach from that of conventional pest control methods.

Q14. Draw a well labeled diagram of a biogas plant and explain its various components.

Q15. Discuss the role of microbes as biofertilizers in detail.

Q16. Write a note on fermentation of microbes and its applications.

Chapter 11: Biotechnology: Principles and Processes

Case Based Questions:

Q1. Read the paragraph given below and answer the questions that follow:
Restriction endonuclease was isolated for the first time by W. Arber in 1962 in bacteria. Restriction endonucleases cut the DNA duplex at specific points therefore they are also called as molecular scissors or biological scissors. Three types of restriction endonucleases are- Type I, Type II and Type III but only Type II restriction endonucleases are used in Recombinant DNA technology. Restriction endonuclease EcoR I recognizes the base sequence GAATTC in DNA duplex and cut strands between G and A.

i. Only Type II restriction enzymes are used in gene manipulation beacuse _____.
a. ATP is not required for cleaving
b. It consists of three different sub-units
c. It makes cleavage or cut in both strands of DNA molecule
d. Both a and c

ii. Which of the following ions are used by restriction endonucleases for restriction?
a. Mg^{2+} ions b. Mn^{2+} ions c. Na^{+} ions d. K^{+} ions

iii. Restriction endonuclease was isolated for the first time in_____.
a. plant cell b. animal cell c. prokaryotic cell d. germinal cell

iv. Restriction endonuclease are also called molecular or biological scissors due to which of the following reason:
a. they cleave base pairs of DNA only at their terminal ends
b. they cleave one or both the strands of DNA
c. they act only on single strand DNA
d. none of these

v. Select the option that correctly states the working action of restriction endonuclease EcoR I on DNA sequence GAATTC.
a. 5`----GAATTC-------3`
3`----CTTAAG-------5`
b. 5`----GAATTC-------3`
3`----CTTAAG-------5`
c. 5`----GAATTC-------3`
3`----CTTAAG-------5`
d. 5`----GAATTC-------3`
3`----CTTAAG-------5`

Objective type questions:

Q2. The DNA polymerase enzyme used in PCR is obtained from _____.
a. Thermus aquaticus
b. Escherichia coli
c. Agrobacterium tumefaciens
d. Salmonella typhimurium.

Q3. Which of the given statement is correct in the context of observing DNA separated by agarose gel electrophoresis?
a. DNA can be seen in visible light
b. DNA can be seen without staining in visible light
c. Ethidium bromide stained DNA can be seen in visible light
d. Ethidium bromide stained DNA can be seen under exposure to UV light

Q4. The _____ in a vector helps in identifying the transformants and eliminating the non-transformants.
a. selectable marker b. cloning vector c. plasmids d. Taq polymerase

Q5. ASSERTION: Bacteriophage vectors are more advantageous than plasmid vectors.
REASON: Bacteriophage vectors can be easily detected at the time of cloning experiments.

Q6. ASSERTION: DNA fingerprinting involves identifying differences in specific regions of DNA sequence.
REASON: DNA fingerprinting is the basis of paternity testing.

Short Answer Type Questions:

Q7. Define vector in terms of biotechnology.

Q8. Why is plasmid an important tool in biotechnology experiments?

Q9. Describe the role of $CaCl_2$ in the preparation of competent cells.

Q10. Name an enzyme needed for amplification of gene during PCR.

Q11. How are sticky ends formed on a DNA strand?

Long Answer Type Questions:

Q12. What is genetic engineering? List the steps involved in DNA technology.

Q13. Draw a schematic representation of PCR.

Q14. Draw a schematic sketch of pBR322 and label the following in it :
I. Any two restriction sites
II. An antibiotic resistant gene

Q15. What is called molecular glue and why?

Q16. Suggest and describe a technique to obtain multiple copies of a gene of interest in vitro.

