CBSE
Class XII Biology
Sample Paper – 1

Time: 3 Hours **Total Marks: 70**

General Instructions:

(i) All questions are compulsory.

(ii) The question paper has four sections: Section A, Section B, Section C and Section D. There are 33 questions in the question paper.

(iii) Section A 14 questions of 1 mark each and 02 case-based questions. Section B has 9 questions of 2 marks each. Section C has 5 questions of 3 marks each. Section D has 3 questions of 5 marks each.

(iv) There is no overall choice in the question paper. However, internal choices are provided in some questions. A student has to attempt only one of the alternatives in such questions.

(v) Wherever necessary, neat and properly labelled diagrams should be drawn.

Section A

1. Name the gland that secretes FSH. [1]

2. What is the significance of amniocentesis? [1]

3. What is the fate of secondary nucleus after fertilization? [1]

4. State the function of exine in the pollen grain. [1]

5. At which particular stage of chromosomes do errors like deletion of genes occur in an individual? [1]

6. In which part of the cell does the translation occur? [1]

7. Name the protein found in the DNA. Also mention the charge on it. [1]

8. Expand GEAC and ELISA. [1]

9. What type of cut ends are formed when both the strands of DNA is cleaved at exactly the same nucleotide position? [1]

10. What is the cause of altitude sickness at high altitudes? [1]

11. **Assertion:** In a person with AB blood group, the erythrocytes carry both A and B antigens on their surface. [1]

Reason: The alleles I^A and I^B, which produce AB blood group, are codominant and both are expressed.

a. Both assertion and reason are true, and reason is the correct explanation of the assertion.

b. Both assertion and reason are true, and reason is not the correct explanation of the assertion.

c. Assertion is true but reason is false.

d. Both assertion and reason are false.

OR

Assertion: Adenine cannot pair with cytosine.

Reason: Adenine and cytosine do not have a perfect match between hydrogen donor and hydrogen acceptor sites.

a. Both assertion and reason are true, and reason is the correct explanation of the assertion.
b. Both assertion and reason are true, and reason is not the correct explanation of the assertion.
c. Assertion is true but reason is false.
d. Both assertion and reason are false.

12. **Assertion:** The cut pieces of DNA are linked with plasmid DNA. [1]

Reason: Plasmid DNA fails to act as vectors.

a. Both assertion and reason are true, and reason is the correct explanation of the assertion.
b. Both assertion and reason are true, and reason is not the correct explanation of the assertion.
c. Assertion is true but reason is false.
d. Both assertion and reason are false.

13. **Assertion:** Chamaeleon can change its colour. [1]

Reason: It is a fashionable animal.

a. Both assertion and reason are true, and reason is the correct explanation of the assertion.
b. Both assertion and reason are true, and reason is not the correct explanation of the assertion.
c. Assertion is true but reason is false.
d. Both assertion and reason are false.

14. **Assertion:** Habitat loss and fragmentation cause driving animals and plants to extinction. [1]

Reason: The most dramatic examples of habitat loss come from tropical rain forests.

a. Both assertion and reason are true, and reason is the correct explanation of the assertion.
b. Both assertion and reason are true, and reason is not the correct explanation of the assertion.
c. Assertion is true but reason is false.
d. Both assertion and reason are false.

15. *Read the following and answer any four questions from 15 (i) to 15 (v) given below:* [4]

The use of drugs and alcohol has been on the rise especially among the youth according to the latest surveys and statistics. This has become a cause of concern as it could result in many harmful effects. Proper education and guidance would enable youth to safeguard themselves against these dangerous behaviour patterns and follow healthy lifestyles.

There are many drugs, which are commonly abused are opioids, cannabinoids and coca alkaloids. Majority of these are obtained from flowering plants. However, some are obtained from fungi too.

