



BIOLOGY

BOOKS - MODERN PUBLISHERS

BIOLOGY (HINGLISH)

BIOTECHNOLOGY AND ITS APPLICATIONS

Practice Problems

1. What is protoplast?



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2. What are DNA vaccines ?



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3. Why is sickle cell anaemia called molecular disease ?



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4. What is Retrovirus ? Give an example



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5. What is a vector?



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6. What is meant by Golden Rice ? In what way it is different from normal rice ?



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7. What is second green revolutions?



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8. What is embryonic stem cell technology?



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9. Name the Human protein , which is used to treat emphysema .



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10. Write the names of any two Indian traditional medicines .



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11. What is patent ?



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12. Why biopiracy should be checked ?



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13. What is bioremediation?



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Ncert File Exercise Questions

1. Crystals of Bt toxin produced by some bacteria do not kill the bacteria themselves because



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2. What are transgenic bacteria ? Illustrate using any one example



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3. Compare and contrast the advantages and disadvantages of production of genetically modified crops.



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4. What are Cry proteins? Name an organism that produces it. How has man exploited this protein to his benefit?



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5. What is gene therapy? Illustrate using the example of ADA deficiency



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6. Diagrammatically represent the experimental steps in cloning and expressing a human gene (say the gene for growth hormone) into a bacterium like E. coli?



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7. Can you suggest a method to remove oil (hydrocarbon) from seeds based on your understanding of rDNA technology and chemistry of oil?



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8. Find out from internet what is golden rice.



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9. Does our blood have proteases and nucleases?



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10. Consult internet and find out how to make orally active protein pharmaceutical. What is the major problem to be encountered?



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1. Bt cotton is not

- A. A GM plants
- B. Insect resistant
- C. A bacterial gene expressing system
- D. Resistance to all pesticides

Answer: D



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2. C-peptide of human insulin is

A. A part of mature insulin molecules

B. Responsible of formation of disulphide
briges

C. Removed during maturation of pro -
insulin to insulin

D. Responsible for its biological activity.

Answer: C





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3. GEAC stands for

- A. Genome Engineering Action Committee
- B. Ground Environment Action Committee
- C. Genetic Engineering Approval committee
- D. Genetic and Environment Approval
Committee

Answer: C



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4. $\alpha - 1$ antitrypsin is

A. An antacid

B. An enzyme

C. Used to treat arthritis

D. used to treat emphysema

Answer: D



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5. A probe which is a molecule used to locate specific sequence in a mixture of DNA or RNA molecules could be

- A. A single stranded RNA
- B. A single stranded DNA
- C. Either RNA or DNA
- D. Can be ss DNA but not ss RNA

Answer: C



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6. Choose the correct option regarding retrovirus

A. An RNA virus that can synthesise DNA during infection.

B. A DNA virus that can synthesise RNA during infection .

C. A ss DNA virus

D. A deRNA virus

Answer: A





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7. The site of ADA production in the body is

- A. neutrophils
- B. Lymphocytes
- C. Blood plasma
- D. Monocytes

Answer: B



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8. A protoxin is:

A. A primitive toxin

B. A denatured by protozoa

C. Toxin produced by protozoa

D. Inactive toxin

Answer: D



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9. Pathophysiology is the

- A. Study of physiology of pathogen
- B. Study of normal physiology of host
- C. Study of altered physiology of host
- D. None of the above

Answer: C



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10. The trigger for activation of toxin of *Bacillus thuringiensis* is

A. Acidic pH of stomach

B. High temperatur

C. Alkaline pH of gut

D. Mechanical action in the insect gut

Answer: C



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11. Golden rice is

- A. A variety of rice grown along the yellow river in China
- B. Long stored rice having yellow colour tint
- C. A transgenic rice having gene for B-carotene
- D. Wild variety of rice with yellow coloured grains

Answer: C



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12. In RNAi, genes are silenced using

A. ss DNA

B. ds DNA

C. ds RNA

D. ss RNA

Answer: C



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13. The first clinical gene therapy was done for the treatment of

A. AIDS

B. Cancer

C. Cystic fibrosis

D. SCID (Severe Combined Immuno
Deficiency resulting form deficiency of
ADA)

Answer: D



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14. ADA is an enzyme which is deficient in a genetic disorder SCID. What is the full form of ADA ?

- A. Adenosine deoxyaminase
- B. Adenosine deaminase
- C. Aspartate deaminase
- D. Arginine deaminase

Answer: B



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15. Silencing of a gene could be achieved through the use of

A. short interfering RNA (RNAi)

B. antisense RNA

C. By both

D. None of the above

Answer: C



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Ncert Exemplar Problems Very Short Answer Type 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..



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



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3. Differentiate between diagnostics and therapeutics, Give one example and for each category.



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4. Give full form of ELISA what disease can be detected using it?



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



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6. Write a short note on biopiracy highlighting the exploitation of developing countries by the developed countries.



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7. Many proteins are secreted in their inactive form . This is also true to may toxic proteins produced by microorganisms. Explain how the mechanism is useful for the organism producing the toxin ?





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8. While creating genetically modified organisms. Genetic barriers are not respected. How can this can be dangerous in the long run?



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9. Why has the Indian parliament cleared the second amendment of the country's patents bill?



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10. Give any two reasons why the patent on Basmati should not have gone to an American company.



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11. How was insulin obtained before the advent of rDNA technology? What were the problems encountered?



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12. With respect to understanding diseases, discuss the importance of transgenic animal models.



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



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14. PCR is a useful tool for early diagnosis of an infectious disease. Elaborate.



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15. What is GEAC and what are its objectives?



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16. For which variety of Indian rice, the patent was filled by a USA company?



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17. Discuss the advantages of GMO.



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Ncert Exemplar Problems Short Answer Type Questions

1. Gene expression can be controlled with the help of RNA. Explain the method with an example.



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2. Ignoring our traditional. Knowledge can be prove costly in the area of biological patenting. Justify.



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



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4. What is a recombinant DNA vaccine? Give two examples.



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5. Why is it that the line of treatment for a genetic disease is different from infectious diseases?



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6. Discuss briefly how a probe is used in molecular diagnostics.



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7. Who was the first patient to be treated with gene therapy? Why was the given treatment recurrent in nature?



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8. Taking example under category, discuss upstream and downstream processing.



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9. Define antigen and antibody. Name any two diagnostic kits based upon them.



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10. ELISA technique is based on the principle of antigen-antibody interaction. Can this technique be used in the molecular diagnosis of a genetic disorder, such as phenylketonuria?



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11. How is a mature, functional insulin hormone different from its pro-hormone form?





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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 replacement therapy. which would also restore the function. which in your opinion is a better option? Give reason for your answer.



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13. Transgenic animals are the animals are the animals in which 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.