Chapter 12: Biotechnology and Its Applications

Case Based Questions:

Q1. Read the paragraph given below and answer the questions that follow:
Plants having foreign genes in their genome through genetic engineering are called transgenic plants. Genes can be incorporated either through a vector or through direct introduction of DNA. Bt cotton is a genetically modified organism which is pest resistant. It contains genes cry I Ac and cry II Ab of *Bacillus thuringiensis*. Bt cotton can resist cotton bollworm and produce higher yields. Cry gene produces cry protein or Bt toxin. Alkaline pHof the insect gut solubilizes the protein crystal, the activated toxin creates pores to the mid guts wall of the insects which cause them to death.

i. Bt cotton crops are -
   a. fungal resistant b. insect resistant
   c. drought resistant d. all of these

ii. Cotton bollworms are killed by the protein encoded by the gene _____.
   a. cry I Ac b. cry I Ab c. cry II Ab d. both a and c

iii. Which of the following is not an advantage of GM crop?
   a.GM plants enhance nutritional value of food.
   b. GM plants are more tolerant to abiotic stresses
   c. GM plants have helped to reduce post harvest losses.
   d. GM plants can cause gene transfer to non-target plant species.

iv. *Bacillus thuringiensis* is a _____.
   a. air borne bacteria b. soil borne bacteria
   c. soil borne fungus d. food borne bacteria

v. Give some other name of transgenic crops. (any two)

Objective type questions:

Q2. Bt cotton is not_____.
   a. A GM plant b. Insect resistant
   c. A bacterial gene expressing system d. Resistant to all pesticides

Q3. The site of production of ADA in the body is _____.
   a. bone marrow b. lymphocytes
   c. blood plasma d. monocytes

Q4. A probe which is a molecule used to locate specific sequences in a mixture of DNA and RNA molecules could be _____.
   a. A single stranded RNA b. A single stranded DNA
   c. Either RNA or DNA d. Can be ssDNA but not ssRNA

Q5. ASSERTION: ELISA is widely used for the detection of infectious diseases like AIDS.
REASON: ELISA is very sensitive and selective test and needs very small amount of reagents.

Q6. ASSERTION: Vaccination is also called preventive inoculation.
REASON: A vaccine prevents the formation of antibodies inside the body.

Short Answer Type Questions:

Q7. Expand GMO. How is it different from a hybrid?

Q8. Can a disease be detected before its symptoms appear? Explain the principle involved.

Q9. Name the first transgenic cow. Which gene was introduced in this cow?

Q10. What is GEAC? What are its objectives?

Q11. Differentiate between antigen and antibody.

Long Answer Type Questions:

Q12. Highlight any four areas where genetic modification of plants has been useful.

Q13. Explain with the help of one example how genetically modified plants can:
i. Reduce usage of chemical pesticides.
ii. Enhance nutritional value of food crops

Q14. Explain the role of biotechnology in therapeutics.

Q15. How is golden rice produced by genetic engineering? Mention its significance.

Q16. What is a transgenic crop? State the advantages of the technique involved in the production of transgenic crop over breeding activities.

Chapter 13: Organisms and Populations

Case Based Questions:

Q1. Read the paragraph given below and answer the questions that follow:
During teaching about various environmental factors, a teacher draw a figure that depicts like history strategies for three plant species (X,Y and Z) along three axes, strength of competition with other organisms, level of disturbance in the habitat and level of environmental stress in the habitat. Species X grows in habitat where competition among species is high but disturbance and stress are low. Species Y grows in habitat with high environmental stress but with low intraspecies competition. Species Z grows in highly disturbed habitats with low environmental stress.

i. Which of the following is correct regarding plant type X ?
   a. It has slow growth rate.
   b. It lives in area with high probability of severe environmental changes.
   c. It has good competitive ability at low population densities near the carrying capacity.
   d. None of these.

ii. Environmental stress occurs through _____.
   a. very low temperature b. drought
   c. nutrient efficiency d. all of these

iii. Select the correct option regarding plant type X, Y and Z.
   a. X type of plants is likely to be trees
   b. Y type of plants could be desert plants
   c. Z type of plants could be herbaceous plants
   d. All of these

iv. Y type of plants grow under high stress and _____.
   a. Produce large number of trees under short time after rains
   b. Have rapid growth
   c. Produce less number of seeds in a long time after rain
   d. Both a and b.

v. Mention the environmental factors affecting the plant type.