(i) Natural cannabinoids are obtained from the inflorescences of the plant:
   a. *Cannabis sativa*
   b. *Erythroxylum coca*
   c. *Atropa*
   d. *Belladonna*

(ii) Which of the following is the main component of opium?
   a. Heroin
   b. Morphine
   c. Methadone
   d. Codeine

(iii) Which of the following is a white, crystalline powder obtained from the acetylation of morphine?
   a. Heroin
   b. Morphine
   c. Methadone
   d. Codeine

(iv) Drugs like barbiturates, amphetamines, benzodiazepines, lysergic acid diethyl amides (LSD), and other similar drugs, that are normally used as medicines to help patients cope with
   a. Digestive disorders
   b. Heart ailments
   c. Mental illness
   d. Urinary infection

(v) **Assertion:** Tobacco has been used by human beings for more than 400 years.
   Reason: It is smoked, chewed or used as a snuff.

a. Both assertion and reason are true, and reason is the correct explanation of the assertion.
b. Both assertion and reason are true, and reason is not the correct explanation of the assertion.
c. Assertion is true but reason is false.
d. Both assertion and reason are false.

16. *Read the following and answer any four questions from 16 (i) to 16 (v) given below:* [4]

Haemophilia is sex linked recessive disease, which shows its transmission from unaffected carrier female to some of the male progeny has been widely studied. In this disease, a single protein that is a part of the cascade of proteins involved in the clotting of blood is affected. Due to this, in an affected individual a simple cut will result in non-stop bleeding.

The heterozygous female (carrier) for haemophilia may transmit the disease to sons. The possibility of a female becoming a haemophilic is extremely rare because mother of such a female has to be at least carrier and the father should be haemophilic.

(i) The _____ for haemophilia may transmit the disease to sons.
a. heterozygous female
b. homozygous female
c. heterozygous male
d. None of these

(ii) Which of the following diseases could be avoided by analysing the pedigree of the parents?
a. Amoebiasis
b. Klinefelter's syndrome
c. Haemophilia
d. Poliomyelitis

(iii) Why do generally human males suffer from haemophilia?
a. Men possess single X chromosome
b. Men possess single Y chromosome
c. Men possess two Y chromosomes
d. Men possess two XX chromosomes

(iv) In _____, an affected individual a simple cut will result in non-stop bleeding.
a. Sickle cell anaemia
b. Phenylketonuria
c. Down's syndrome
d. Haemophilia

(v) The possibility of a female becoming a haemophilic is extremely rare. What condition/s makes a female child haemophilic?

a. Father should be normal and mother should be haemophilic.
b. Father should be haemophilic and mother should be a carrier.
c. Mother should be normal and father should be haemophilic.
d. Both father and mother should be normal.

Section B

17. How is *Bryophyllum* cultivated? [2]

18. What will be the genotypes of the parents if the offspring had phenotypes in the following proportion? [2]

(a) 9:3:3:1
(b) 1:1:1:1 (use the symbols Aa and Bb)

19. Name any two species of fungus which are used in the production of antibiotics. [2]

20. Explain any two methods of vectorless gene transfer. [2]

OR

How has recombinant technology helped in large scale production of vaccines? Explain giving one example.

21. Bacillus thuringiensis produces insecticidal protein. Why does this toxin not kill Bacillus? [2]

22. Before integrating DNA with bacterial plasmid, bacterial cells are treated with calcium. Why? [2]

OR

Name the vectors and enzymes used in recombinant DNA technology.