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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?



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15. Bt cotton is resistant to pest, such as lepidopteran, dipterans and coleopterants. Is Bt cotton also resistant to other pests as well?



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1. A patient is suffering from ADA deficiency.

Can he be cured? How?



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2. Define transgenic animals. Explain in detail

any four areas where they can be utilised.



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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.



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4. Highlight five areas where biotechnology has influenced our lives.



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5. What are the various advantages of using genetically modified plants to increase the overall yield of the crop?



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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.



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7. List the disadvantages of insulin obtained from the pancreas of slaughtered cows and pigs.



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8. List the advantages of recombinant insulin.



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9. What is meant by the term biopesticide?

Name and explain the mode of action of a popular biopesticides.



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10. Name the five key tools for accomplishing

the tasks of recombinant DNA technology. Also

mention the functions of each tool.



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Higher Order Thinking Skills Brain Twisting Very Short Answer Questins

1. What are transgenic organisms?



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2. How food production can be increased by techniques of biotechnology?



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3. Why green revolution is not enough to feed the rapidly growing human population ?



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4. Expand Bt.



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5. Name the nematode which infects the roots of tobacco plant, which reduces its

production.



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6. State the role of C peptide in human insulin.



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Higher Order Thinking Skills Brain Twisting Short Answer Questions

1. Does our blood have proteases and nucleases?



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2. Distinguish between Cry and cry



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3. Why is functional insulin produced considered better than used earlier by

diabetic patients ?



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4. Name two methods which serve the purpose of early diagnosis is of bacterial or viral infection.



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5. State the role of transposons in silencing of mRNA in eukaryotic cells.



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6. What are the disadvantages of GM crops ?



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7. Probe is made up of single stranded RNA. It is true or false.



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8. How GMO differs from a hybrid ?



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9. A retrovirus can synthesize DNA during injection. Discuss.



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10. How does silencing of specific mRNA in RNA interference prevent parasitic infection?



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11. How is a mature, functional insulin hormone different from its pro-hormone form?



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Higher Order Thinking Skills Brain Twisting Long Answer Questins

1. Mention three molecular diagnostic techniques which help to detect pathogens from suspected patients. Write the advantage of these techniques over conventional methods.



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2. What is gene therapy? Illustrate using the example of adenosine deaminase (ADA) deficiency.





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3. What is a recombinant DNA vaccine? Give two examples.



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4. List any four advantages of genetically modified crop plants over their wild/domesticated relatives.



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5. What are transgenic bacteria ? Illustrate using any one example



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Qucik Memory Test Write True Or False

1. Recombinant DNA technology has made possible to engineer microbes, plants and animlas such that they have novel capabilities .



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2. Gene therapy is the extraction of genes into an individual's cells and tissue to treat diseases especially hereditary disease.



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3. Human insulin is made in yeast cell , yet its strcuture is absolutely identical to that of natural molecule.



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4. Today, transgenic models exist for many human diseases which includes.

A. Cancer .

B. Cystic fibrosis .

C. Rheumatoid arthritis

D. Alzheimer's diseases.



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5. Cloned genes are used as probes to detect the presence of its complementary DNA strand



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6. Insulin consists of three short polypeptide chains i.e., chains A, chain B and Chain C.



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7. Bt toxin is coded by a gene named cry.



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Quick Memory Test Complete The Missing Links

1. Plants, bacteria, fungi and animals whose genes have been altered by manipulation are called _____.



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2. toxin is produced by bacterium *Bacillus thuringiensis*.



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3. In GM plants, genetic modifications enhances value of food.



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4. A nematode incognitia infects roots of tobacco plants and cause a great reduction in yields.



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5. At present, about _____ recombinant therapeutics have been approved for human-use the world over. In India, _____ of these are presently being marketed.



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6. In insulin chain A and chain B are linked together by bridges.



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7. therapy is a collection of methods that allows correction of a gene defect that has been diagnosed in child/ embryo.



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8. ADA enzyme is crucial for system to function.



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9. mice are being used to test the safety of polio vaccine.



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10. Basmati rice is distinct for its unique aroma and



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Quik Memory Test Choose The Corret
Alternative

1. Cry proteins are a group of useful/toxic proteins.



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2. Ethics/Biopiracy is a set of moral principles by which a community regulates its behaviour and decides as to legitimacy of activity.



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3. Vaccine for hepatitis B is produced from transgenic cow/ yeast.



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4. The gene transferred to another organism artificially by technique of genetic is called wonder gene/transgene.



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5. Stem Cell Technology/PCR is being used for transformation of cells into specialized cells.



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6. In hybrid/ GMO, a completely new trait is introduced.



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1. An enzyme produced commercially from *Saccharomyces cerevisiae* is :

A. Lactase

B. Invertase

C. Amylase

D. Maltase

Answer: B



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2. Fermentation ability of Yeast is due to

A. Amylase

B. Galactase

C. Zymase

D. Invertase

Answer: C



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3. Steroids are used in :

A. Treatment of hormonal imbalance

B. Birth control

C. Treatment of autoimmune diseases

D. All the above

Answer: D



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4. Enzymes used in detergent are :

A. Amylases

B. Lipases

C. Proteases

D. Glucoisomerases

Answer: C



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5. B_2 is got from:

A. Acetobacter

B. Bacillus megaterium

C. *Ashbya gossypii*

D. *Pseudomonas*

Answer: C



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6. Third generation vaccines are:

A. Attenuated pathogen

B. Pathogen relative

C. Monoclonal antigen

D. Synthetic antigen

Answer: D



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7. Insulin has 51 amino acids arranged in

A. Single polypeptide

B. Two polypeptides of 21 and 30 amino acids

C. Two polypeptides of 25 and 26 amino acid

D. Three polypeptides having 15, 16 and 20 amino acids

Answer: B



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8. Dermatoglyphic is connected with:

A. Skin diseases.

B. Skin care

C. Cosmetics

D. Finger printing

Answer: D



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9. Hybridoma technology has been successfully used in:

A. Production of somatic hybrids

B. Synthesis of monoclonal antibodies

C. Synthesis of haemoglobin

D. Production of alcohol in bulk

Answer: B



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10. Enzymes, vitamins and hormones can be classified into a single category of biological chemicals, because all of these

A. Help in regulating metabolism

B. Are extensively synthesised in the body
of living organism

C. Are conjugate proteins

D. Enhance oxidative metabolism

Answer: A



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11. *Bacillus thuringiensis* (Bt) strains have been used for designing novel

- A. Biofertilizers
- B. Biometallurgical techniques
- C. Biomineralization processes
- D. Bioinsecticidal plants

Answer: D



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12. A tumour inducing plasmid widely used in the production of transgenic plants is that of :

