2 MARKS EACH

1. a. Name the nematode that infests and damages tobacco roots.
   b. How tobacco plant is made resistant to the attack of a nematode?
2. Name the source from which insulin was extracted earlier. Why is this insulin no more in use by diabetic patients?
3. a. Name the deficiency for which the first clinical gene therapy was given.
   b. Mention the cause of this disease.
4. a. Mention the chemical change that pro insulin undergoes, to be able to act as mature insulin.
   b. How insulin prepared by Eli lily was different from that produced in the human body?
5. What are the two limitations of agrochemical based farming?
6. Why does Bt toxin not kill the bacterium that produces it, but kill insects that ingest it?
7. Explain RNAi.
8. State the principle on which ELISA technique is based. How does it help in early detection of a disease?
9. Transgenic animals are developed to obtain biological products. Name any two such products.
10. With one example of each give one difference between therapeutic and diagnostic.

3 MARKS EACH

1. List three critical research areas of biotechnology.
2. In the year 1983 Eli lily first prepared human insulin synthetically using biotechnology. Explain the process used by them to get human insulin.
3. What are the main advantages of producing genetically engineered insulin?
4. A multinational company outside tried to sell new varieties of turmeric without proper patent rights. What is such an act referred to? Define it. State the initiative taken by the Indian Parliament against it.
5. What are responsibilities GEAC, set up by the Indian Government?
6. What is a GMO? List five ways in which GM plants have been useful.
7. What are transgenic animals? What are the reasons for which these animals produced? Explain with examples.
8. 'Plasmid is a boon to biotechnology'. Justify this statement quoting the production at least two products of human use .
9. (a) Name the deficiency for which first clinical gene therapy was given.
   (b) Mention the causes of and one cure for the deficiency of insulin .
10. Name the genes responsible for making Bt cotton plants resistant to bollworm attack. How do such plants attain resistance against bollworm attacks? Explain.

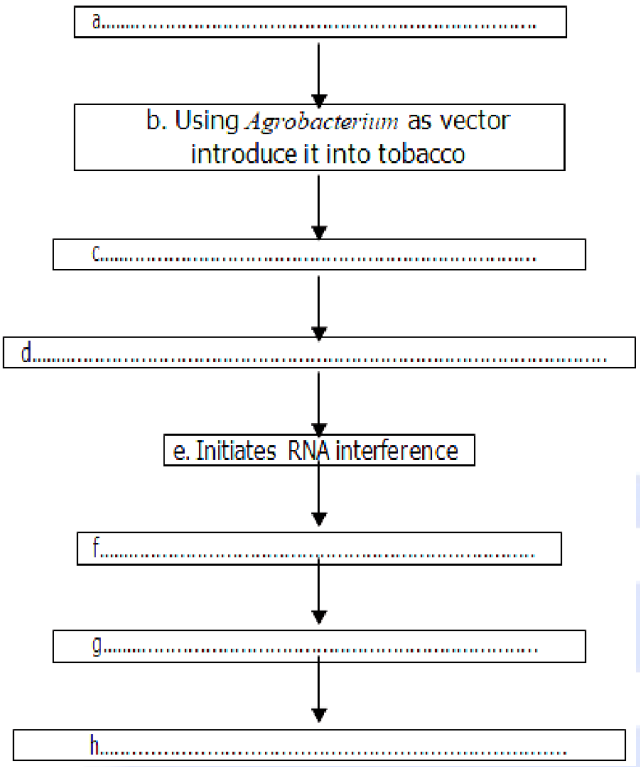
5 MARKS EACH

1. A method to present infestation of a nematode Meloidegyne incognitia on roots of tobacco is silencing the specific mRNA. What is the scientific name of the technique? How is this performed by ds- RNA?

2. A two years old baby is deficient in his immune system since birth. His father was told that this was due to an enzyme deficiency which is crucial for the immune system to function.
   a) Name the enzyme
   b) The cause of its deficiency
   c) The cure of the disease?
3. (a) Why are transgenic animals so called?
   (b) Explain the role of transgenic animals in (i) Vaccine safety and (ii) Biological products with the help of an example each.

5 MARKS EACH

1. a. What is the difference between cry and Cry?
   b. Which gene of B.thuringiensis will be used against cotton bollworms?
   c. Which insect would be killed by a plant with a cry IAb gene?
2. a. Expand ELISA
   b. What is its principle?
   c. Name a disease for which this technique can be used.
3. a. What is meant by ADA deficiency?
   b. How is gene therapy a solution to this problem?
   c. Why is it not a permanent cure?
4. a. Name two conventional methods of diagnosis.
   b. What is the limitation of such methods?
   c. How one can detect the presence of pathogens present in a very low amount?
5. Name the following
   a. The human protein used to treat emphysema.
   b. First transgenic cow.
   c. The vaccine developed using transgenic mice.
   d. What is a recombinant DNA vaccine? Give two examples.
6. Two of the steps involved in producing nematode resistance tobacco plants based on the process of RNAi are mentioned below. Write the missing steps in its proper sequence.



7. One of the main objectives of biotechnology is to minimise the use of insecticides on cultivated crops. Explain with the help of a suitable example how insect resistant crops have been developed using techniques of biotechnology.