Objective type questions:

Q2. Competition results in _____.
   a. Extinction b. mutation
   c. large number of niches d. symbiosis

Q3. Warm-blooded animals of cold climate have small extremities. This was stated by _____.
   a. Bergman b. Gloger
   c. Dollo d. Allen

Q4. In commensalism _____.
   a. both partners are harmed b. weaker partner is benefitted
   c. both partners are benefitted d. none of the partners is benefitted

Q5. ASSERTION: Census is held in India after every ten years.
REASON: Scientific study of population is called demography.

Q6. ASSERTION: Migration is an important factor which determines both population size and population density.
REASON: In migration, a major part of population goes from one area to another area.

Short Answer Type Questions:

Q7. What is an interaction between two species called?

Q8. Very small animals like humming birds are rarely found in Polar Regions. Why?

Q9. What is high altitude sickness? Write its symptoms.

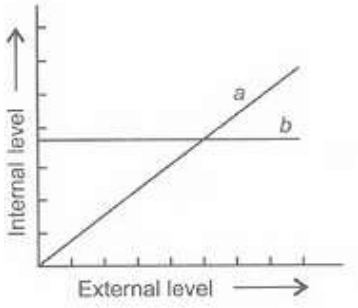
Q10. Construct an age pyramid which reflects an expanding growth status of human population.

Q11. List any for characters that are employed in human population census.

Long Answer Type Questions:

Q12. If 8 individuals in a population of 80 butterflies die in a week, calculate the death rate of population of butterflies during that period.

Q13. The graph given below depicts the organism response to changing external environmental conditions. According to their response, the organisms are grouped into two types.



i. Name the group of organisms, which will show pattern A. Give an example
ii. Name the group of organisms, which will show pattern B. Give an example.
iii. Define homeostasis.

Q14. Draw and explain logistic curve for a population of density (n) at time (t) whose intrinsic rate of natural increase is (r) and carrying capacity is (k).

Q15. How do snails, seeds, bears, zooplanktons, fungi and bacteria adapt to conditions unfavorable for their survival?

Q16. Name the interaction in each of the following.
i. Cuckoo laid her eggs in the crow's nest.
ii. Orchid grows on a mango tree.
iii. Ticks live on the skin of dogs.
iv. Sea anemone is often found in the shells of the hermit crab.
v. Association of Algae and Fungi

Chapter 14: Ecosystem

Objective type questions:

Q1. Which one of the following has the largest population in a food chain?
a. Producers b. Primary consumers
c. Secondary consumers d. Decomposers

Q2. Stability of ecosystem depends upon _____.
a. Primary productivity b. Interchange between producers and consumers
c. Number of producers d. Number of consumers

Q3. Two species occupying same or overlapping area are called _____.
a. Sympatric b. Allopatric
c. Parapatric d. Ring species

Q4. ASSERTION: Minerals have sedimentary cycles.
REASON: Their reservoir is in the earth`s sediment.

Q5. ASSERTION: Ecological succession can turn a lake into a dryland forest with time.
REASON: A bare rock can become a forest through ecological succession.

Short Answer Type Questions:

Q6. Name any two organism which can occupy more than one trophic level in an ecosystem.

Q7. Why nutrient cycles in nature are called biogeochemical cycles?

Q8. Why are oceans least productive?

Q9. Define self-sustainability.

Q10. List the reason responsible for the faster rate of decomposition in the trophics.

Long Answer Type Questions:

Q11. 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."