- A. *Escherichia coli*
- B. *Bacillus thuringiensis*
- C. *Staphylococcus aureus*
- D. *Agrobacterium tumefaciens*

Answer: D



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13. Which one of the following statements is correct

A. B' in Bt cotton indicates that it is genetically modified organism produced through biotechnology

B. Somatic hybridization involves fusion of two complete plant cells carrying desired genes

C. The anticoagulant hirudin is being produced from transgenic Brassica napus seeds

D. Flavr Savr' variety of tomato has enhanced production of ethylene which improves the taste

Answer: C



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14. Leech secretes which of the following anticoagulant

A. Hirudin

B. Heparin

C. Serotonin

D. Histamine

Answer: A



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15. A technology which has found immense use in solving cases of disputed parentage is :

- A. Polymerase chain reaction
- B. DNA fingerprinting
- C. Monoclonal antibody production
- D. Recombinant DNA technology

Answer: B



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16. Purified antibiotic penicillin of *Penicillium notatum* was obtained by

A. Alexandar Fleming

B. Howard Florey

C. Robert Hooke

D. Carolus Linnaeus

Answer: B



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17. Which of the following statements is not true for stirred tank fermentation

A. Buffer needed to control pH

B. Batch and feed possible

C. Controlled dissolved oxygen

D. Easy in process sampling

Answer: C



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18. BT cotton is resistant to

A. Insects

B. Herbicides

C. Salt

D. Draught

Answer: A



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19. Bt toxin is :

- A. Intracellular lipid
- B. Intracellular crystalline protein
- C. Extracellular crystalline protein
- D. Lipid

Answer: C



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20. Two microbes found to be very useful in genetic engineering are

A. *Escherichia coli* and *Agrobacterium tumefaciens*

B. *Vibrio cholerae* and tailed bacteriophage

C. *Diplococcus* sp. and *Pseudomonas* sp.

D. Crown gall bacterium and *Caenorhabditis elegans*

Answer: A



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21. rRNA is synthesised in

A. Nucleus

B. Nucleolus

C. Cytoplasm

D. Endoplasmic reticulum

Answer: B



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22. Commonly used reporter gene that utilises histochemical assay in plant expression vector is :

A. TAC

B. GAT

C. CAT

D. TAG

Answer: C



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23. The species used as natural genetic engineer is :

A. *Agrobacterium tumefaciens*

B. *Bacillus thuringiensis*

C. *Aspergillus*

D. *Drosophila*

Answer: A



24. Herbicide resistant gene is

A. Ct

B. Mt

C. Bt

D. Gst

Answer: D



1. What is the cause of ADA deficiency?



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2. What are transgenic animals?



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3. Name the human insulin produced by genetic engineering.



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4. The protein encoded by which gene control bollworm:

A. Cry 1AC

B. Cry 2 AB

C. Both (a) and (b)

D. Cry 1 AB

Answer:



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5. What is Bt cotton?



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6. Name the DNA polymerase which is usually used for PCR?



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7. Name any three types of Recombinant proteins?



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8. Bt cotton is resistant against:

A. Salt

B. Herbicides

C. Insect

D. Drought

Answer:



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9. What is biopiracy?



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10. Bt in Bt cotton signifies biotechnology.



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11. What do you mean by GM organisms?



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12. Mention a gene that codes for insecticidal protein in Bt cotton.



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13. Name the plasmid present in *Agrobacterium tumefaciens*.



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14. What is cry protein?



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15. Cryopreservation is done in:

A. CO_2

B. Distilled water

C. Nitric acid

D. Liquid N_2

Answer:



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Revision Exercises Questions From Cbse Examinations

1. Define biopatent .



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2. How is Rosi considered different from a normal cow?



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3. Why is the enzyme cellulase needed for isolating genetic material from plant cells and

not from the animal cells?



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4. Write the importance of MOET.



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5. What are Cry genes ? In which organism are they present?



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6. What are transgenic animals. Give an example.



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7. Write the two components of the first artificial recombinant DNA molecule constructed by Cohen and Boyer .



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1. What is microinjection?



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2. Write a short note on biopatent.



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3. Write down the applications of gene therapy.





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4. What is DNA fingerprinting ?



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5. Match the followig :

- (a) Antigen-antibody reaction
- (b) α -lactalbumin
- (c) α -1-antitrypsin
- (d) Gene therapy

- (i) ADA deficiency
- (ii) Emphysema
- (iii) Rosie
- (iv) ELISA



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6. Insulin getting assembled into a mature form was the major challenge in commercial insulin production by rDNA technology. How did Eil Nilly Company found a solution to this problem ?



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7. Why does the Bt toxin not kill the bacterium that produces it but kills the insect that ingests it?





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8. What is gene therapy? Name the first clinical case where it was used.



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9. What are cry protein ? and organisms?



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10. One of the application of biotechnology is to get pest resistant plants - " Justify the statement with reference to Bt cotton".



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11. Mention any three advantages of GM organisms .



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12. What is the characteristic feature of human insulin ?



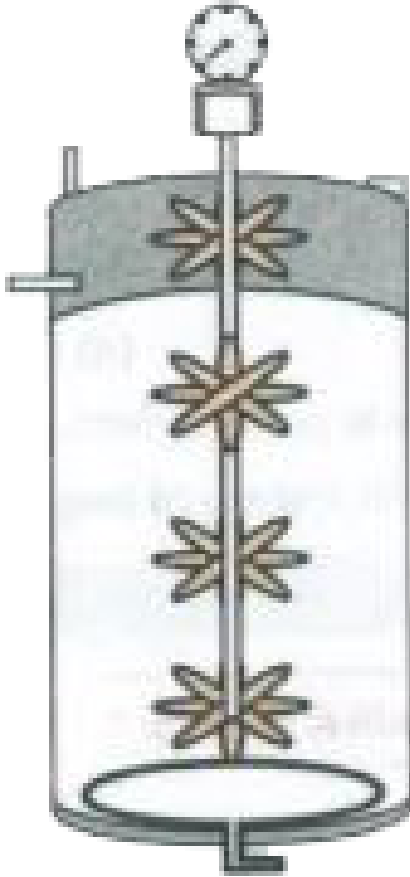
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13. List any four advantages of genetically modified crop plants over their wild/domesticated relatives.



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14. Name the type of bioreactor shown. Write the purpose for which it is used.



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15. Why is the introduction of genetically engineered lymphocytes into an ADA deficiency patient not a permanent cure ? Suggest a possible permanent cure.



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16. In which technique do we use Taq polymerase and why ?



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17. Expand the following :

(a) AIDS (b) ELISA



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18. What are Satellite DNA in a genome?

Explain their role in DNA fingerprinting.