23. What is IUCN Red List? Give its main aim. [2]

24. Name and explain the type of interaction between big trees and certain species of wasps. [2]

25. What is parasitism? Give an example. [2]

Section C

26. Differentiate between spermatocytes and oocytes. [3]

27. During his studies on genes in Drosophila which were sex-linked, T. H. Morgan found that F_2-population phenotypic ratios deviated from the expected 9:3:3:1. Explain the conclusion he arrived at. [3]

28. List some symptoms of drug addicts. [3]

29. How does the RNA interface help in developing resistance in tobacco plant against nematode infection? [3]

30. What are positive interactions in a biotic community? Give their kinds. Explain any one of them. [3]

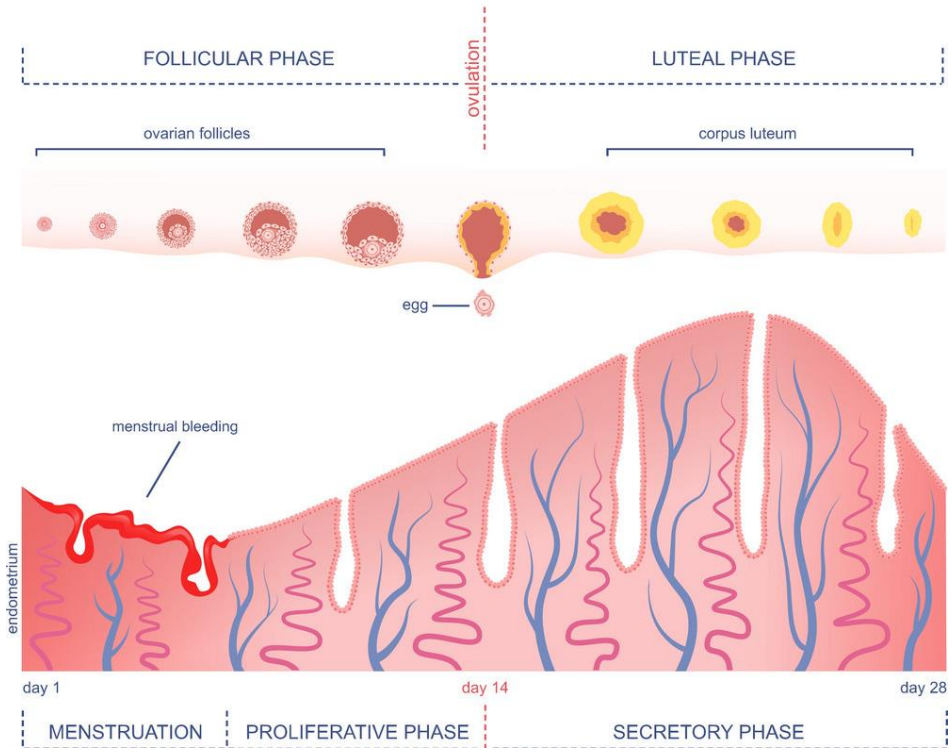
Section D

31.

(a) With reference to the below schematic representation of menstrual cycle answer the following questions: [5]

(i) What is proliferative phase? For how many days does it last?

(ii) What changes occur in uterus during menstruation?



(b) Name any two copper-releasing IUDs.

(c) Explain how they act as effective contraceptives in human females.

OR

Write the function of the following: [5]

(a) Corpus luteum

(b) Endometrium

(c) Acrosome

(d) Sperm tail

(e) Fimbriae

32. [5]

(i) A phenomena in which more than two alleles exist at a given locus of a chromosome in individuals. Mention the name of the phenomena and explain with the help of an example.

(ii) What is codominance? Which blood group is an example of codominance?

OR

Explain the structure of transfer RNA. What are its main sites? Also, draw its diagram to show its sites.

33. In agriculture, there is a method of controlling pests that relies on natural predation rather than introduced chemicals. [5]

(i) What any two advantages of Biological control over chemical control?

(ii) Why are chemical pesticides not preferred by the farmers in controlling pests?

(iii) Name the main sources of biofertilizers.

(iv) What are biofertilizers?

(v) Name the two elements which are made available of biofertilizers.

OR

(a) Name the stage of *Plasmodium* which gains entry into the human body.

(b) Trace the stages of *Plasmodium* in the body of female *Anopheles* after its entry.

(a) Explain the cause of periodic recurrence of chill and high fever during malarial attack in humans.

