CBSE Test Paper 04

Ch-12 Biotechnology and its Applications

1. Bacillus thuringiensis gives a positive result with gram stain , therefore this bacteria is
   a. slime mould
   b. eukaryotic
   c. Gram positive
   d. Gram negative
2. The current interest in the manipulation of microbes, plants and animals have raised
   a. Individual ethical issues
   b. Unimportant ethical questions
   c. Serious ethical questions
   d. Serious biological questions
3. Detection of bands on a southern blot is done by
   a. ELISA
   b. electrophoresis
   c. probe
   d. PCR
4. A radioactively labeled Probe can be detected by
   a. UV rays
   b. ELISA
   c. Autoradiography
   d. PCR
5. Gene transfer in biotechnology can be done by
   a. breeding
   b. microinjection
   c. somatic hybridization
   d. cloning
6. Rosie's milk is enriched nutritionally as it has
   a. Beta lactalbumin
   b. Human gene alpha lactalbumin
   c. lactose
   d. Vitamin A

7. Role of GEAC is to
    a. Study the positive effects of GMO's
    b. Commercialize the new technology
    c. Bring new technology
    d. Take decisions regarding GM research and safety of introducing GM genes
8. In isolating recombinant insulin from a culture of E. coli, the cells were filtered and the filtrate was subjected to a purification protocol. However, no insulin was obtained. Why?
9. Name any two techniques that serve the purpose of early diagnosis of some bacterial / viral human diseases.
10. State the role of DNA ligase in biotech.
11. Tobacco plants are damaged severely when infested with Meloidegyne incognitia. Name and explain the strategy that is adopted to stop this infestation.
12. Why cannot E. coli be used to overproduce penicillin?
13. Name some techniques used for early molecular diagnosis of pathogens and genetic disorders.
14. Can you suggest a method to remove oil from seeds based on your understanding of rDNA technology and chemistry of oil?
15. How did Eli Lilly synthesize the human insulin? Mention one difference between this insulin and the one produce by the human pancreas.

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Answer

1. c. Gram positive, **Explanation:** Gram positive bacteria retains the Gram stain after washing with iodine. Bacillus thuringiensis is a gram positive bacteria so, gives positive results.
2. c. Serious ethical questions, **Explanation:** The current interest in the manipulation of microbes, plants and animals have raised serious ethical questions due to involvement of multinational companies and other organizations in exploiting bio-resources of other countries.
3. c. probe, **Explanation:** A Southern blot is a method used in molecular biology for detection of a specific DNA sequence in DNA samples. Southern blotting combines transfer of electrophoresis-separated DNA fragments to a filter membrane and subsequent fragment detection by probe hybridization.
   The method is named after its inventor, the British biologist Edwin Southern.
   Detection of bands on a southern blot is done by probe that contain radioactive single stranded DNA or RNA.
4. c. Autoradiography, **Explanation:** Radioactively labeled probe can be detected by autoradiography. A single stranded DNA or RNA tagged with a radioactive molecule is allowed to hybridise to its complementary DNA in a clone of cells followed by detecting using autoradiography.
5. b. microinjection, **Explanation:** Gene transfer in biotechnology can be done by number of methods. Microinjection is the use of a glass micropipette to inject a liquid substance at a microscopic or borderline macroscopic level. The target is often a living cell but may also include intercellular space.
   Microinjection is one of the best methods to transfer desired gene into suitable host.
6. b. Human gene alpha lactalbumin, **Explanation:** The first transgenic cow Rosie produced human protein enriched milk. The milk contained Alpha lactalbumin which was nutrionally more balanced than normal cow milk for babies.

7. d. Take decisions regarding GM research and safety of introducing GM genes, **Explanation:** The GEAC is also responsible for approval of proposals relating to release of genetically engineered organisms and products into the environment including experimental field trials (Biosafety Research Level trial-I and II known as BRL-I and BRL-II).

8. Generally recombinant proteins formed in E. coli accumulate within the cell itself.
- Because the product (insulin) is intracellular so cell disruption is required.

9. PCR and ELISA

10. DNA ligase is an enzyme that repairs irregularities or breaks in the backbone of double-stranded DNA molecules. It has important role in the process of DNA replication and DNA repair.

    It has three general functions:

    - It seals repairs in the DNA,
    - it seals recombination fragments, and
    - it connects Okazaki fragments (small DNA fragments formed during the replication of double-stranded DNA).

    DNA ligase functions by forming a bond between the end of a “donor” nucleotide and the end of an “acceptor” nucleotide. hence it is also known as molecular glue.

11. The strategy is based on the process of RNA interference.

    It involves blocking of a specific mRNA due to complementary ds RNA molecule that binds to and prevent translation of the mRNA. It is called silencing of mRNA.

12. Because Penicillin is Intracellular Product, if use we E.Coli to overproduce this intracellular product cause increasing of number of product and cellular weight results metabolic imbalance and physically cell disruption and loss of cells. Penicillin will kill the antibiotic sensitive E.coli cells.

13. Recombinant DNA technology, polymerase chain reaction (PCR) and enzyme Linked Immuno Sorbent Assay (ELISA).

14. Oil is a lipid synthesized by the condensation of one molecule of glycerol with three molecules of fatty acids.
    Thus, the oil from the seeds can be removed by preventing the synthesis of either glycerol or the enzyme lipase which catalyses the synthesis of oil.
    It can be achieved by knocking out the genes coding for the enzyme lipase or the enzyme required for the synthesis of glycerol.

15. Eli Lilly company prepares proinsulin chain A and B using separate DNA sequences corresponding to A and B, chains of human insulin and introduced them in the plasmid of E. coli to prepare insulin chains, chains A and B produced separately, extracted and combined by disulphide bond produces mature insulin.
    The one important difference between the insulin produced by human pancreas and the one produced by Eli Lilly is that human insulin has an additional C peptide.