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19. Describe the gene therapy procedure for an ADA deficient patient



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20. Expand the following and mention one application of each : (i) PCR (ii) ELISA



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21. Name the source of the DNA polymerase used in PCR technique. Mention why it is used.



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22. Write any four ways used to introduce a desired DNA segment into a bacterial cell in recombinant technology experiments.



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23. What is Bt toxin ? Name an organism that produces it ? How has man exploited it ?



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24. Name the bacterium responsible for the large holes seen in "Swiss Cheese" . What are these holes due to?



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1. What is the principle of PCR?



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2. What are cry proteins ? Name the organism that produces it.



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3. Write a short note on DNA fingerprinting .





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4. Give at least three applications of biotechnology.



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5. Write short note on biotechnology.



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6. Write short note on Gene therapy.



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7. What is golden rice ?



[Watch Video Solution](#)

8. What is golden rice ?



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9. What are the uses of Genetically Modified (GM) plants ? Why they are useful now - a-day?



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10. What are three critical research areas of biotechnology ?



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11. Write a brief account of genetically engineered Insulin



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12. Crystals of Bt toxic protein synthesized by some bacteria kill the insects but do not kill themselves. Explain.



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13. Write the applications of transgenic animals.



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14. What do you mean by gene therapy?



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15. What do you mean by cloning ?



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16. Write a short note on single cell protein .



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17. Explain one genetically modified organism.



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18. Write a short note on the importance of transgenic plants.



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19. What are Cry proteins? Name an organism that produces it. How has man exploited this protein to his benefit?



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20. (a) How is Bt cotton Plant produced ? Explain, how does it resist the infestation by

Cotton Bollworm.

(b) Define Biopiracy.



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21. What are the advantage of transgenic plants ?



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22. Write about various useful biological products by transgenic animals.



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23. What is DNA fingerprinting? Explain its importance



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24. What is biotechnology? Describe its two applications in the field of agriculture.



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25. Genetically modified organism (GMO) is always a debatable topic among scientists, academicians and public. State any four usefulness of GMOs.



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26. What do you mean by GM organism ? Write any four advantages of GMO.



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27. Briefly explain the gene gun method to introduce alien DNA into host cell ?



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28. Briefly explain the micro injection method to introduce alien DNA into host cell.



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29. What is gene therapy ? Illustrate using the example of Adenosine deminase deficiency.



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30. What short notes on :

(a) Genetic Engineering . (b) Biopiracy.



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31. Why Bt toxin gene does not kill Bacillus bacteria in which it is found ?



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32. How does *Agrobacterium* act as natural genetic engineer of plants ?



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33. Write short note on Gene therapy.



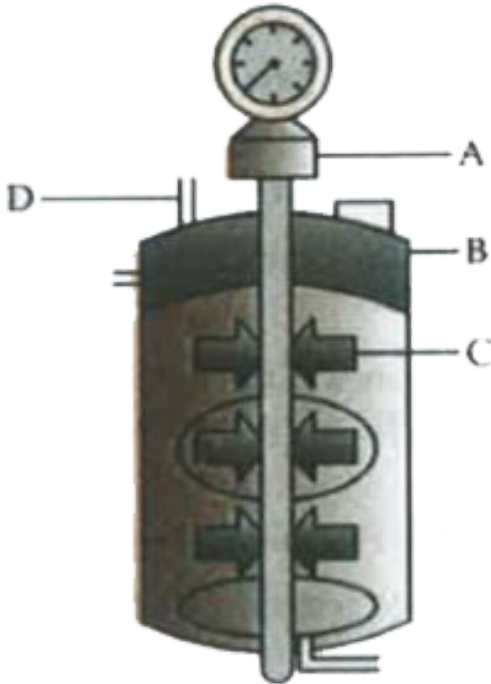
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34. What are cloning vectors ? Name any one common vector used in experiments.





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35.

Observe the sketch of stirred - tank bioreactor and label the part A,B,C and D.



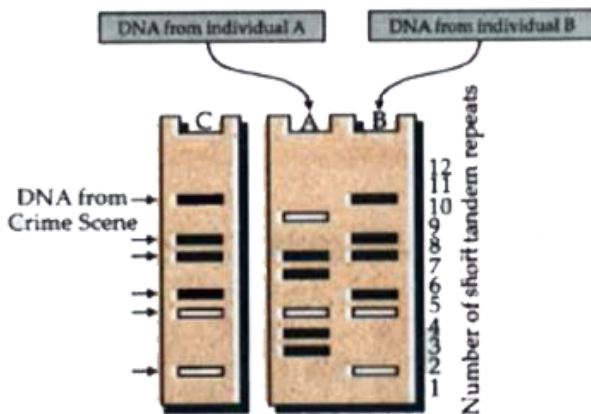
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36. Some ethical standards are required to evaluate the morality of all human activities.

Explain Biopiracy.

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37. Schematic representation of DNA fingerprints are shown below:



(a) Which one of the suspected individual may be involved in the crime ?

(b) Write any other use of DNA fingerprinting.



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38. Write a short note on Bt cotton.



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39. Bt in Bt cotton is?



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40. Write a short note on Biopatent.



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41. Briefly explain the principle and procedure of ELISA technique ?



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42. Describe in brief the process of human insulin production by biotechnology.



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43. What is Single Cell Protein (SCP)? Name two algae used to produce SCP.



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44. What is human genome project? Write the functional aspects of human genome project.



Watch Video Solution

45. Why is *Agrobacterium tumefaciens* a good cloning vector ? Explain.



Watch Video Solution

46. What are transgenic plants ? Give two examples.



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47. Write note on the following : (i) Gene gun
(ii) Tools of genetic engineering (iii) Gene cloning.



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48. Write about the function and principle of ELISA technique.



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49. Why does the Bt toxin not kill the bacterium that produces it but kills the insect that ingests it?



Watch Video Solution

50. In case of Bt cotton how does the toxic insecticide protein produced by bacterium kill the insect pest but not the cell of *Bacillus thuringiensis* where the toxic protein is generated?



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51. Name the insect pest that is killed by the products of cryI_{Ac} gene. Explain how the gene makes the plant resistant to the insect pest.





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52. (a) How does cryI AC gene express itself in its host?

(b) State the role of this gene in controlling the infestation of bollworm.



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53. How are the DNA fragments separated and isolated for DNA fingerprinting? Explain.



[Watch Video Solution](#)

54. How is the amplification of a gene sample of interest carried out using Polymerase Chain Reaction (PCR)?



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55. Tobacco plants are damaged severely when infested with *Meloidogyne incognita*. Name and explain the strategy that is adopted to stop this infestation.

(b) Name the vector used for introducing the nematode specific gene in tobacco plant.