CBSE

Class XII Biology

Sample Paper - 1 (Solution)

Time: 3hrs **Total Marks: 70**

Section A

1. Gonadotropin releasing hormone (GnRH) acts at the anterior pituitary gland and stimulates the secretion of two gonadotropins – luteinising hormone (LH) and follicle stimulating hormone (FSH). Hence, FSH is secreted by anterior pituitary.

2. Amniocentesis is a technique by which any chromosomal anomalies in the foetus can be detected.

3. The secondary nucleus after fertilization forms the endosperm.

4. Exine is made up of complex substance which is most resistant to biological materials and helps in fossilization of pollen grains.

5. Deletion of genes can occur in an individual at crossing-over stage of chromosomes.

6. It occurs in the cytoplasm.

7. Histone. It is positively charged.

8. GEAC – Genetic Engineering Approval Committee

ELISA – Enzyme Linked Immunosorbent Assay.

9. Blunt or flush ends.

10. It is due to the low atmospheric pressure of high altitudes that the body is unable to get enough oxygen.

11. A; Both assertion and reason are true, and reason is the correct explanation of the assertion. In ABO blood group system, a person with AB blood group, the erythrocytes carry both A and B antigens on their surface, that is. the alleles I^A and I^B, that produce AB blood group, are codominant and both are expressed. The heterozygote (IAIB) expresses the characteristics of both A and B antigens.

OR

A; Both assertion and reason are true, and reason is the correct explanation of the assertion. Adenine cannot pair with cytosine as forms two hydrogen bonds with Thymine. Adenine Similarly, Guanine is bonded with Cytosine with three H-bonds. So, adenine and cytosine do not have a perfect match between hydrogen donor and hydrogen acceptor sites.

12. C; Assertion is true but reason is false. The restriction enzymes cut the piece of DNA and was then linked with the plasmid DNA. These plasmid DNA act as vectors to transfer the piece of DNA attached to it.

13. C; Assertion is true but reason is false. Chameleon can rapidly change its colour by adjusting a layer of special cells nestled within their skin. It is not a fashionable animal.

14. B; Both assertion and reason are true, and reason is not the correct explanation of the assertion. Habitat loss and fragmentation is the most important cause driving animals and plants to extinction. The most dramatic examples of habitat loss come from tropical rain forests as it once covered more than 14 per cent of the earth's land surface, but now these rain forests cover no more than 6 per cent.

15.

(i) a; Natural cannabinoids are obtained from the inflorescences of the plant Cannabis sativa.

(ii) b; Morphine is the main component of opium.

(iii) a; Heroin is a white, odourless, bitter crystalline powder obtained from the acetylation of morphine.

(iv) c; Drugs like barbiturates, amphetamines, benzodiazepines, lysergic acid diethyl amides (LSD) are normally used as medicines to help patients cope with mental illnesses like depression and insomnia.

(v) b; Both assertion and reason are true, and reason is not the correct explanation of the assertion. Tobacco has been used by human beings for more than 400 years. It is smoked, chewed or used as a snuff and contains a large number of chemical substances including nicotine, an alkaloid. Nicotine stimulates adrenal gland to release adrenaline and nor-adrenaline into blood circulation, both of which raise blood pressure and increase heart rate.

16.

(i) a; The heterozygous female (carrier) for haemophilia may transmit the disease to sons.

(ii) c; Haemophilia could be avoided by analysing the pedigree of the parents.

(iii) a; Men possess single X chromosome so presence of a single recessive gene on it makes a person haemophilic.

(iv) d; In Haemophilia, an affected individual a simple cut will result in non-stop bleeding.

(v) b; The possibility of a female becoming a haemophilic is extremely rare because mother of such a female has to be at least carrier and the father should be haemophilic.

Section B

17. The margins of the green leaf of Bryophyllum has notches bearing buds. The plantlets develop from these buds in the notches which develop into independent plants when they are detached and grown in moist ground.

18.