Q12. i. Describe phosphorous cycle in nature.
ii. Describe pond as a ecosystem.

Q13. What is a biogeochemical cycle? Enumerate and describe any one of them with the help of a suitable diagram.

Q14. What is 10% law? Describe it in relation to transfer of energy in an ecosystem.

Q15. Describe a man-made ecosystem. Why are such ecosystems more efficient?

Chapter 15: Biodiversity and Its Conservation

Case Based Questions:

Q1. Read the paragraph given below and answer the questions that follow:
IUCN maintains a Red Data Book or Red List which is a catalogue of taxa facing risk of extinction. The IUCN Red List (2004) documents the extinction of 784 species in the last 500 years. Some examples of recent extinction include Dodo, Quagga, Thylacine and Steller`s Sea cow. The last twenty years alone have witnessed the disappearance of 27 species. Red List has eight categories of species.

i. Dodo, an extinct taxon, belongs to which country?
a. Mauritius b. Africa
c. Australia d. Russia

ii. To which of the following categories of IUCN *Berberis nilghiriensis* belongs?
a. Extinct b. extinct in wild
c. Endangered d. Critically endangered

iii. Steller`s Sea Cow and Passenger Pigeon became extinct due to_____.
a. Alien species invasion b. over-exploitation
c. Coextinctions d. Intensive agriculture

iv. Bali, Javan and Caspian are _____.
a. species of tiger b. species of cheetah
c. subspecies of tiger d. subspecies of cheetah

v. IUCN stands for _____.
a. International Union for Conservation of Nature
b. International Union for Conservation of Naturalist
c. International Union for Conservation of Nature and Wild life
d. None of the Above

Objective type questions:

Q2. Which of the following is not done in a wildlife sanctuary?
a. Fauna is conserved
b. Flora is conserved
c. both a and b
d. none of the above

Q3. Which one of the following is not a major characteristic feature of biodiversity hotspots?
a. Large number of species b. Abundance of endemic species
c. Large number of exotic species d. Destruction of habitat

Q4. Which of the following group of plants exhibit more species diversity?
a. Angiosperms b. Algae
c. Fungi d. Bryophytes

Q5. ASSERTION: Improvement cutting is an important practice in forest management.
REASON: It provides space for growing new healthy trees.

Q6. ASSERTION: Genetic diversity within species increases with the increase in habitat variations.
REASON: It is essential for adaptation to varied environments.

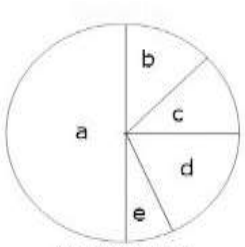
Short Answer Type Questions:

Q7. What accounts for greater ecological diversity of India?

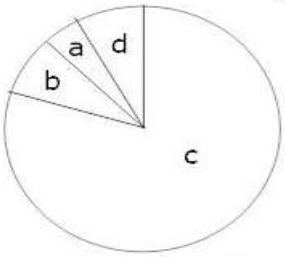
Q8. What is Red Data Book?

Q9. How is species diversity differ from ecological diversity?

Q10. Given below are the representation of global diversity of invertebrates & vertebrates.



Vertebrates



Invertebrates

Mention the class of organism which belongs to each group in this representation.

Q11. List the important attributes of a stable community?

Long Answer Type Questions:

Q12. What do you mean by latitudinal gradient? What could be the possible reasons for diversity between tropic & temperate region?

Q13. The Amazon rain forest is referred to as the lungs of the planet. Mention any one human activity which causes loss of biodiversity in this region.

Q14. Alien species are highly invasive and are threat to indigenous species. Substantiate this statement with any 3 examples.

Q15. Name the type of biodiversity represented by the following.
a. 5000 different strains of rice in India.
b. Estuaries and alpine meadows in India.

Q16. What is the relation between species richness & area? What is the significance of slope of regression?