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56. How did the process of RNA interference help to control the nematode form infecting roots of tobacco plants ? Explain



[Watch Video Solution](#)

57. (a) What do 'Y' and 'B' stand for in 'YAC' and 'BAC' used in Human Genome Project (HGP). Mention their role in the project.
- (b) Write the percentage of the total human genome that codes for proteins and the percentage of discovered genes whose functions are known as observed during HGP.
- (c) Expand 'SNPs' identified by scientists in HGP.



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58. Give a schematic representation of the transformation of a pro-insulin into insulin.



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59. Name the most commonly used bioreactor in biotechnology labs. Mention the most essential components this bioreactor must have so as to provide the optimum conditions to the culture medium, resulting in the production of large volume of desired product.



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60. Why does the insecticidal protein produced by *Bacillus thuringiensis* not kill the bacterium, but kills the cotton bollworm? Explain.



[Watch Video Solution](#)

61. CryIAb is introduced in a plant to prevent infestation by insects.

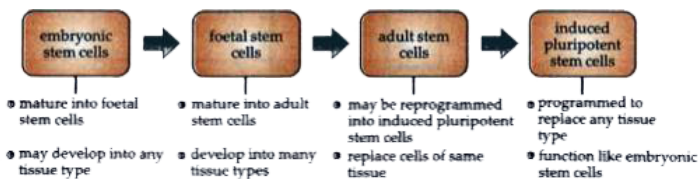
(a) What is the resultant plant referred as?

(b) Summarize the action of the gene introduced.



Revision Exercises Case Based Short Answer Type Questions

1. Have a look on the diagram given below and answer the following :



(a) What are induced pluripotent stem cells

(IPSCs)?

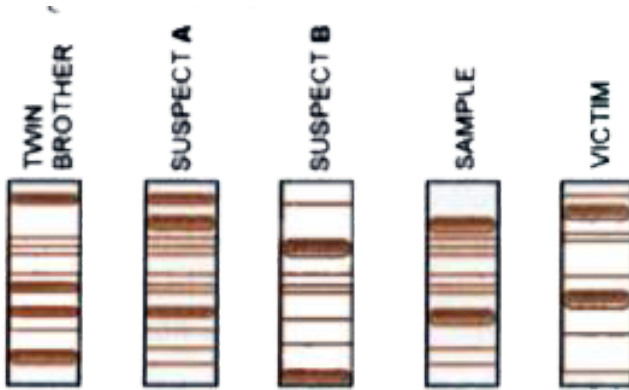
(b) Mention any two features of IPSCs.



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2. During a murder trial two suspects appeared before court . After an investigation (which included DNA fingerprinting) the available evidence proved that suspect A was the murderer. This suspect said that the he was innocent and that his identical twin brother , still on the loose, was in fact the

guilty person. His twin brother was subjected to DNA fingerprint tests. Study the DNA fingerprints of hair samples and answer the questions given below:



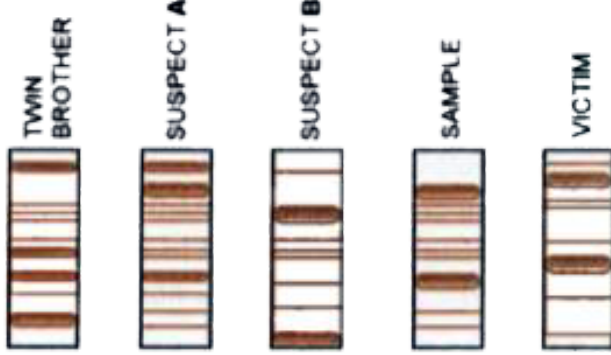
Which suspect would you arrest for the murder if you were the investigating officer ?

Motivate.



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3. During a murder trial two suspects appeared before court . After an investigation (which included DNA fingerprinting) the available evidence proved that suspect A was the murderer. This suspect said that he was innocent and that his identical twin brother , still on the loose, was in fact the guilty person. His twin brother was subjected to DNA fingerprint tests. Study the DNA fingerprints of hair samples and answer the questions given below:



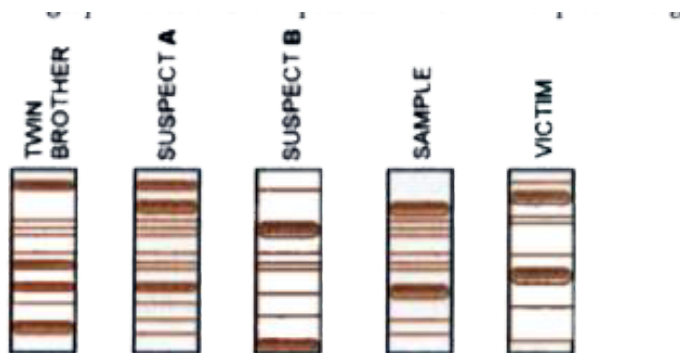
Is it true that the suspect and his twin brother are identical twins ? Give reason.



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4. During a murder trial two suspects appeared before court . After an investigation (which included DNA fingerprinting) the available evidence proved that suspect A was

the murderer. This suspect said that the he was innocent and that his identical twin brother , still on the loose, was in fact the guilty person. His twin brother was subjected to DNA fingerprint tests. Study the DNA fingerprints of hair samples and answer the questions given below:

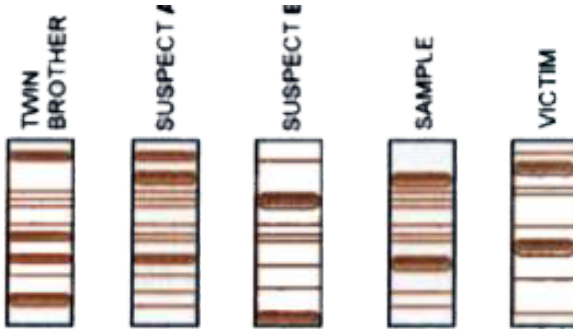


Do you consider the twin brother could possibly be the murderer



5. During a murder trial two suspects appeared before court . After an investigation (which included DNA fingerprinting) the available evidence proved that suspect A was the murderer. This suspect said that he was innocent and that his identical twin brother , still on the loose, was in fact the guilty person. His twin brother was subjected to DNA fingerprint tests. Study the DNA fingerprints of hair samples and answer the

questions given below:



What is this type of investigation(Where DNA fingerprints are involved) called ?



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Revision Exercises Long Answer Type Questions

1. Explain the synthesis of insulin through recombinant DNA technology with a diagram.



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2. (a) Define DNA fingerprinting.

(b) Explain in brief about the procedure of DNA fingerprinting.



Watch Video Solution

3. Explain the technique of DNA fingerprinting.

Write a note on its applications.



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4. Why is human genome called a mega project?