(a) Because the ratio of the offspring is 9:3:3:1, it reveals the law of independent assortment of genes. The genotype of the parents will be Aa Bb and Aa Bb.

(b) Because the ratio of the offspring is 1:1:1:1, it exhibits the ratio of a test cross where one of the parents will be recessive. So, the genotype of the parents will be AaBb × aabb.

19.

(i) *Penicillium notatum.*

(ii) *Trichoderma polysporum.*

20. The two methods of vectorless gene transfer are as below:

(i) Microinjection: The technique of introducing foreign DNA into a target cell by injecting the DNA directly into the nucleus with the help of a micro-needle is called micro-injection.

(ii) Electroporation: The process in which transient holes are produced in the plasma membrane of the target cell to incorporate foreign DNA is called electroporation.

OR

Recombinant technology has allowed the production of antigenic peptides of the pathogen in other microbes like yeast and bacteria. For example, Hepatitis B vaccine is produced using yeast cell.

21. The insecticidal protein (Bt toxin) exists as an inactive protoxin. When an insect ingests the inactive toxin, it is converted to an active form of toxin because of the alkaline pH of the gut which solubilises the crystals of the protein. Thus, this toxin does not kill *Bacillus*.

22. DNA is a hydrophilic molecule which cannot pass through the cell membrane, so to make it competent to take up DNA, bacterial cells should be treated with divalent cations or calcium so that DNA can enter through the pores of cell wall.

OR

(a) Enzymes used in recombinant DNA technology are
(i) Restriction endonuclease which cut DNA into short pieces.
(ii) DNA ligase which joins segments of DNA.
(b) Vectors used in this technique are Plasmids and Viruses (phages).

23. IUCN Red List is a catalogue of taxa that are facing the risk of extinction. Its main aim is to give information about the urgency and scale of conservation problems to the public and policy makers.

24. Mutualism exists between big trees and certain species of wasps. Certain wasps pollinate fig by laying eggs in their inflorescence. Fig plants in return offer some of its seeds as food for developing larvae of wasps.

25. Parasitism: It is a type of interaction in which one species is benefitted and the other species is harmed. Example: Malarial parasite inside the female Anopheles mosquito causes malaria in humans.

Section C

26. Differences between spermatocytes and oocytes:

Spermatocytes	**Oocytes**
These are formed when the spermatogonia in the seminiferous tubules of the testes divide mitotically. Each spermatogonium undergoes mitosis and forms two primary spermatocytes.	These are formed in the Graafian follicles of the ovary. Each maturing Graafian follicle contains a diploid primary oocyte at its centre.
Each primary spermatocyte undergoes meiosis I and forms two haploid secondary spermatocytes.	Each primary oocyte undergoes meiosis I and forms two haploid cells- secondary oocyte and small polar body.
The secondary spermatocytes undergo meiosis II and form haploid spermatids.	The secondary oocyte undergoes meiosis II and forms one ovum and polar body.

27.

(a) Genes on the same chromosomes are closely associated and are called linked genes. He discovered the process of linkage. The genes could be far apart.

(b) When genes are linked, the percentage of the parental combination is higher than recombinants.

(c) When genes are not linked or loosely linked or far apart, the percentage of the parental combination is less than the recombinants.

28. Symptoms of drug addictions:

(a) Drowsiness, disturbances in sleep, pale looking eyes, irritation and undue excitement.

(b) Lack of interest in studies and work, increasing demand for money and socially inactive.

(c) Loss of weight and appetite, poor memory, weakness and always looking tired.

29. A nematode (*Meloidogyne incognita*) infects the roots of tobacco plants and affects its yield. So, to prevent this infestation, the RNA interference (RNAi) process is adopted. Using *Agrobacterium* vectors, nematode-specific genes were introduced into the host plant. The introduction of DNA produces sense and antisense RNA in the host cells. These two RNAs, being complementary to each other, form a double-stranded RNA which binds to and prevents the translation of mRNA (silencing) of the nematode. The parasite will not survive in a transgenic host expressing specific interfering RNA. The transgenic plant therefore gets itself protected from the parasite.