Watch Video Solution

5. How can the pest resistance plants of tobacco be developed ?



Watch Video Solution

6. Describe any three applications of genetically modified plants.



Watch Video Solution

7. How did an American company Eli Lilly use the knowledge of rDNA technology to produce human insulin?



[Watch Video Solution](#)

8. (a) What is DNA fingerprinting?

(b) Explain the steps involved in DNA fingerprinting.



[Watch Video Solution](#)

9. Write the salient features of Human Genome Project.



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10. What do Genetically Modified Organisms (GMO) do to the food? How do they make it useful to us ?



Watch Video Solution

11. Give an account of the production of human insulin in transgenic organism.



Watch Video Solution

12. Write an account of biotechnological applications in medicine.



Watch Video Solution

13. What is polymerase chain reaction (PCR) ?

Explain in detail the steps involved in PCR.



Watch Video Solution

14. Describe the salient features of human genome.



Watch Video Solution

15. What are Cry proteins? How has biotechnologist exploited these proteins to benefit farmers?



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16. Briefly write about: (a) Downstream processing (b) Bioreactors.



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17. With an example, explain how biotechnology has been applied in each of the following:

(i) In curing Diabetes mellitus

(ii) In raising pest resistant plants

(iii) In producing more nutritionally balanced milk.

Do you think it is ethical to manipulate organisms for human benefits? Justify your answer.



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18. How is Bt cotton plant produced? Explain the mechanism by which the plant is able to resist the infestation by cotton bollworms.



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19. What is RNA interference (RNAi)? Explain in correct sequence the use of this process in producing nematode resistant tobacco plants.



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20. (a) Name the nematode that infests and damages tobacco roots.

(b) How are transgenic tobacco plants produced to solve this problem?



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21. (a) Name the source of Taq polymerase. Explain the advantage of its use in biotechnology.



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22. One of the main objectives of biotechnology is to minimize 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.



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23. How is mature insulin different from proinsulin secreted humans pancreas in

human?

Explain how was human functional insulin produced using rDNA technology.

Why is the functional insulin thus produced considered better than the ones used earlier by diabetic patients?



[Watch Video Solution](#)

24. a) Explain DNA polymorphism as the basis of genetic mapping of human genome.

b) State the role of VNTR in DNA fingerprinting.



[Watch Video Solution](#)

25. (a) What do 'Y' and 'B' stand for in 'YAC' and 'BAC' used in Human Genome Project (HGP). Mention their role in the project.

(b) Write the percentage of the total human genome that codes for proteins and the percentage of discovered genes whose functions are known as observed during HGP.

(c) Expand 'SNPs' identified by scientists in HGP.



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26. (a) Why should a bacterium be made 'competent'?

(b) Explain the role of 'microinjection' and 'gene gun' in biotechnology .



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27. Write any six salient features of the human genome as drawn from the human genome project.



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[Competition](#) [File](#) [Multiple Choice](#) [Questions](#)
[Mcqs](#)

1. ELISA is used to detect viruses, where

A. DNA probes are required

B. Southern blotting is done

C. Alkaline phosphatase is the key reagent

D. Catalase is the key reagent

Answer: C



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2. In transgenics, expression of transgene in target tissue is determined by :

A. Enhances

B. Transgene

C. Promoter

D. Reporter

Answer: D



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3. Industrial production of ethanol from which is brought about by a certain species of:

A. Azotobacter

B. Lactobacillus

C. Saccharomyces

D. Penicillium

Answer: A



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4. Bacillus thuringiensis (Bt) strains have been used for designing novel

A. Bio-metallurgical technique

B. Bio-mineralization processes

C. Bio-insecticidal plants

D. Bio-fertilizers

Answer: C



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5. Golden rice is a transgenic crop of the future with the following improved trait:

A. High lysine (essential amino acid)

content

B. Insect resistance

C. High protein content

D. High vitamin A content

Answer: D



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6. First hormone produced artificially by culturing bacteria is

A. Insulin

B. Thyroxine

C. Testosterone

D. Adrenaline

Answer: A



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7. Which of the following enzymes is not used in making detergent

A. Amylase

B. Cellulase

C. Protease

D. Peptidase

Answer: C



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8. Penicillin was used in

A. World War I

B. World War II

C. Both (a) and (b)

D. None of the above

Answer: B



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9. Cry 1 endotoxins obtained from *Bacillus Thuringiensis* are effective against

A. Nematodes

B. Bollworms

C. Mosquitoes

D. Flies

Answer: B



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10. A transgenic food crop which may help in solving the problem of night blindness in developing countries is

- A. Bt soybean
- B. Golden rice
- C. FlavrSavr tomatoes
- D. Starlink maize

Answer: B



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11. Variable number of tandem repeats (VNTRs)
are analysed for

- A. Recombinant DNA technology
- B. Gene therapy
- C. Direct gene transfer
- D. DNA fingerprinting

Answer:



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12. Improvement of qualities of F₁ hybrid when two unrelated individuals are crossed is called :

A. Dominance

B. Inbreeding depression

C. Heterosis

D. Selection

Answer: C



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13. The Bt gene is isolated from the organism called :

A. Brassica napus

B. Rhizobium

C. Azolla

D. Bacillus thuringiensis

Answer: D



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14. Amniocentesis is a method to:

1. Detect genetic disorders in an unborn baby
2. Prenatal sex determination
3. Medical termination of pregnancy
4. Fertilize the egg

A. 1, 2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer: B



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15. To confirm ELISA for AIDS we used

- A. Western blotting
- B. Northern blotting
- C. Southern blotting
- D. Bastern blotting

Answer: A



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16. Cultivation of Bt cotton has been much in the news.

A. Barium-treated cotton seeds

B. Bigger thread variety of cotton with better tensile strength

C. Produced by biotechnology using restriction enzymes and ligases

D. Carrying an endotoxin gene from *Bacillus thuringiensis*

Answer: D



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17. Magic bullets are the:

- A. Recombinant vaccines
- B. Monoclonal antibodies
- C. Chemotherapy drugs for cancer
- D. Anabolic steroids

Answer: C



Watch Video Solution

18. The tests that are used in the diagnosis of AIDS are:

- A. ELISA and immunoblot
- B. Northern blot and ELISA
- C. ELISA and Southern blot
- D. Western blot and ELISA

Answer: D



19. Polymerase chain reaction technology (PCR -technique) is used for

- A. DNA identification
- B. DNA repair
- C. DNA amplification
- D. Cleave DNA

Answer: C



20. The abbreviation 'Bt' in 'Bt' toxin stands for

A. Biotechnology

B. Biotoxin

C. Toxin released by *Bacillus thuringiensis*

D. Toxins released by Bacteria

Answer: C



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21. The bacterium *Bacillus thuringiensis* is widely used in contemporary biology as

A. Indicator of water pollution

B. Insecticide

C. Agent for production of dairy products

D. Source of industrial enzyme

Answer: B



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22. The genetic defect-adenosine deaminase (ADA) deficiency may be cured permanently by

A. Periodic infusion of genetically engineered lymphocytes having functional ADA cDNA.

B. Administering adenosine deaminase activators

C. Introducing bone marrow cells producing ADA into cells at early

embryonic stages

D. Enzyme replacement therapy

Answer: A



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23. What is true about Bt toxin ?

A. The inactive protoxin gets converted into active form in the insect gut

B. Bt protoxin exists as active toxin in the Bacillus.

C. The activated toxin enters the ovaries of the pest to sterilize it and thus prevents its multiplication.

D. The concerned Bacillus has antitoxins.

Answer: A



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24. Which one of following pairs is wrongly matched ?

- A. Detergents - Lipase
- B. Alcohol - Nitrogenase
- C. Fruit juice - Pectinase
- D. Textile - Amylase

Answer: B



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25. Among the following stem , cell which are found in umbilical cord:

- A. Embryonic stem cells
- B. Adult stem cells
- C. Cord blood stem cells
- D. All of the above

Answer: A



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26. Genetically engineered bovine (bST), sometimes called rbST (recombinant bovine somatotropin) or rbGH (recombinant bovine growth hormone) are used in the

A. Therapeutic drugs

B. Agriculture

C. Dairy industry

D. DNA fingerprinting

Answer: A



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27. PCR technique was invented by

A. Karry Mullis

B. Kohen

C. Boyer

D. Sanger

Answer: A



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28. *Bacillus thuringiensis* is used to control

A. Bacterial pathogens

B. Fungal pathogens

C. Nematodes

D. Insect pests

Answer: D



Watch Video Solution

29. Which of the following is used as a bioweapon ?

- A. Bacillus anthracis
- B. Botulinum toxin
- C. Bacillus thuringiensis toxin
- D. Smallpox

Answer: C



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30. Single cell protein refers to

- A. A specific protein extracted from pure culture of single type cells
- B. Source of mixed proteins extracted from pure culture of single type of cells
- C. Proteins extracted from a single cell
- D. A specific protein extracted from a single cell

Answer: B



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31. Silencing of mRNA has been used in producing transgenic plants resistant to:

- A. White rusts
- B. Bacterial blights
- C. Bollworms
- D. Nematodes

Answer: C



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32. In history of biology, human genome project crystals which contains insecticidal protein . This protein.

A. Bioinformatics

B. Biosystematics

C. Biotechnology

D. Biomonitoring

Answer: A



View Text Solution

33. *Bacillus thuringiensis* forms protein crystals which contain insecticidal protein.

This protein:

A. Is activated by acid pH of the foregut of the insect pest

B. Does not kill the carrier bacterium which is insect pest ultimately killing it

C. Binds with epithelial cells of midgut of the insect pest ultimately killing it

D. Is coded by several genes including the
gene cry

Answer: C



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34. Maximum number of existing transgenic animals is of

A. Fish

B. Mice

C. Cow

D. Pig

Answer: B



Watch Video Solution

35. The process of RNA interference has been used in the development of plants resistant to

A. Nematodes

B. Fungi

C. Virus

D. Insects

Answer: A



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36. Which one of the following is correctly matched ?

A. *Agrobacterium tumifaciens* - tumor

B. *Thermus aquaticus* - Bt-gene .

C. pBR322 - enzymes.

D. Ligase - Molecule scissors.

Answer: A



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37. The protein $\alpha - 1$ antitrypsin is used to treat the disease

A. Cancer

B. Rheumatoid arthritis

C. Alzheimer's disease

D. Emphysema

Answer: D



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38. The Bt toxin is not toxic to human beings because.

A. The pro Bt toxin activation requires insect
- specific targets

B. The Bt toxin recognizes only insect-targets

C. The Bt toxin formation from pro Bt toxin requires pH lower than that present in human stomach

D. Conversion of pro- Bt toxin to Bt toxin place only in highly alkaline conditions

Answer: D



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39. The method of DNA fingerprinting involves the use of :

A. Restrictions enzymes

B. Taq polymerase

C. Oligonucleotide primers

D. B-peptide is removed from proinsulin

Answer: D



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40. During the processing of the prohormone "proinsulin" into the mature "insulin"

- A. C-peptide is added to proinsulin
- B. C-peptide is removed from proinsulin
- C. B-peptide is added to proinsulin
- D. B-peptide is removed from proinsulin

Answer: B



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41. Which of the following is useful in solving cases of parental disputes ?

A. Hybridoma technology

B. Western blotting

C. ELISA

D. DNA fingerprinting

Answer: D



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42. What is it that forms the basis of DNA Fingerprinting

A. The relative proportions of purines and pyrimidines in DNA

B. The relative difference in the DNA occurrence in blood, skin and saliva

C. The relative difference in the DNA in the ridges and grooves of the fingerprints

Satellite DNA occurring as highly repeated short DNA segments.

D. Satellite DNA occurring as highly repeated short DNA segments .

Answer: D



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43. Choose the wrong statement:

A. VNTR belong to a class of mini - satellite DNA

B. DNA sequences work on the principle developed by Frederick Sanger

C. HGP was coordinated by US Department of Energy and the National Institute of Health

D. DNA fingerprinting involves identifying similarities in repetitive DNA.

Answer: D



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44. Which of the following Bt crops is being grown in India by the farmers ?

A. Cotton

B. Brinjal

C. Soybean

D. Maize

Answer: A



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45. The enzyme affecting the shelf life of Flavr
savr tomato is

A. Galactosidase

B. Transacetylase

C. Permease

D. Polygalacturonase

Answer: D



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46. Commonly used vectors for human genome sequencing are :

A. T-DNA

B. BAC

C. Expression vectors

D. T/A cloning vectors

Answer: B



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47. The first human hormone produced by recombinant DNA technology is :

- A. Insulin
- B. Estrogen
- C. Thyroxin
- D. Progesterone

Answer: A



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48. An analysis of chromosomal DNA using the southern hybridization technique does not use

- A. Electrophoresis
- B. Blotting
- C. Autoradiography
- D. PCR

Answer: D



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49. In vitro clonal propagation in plants is characterized by

- A. PCR and RAPD
- B. Northern blotting
- C. Electrophoresis and HPLC
- D. Microscopy

Answer: A



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50. More than 95% of transgenic animals are

A. Rabbits

B. Mice

C. Fish

D. Cows

Answer: B



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51. In the nomenclature of enzyme restriction endonuclease the Roman numerical indicates

- A. Number of times it is used
- B. The order of discovery from source
- C. Number of cuts on DNA
- D. number of recombinants formed

Answer: B



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52. One of the advantages of developing transgenic mice is that it is very useful:

- A. To study vaccine safety
- B. In producing new varieties of mice
- C. In developing a show piece example
- D. In gene targeting

Answer: A



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53. One of the methods by which DNA cannot be transferred to host cell by :

A. The concerned bacillus has antitoxin

B. Bt protein exists as active toxin in the bacillus

C. The inactive protein gets converted into active form in the insect gut.

D. Activated toxin enters ovaries of pest and sterilize them.

Answer: C



View Text Solution

54. Which one of these is not a tool of recombinant DNA technology ?

A. Restriction enzyme

B. Vector

C. Polymerase enzyme

D. Intorns

Answer: D



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55. One of the methods of which DNA cannot be transferred to the host cell is by

- A. Microinjection
- B. Gene gun
- C. Disarmed pathogen vectors
- D. Polymerase chain reaction

Answer: D



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56. The DNA molecule to which the gene of interest is integrated for cloning is called :

- A. Template
- B. Carrier
- C. Transformer
- D. Vector

Answer: D



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57. Golden rice is a genetically modified crop plant where the incorporated gene is meant for biosynthesis of:

- A. Gomega 3
- B. Vitamin A
- C. Vitamin B
- D. Vitmain C

Answer: B



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58. Which of the following is not required for any of the techniques of DNA fingerprinting available at present

- A. Polymerase chain reaction
- B. Zinic finger analysis
- C. Restriction enzyme
- D. DNA - DNA hybridization .

Answer: A



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59. Which of the following is a restriction endonuclease ?

A. Hind II

B. Protease

C. Dnase - 1

D. Rnase

Answer: A



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60. Stirred-tank bioreactors have been designed for

A. Availability of oxygen throughout the process

B. Ensuring anaerobic conditions in the culture vessel

C. Purification of product

D. Addition of preservatives to the product

Answer: A



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61. Name a peptide hormone which acts mainly on hepatocytes, adipocytes and enhances cellular glucose uptake and utilisation

A. Insulin

B. Glucagon

C. Secretin

D. Gastrin

Answer: D



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62. The correct order of steps in Polymerase Chain Reaction (PCR) is

A. Annealing , Extension , Denaturation

B. Denaturation , Extension, Annelaing

C. Extension, Denaturation , Annealing

D. Denaturation , Annealing , Extension

Answer: C



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63. What triggers activation of protoxin to active toxin of *Bacillus thuringiensis* in boll worm

- A. Body temperature
- B. Moist surface of midgut
- C. Alkaline pH of gut
- D. Acidic pH of stomach

Answer: C



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Competition File Matching Type Questions

1. Match the following :

Column A	Column B
(i) Interferons	(a) George Kohler and Cesar Milstein
(ii) Penicillin	(b) <i>Saccharomyces cerevisiae</i>
(iii) Monoclonal antibodies	(c) Steroid
(iv) Baker's yeast	(d) Sir Alexander Fleming
(v) Vitamin	(e) Human insulin
(vi) Cholesterol	(f) Funk
(vii) 51 amino acids	(g) Antiviral proteins



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Competition File Assertion Reason Type
Questions

1. 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.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

Answer: B



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2. Assertion : Vaccination is also called preventive inoculation.

Reason: A vaccine prevents the formation of antibodies inside the body.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

Answer: C



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3. Assertion : Hybridomas are formed by fusing lymphocytes and tumour cells called myeloma.

Reason: Hybridomas are used to produce monoclonal antibodies.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

Answer: B



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4. Assertion : Humulin is more effective than the insulin produced by conventional methods.

Reason: Humilin is absorbed rapidly in the

blood than the conventionally produced insulin.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

Answer: A



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5. Assertion : 'Bt' toxin gene has been cloned from bacteria and expressed in plants to provide resistance from insect without the need of insecticides.

Reason: 'Bt' toxin is produced from bacterium *Bacillus thuringiensis*.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

Answer: A



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6. Assertion : Interferons are a type of antibodies produced by body cells infected by bacteria.

Reason : Interferons stimulate inflammation at the site of injury.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

Answer: D



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7. Assertion : *Agrobacterium tumefaciens* is popular in genetic engineering because this bacterium is associated with the roots of all cereal and pulse crops.

Reason : A gene incorporated in the bacterial chromosomal genome gets automatically transferred to the crop with which the bacterium is associated .

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not correct explanation of Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

Answer: C



Watch Video Solution

8. Assertion : DNA fingerprinting involves identifying difference in some specific regions in DNA sequence.

Reason: In repetitive DNA sequences , a small stretch of DNA is repeated many times.

A. If both Assertion and Reason are true and Reason is correct explanation of Assertion.

B. If both Assertion and Reason are true but Reason is not correct explanation of

Assertion.

C. If Assertion is true but Reason is false.

D. If both Assertion and Reason are false.

Answer: A



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Chapter Practice Test Section A

1. Which one is used for preparation of bread?

A. *S. cerevisiae*

B. *Lactobacillus*

C. *Streptobacillus*

D. *Aspergillus*

Answer:



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2. Streptomycin is obtained from

A. *Streptomyces griseus*

B. *S. aureofaciens*

C. *S. venezualae*

D. *S. ramosus*

Answer:



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3. Anticoagulant hirudin is found in

A. Snake

B. Lizard

C. Leech

D. Scorpion

Answer:



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4. Widal test is used for the diagnosis of –

A. Malaria

B. Cholera

C. Typhoid

D. Yellow fever

Answer:



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5. Most widely used bioweapon is

A. *Bacillus subtilis*

B. *Pseudomonas putida*

C. *Bacillus anthracis*

D. None of the these

Answer:



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6. DNA fingerprinting refers to

A. Molecular analysis of profiles of DNA samples

B. Analysis of DNA samples using imprinting device

C. Technique used for molecular analysis of
different specimens of DNA

D. Techniques used for identification of
fingerprints of individuals

Answer:



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Chapter Practice Test Section B

1. What is the advantage of techniques like PCR and ELISA over conventional methods?



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2. What is a probe?



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3. Why patent is given?



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4. What are transgenic bacteria ? Illustrate using any one example



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Chapter Practice Test Section C

1. What is ELISA?



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2. What are stem cells?



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3. Gene expression can be controlled with the help of RNA. Explain the method with an example.



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4. Why do toxic insecticide protein secreted by *Bacillus thuringiensis* kill insects?



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5. How did the process of RNA interference help to control the nematode form infecting roots of tobacco plants ? Explain



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1. Mention two advantage each in biotechnology have made as an impact in the following areas:

(a) Medicine (b) Agriculture



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Chapter Practice Test Section E

1. Compare and contrast the advantages and disadvantages of production of genetically

modified crops.



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2. Discuss the various biotechnological applications in agriculture.



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