30. Positive interactions or beneficial interactions are population interactions in which one or both participating species are benefited. These include scavenging, commensalism, protocooperation, mutualism and interdependence of plants and animals. Mutualism is the relationship between two organisms where both are benefited for food, shelter and substratum for attachment. It may or may not involve close physical association between the individuals of pairs of species. It is a functional association, not merely of living together. It may be obligate, i.e. the species are completely dependent on each other, or facultative, i.e. one species may survive even in the absence of the partner species.

Example: Mycorrhiza is the mutualistic relationship between fungi and the roots of higher plants. The fungi help in the mineral nutrition of the plant with which they are associated and in turn obtain carbohydrates from the plant.

Section D

31. (a)

(i) Proliferative phase is the phase of repair and proliferation. During this phase, endometrium regenerates and enlarges, and uterine glands become corkscrew shaped. The uterine movements increase, and the epithelium of fallopian tube become thicker and its ciliary movements increase. Estrogen hormone from the ovary is secreted under the influence of FSH by the anterior pituitary.
This phase extends from the end of menstruation and lasts for about 10 days.

(ii) Changes in uterus during menstruation: Endometrial lining and uterine epithelium glands are sloughed off. Bleeding occurs due to rupture of blood vessels.

(b) The copper-releasing IUDs are Multiload 375 and CuT.

(c) IUDs increase phagocytosis of sperms in the uterus and copper ions released suppress sperm motility and their ability to fertilise the ovum.

OR

(a) Corpus luteum: It secretes progesterone hormone which inhibits the production of gonadotropin hormone from the pituitary. This prevents the sloughing off of the uterine lining and supports pregnancy.

(b) Endometrium: It provides a place for the implantation of the fertilised ovum. If fertilisation fails to occur, then the endometrium lining sloughs off, leading to menstrual flow.

(c) Acrosome: The acrosome carries the sperm lysin which facilitates the sperm to penetrate the ovum during fertilisation.

(d) Sperm tail: It provides mobility to the sperm with the head forward in the fluid medium.

(e) Fimbriae: It increases the surface area for catching ovum during ovulation.

32.

(i) Multiple allelism is a phenomena that occurs when more than two alleles exist at a given locus of a chromosome and in a given individual, only two of these alleles occur, one derived from each parent.
Example – ABO blood types in humans is an example of multiple allelism where alleles I^A, I^B and i produces four phenotypes (A, B, AB and O) of blood groups. In an individual, any two different alleles out of many (I^A, I^B and i) or the same allele in duplicate are present to represent any blood group.

(ii) When both alleles of a pair are fully expressed in a heterozygote, the genes and trait are said to be codominant. This phenomena is called codominance.

(iii) A person of blood group AB is an example of codominance where alleles I^A for A-type blood is codominant with its allele I^B for B-type blood group. The heterozygote (IAIB) expresses the characteristics of both A and B antigens.

OR

Structure of transfer RNA:

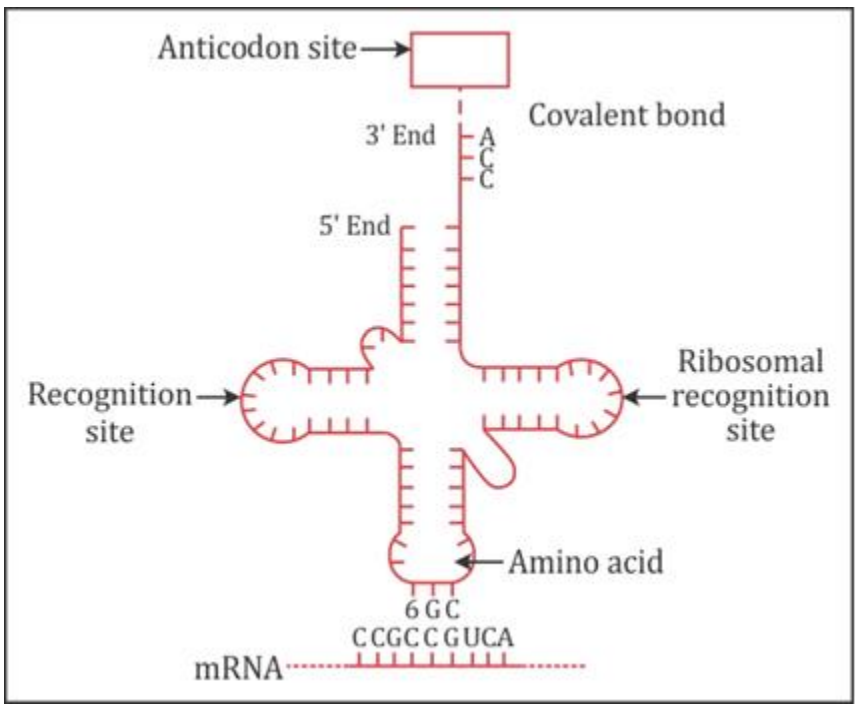
It is soluble RNA and constitutes 10–12% of the total RNA in the cell cytoplasm. It has four main sites:

(i) Amino acid binding site (tail): The 3′ end of the molecule carries a specific amino acid with the CCA base sequence having –OH at the tip. This site is responsible for the attachment of the activated amino acid with its free –OH group and COOH of the amino acid.

(ii) Recognition site or dihydrouridine loop (DHU): It contains a specific base sequence and charging enzymes which catalyse the attachment of the correct amino acid to the t-RNA molecule.

(iii) Anti-codon site: It contains three unpaired ribonucleotides complementary with the codon on mRNA. It determines the correct pairing of t-RNA with the specific codon on mRNA.

(iv) Ribosome recognition site (TψC): It is meant for binding the t-RNA with the ribosome. It is made of seven nucleotides and is overlapped on the DHU loop, thus t-RNA appears L-shaped in a 3-D structure.



33.

(i) Advantages of Biological control over chemical control:
   a. Biological control is self-perpetuating and no manufacturing is required for the synthesis of pathogen or beneficial organisms.
   b. The pests are unable to develop resistance against the pathogens of biological control.

(ii) Chemical pesticides are not preferred by the farmers in controlling pests because:
   a. Their production pollutes the environment.
   b. Most of the chemical pesticide are washed away with the rain water and pollute the soil and water resources.

(iii) The main sources of biofertilizers are bacteria, fungi and cyanobacteria.

(iv) Biofertilizers are the organisms which can bring about soil nutrient enrichment.

(v) Nitrogen and phosphorous are added to the soil by biofertilizers.

OR

(a) Plasmodium enters a human body at the sporozoite stage through the bite of an infected female Anopheles mosquito.

(b) Life Cycle of Plasmodium:
   (i) Plasmodium sporozoites enter the human body through the bite of a female Anopheles mosquito.
   (ii) First, the parasites undergo asexual reproduction when they enter the liver cells and then attack the RBCs resulting in their rupture.
   (iii) The rupture of RBCs produces a toxic element called haemozoin which is responsible for the chill and high fever for 3–4 days.
   (iv) When a female Anopheles mosquito bites an infected person, the parasites enter the mosquito's body and multiply forming the sporozoites which multiply sexually.
   (v) These sporozoites are stored in the salivary glands of the mosquito and are released when a healthy person is bitten by this mosquito.
   (vi) When these mosquitoes bite a human, the sporozoites are introduced into the body of the human. Thus, plasmodium requires two hosts—man and mosquito—to complete its life cycle. The female Anopheles mosquito acts as the vector.

(c) Haemozoin is a toxic element released when RBCs get ruptured. This is responsible for the chill and high fever for 3–4 days.