

12/8/22

PAPER TITLE: RECOMBINANT DNA TECHNOLOGY

Time: Three Hours

Maximum Marks: 75

Attempt all questions. All parts of a question must be attempted in continuation. Start answer of a fresh question on a new page. Cite examples and draw labeled diagrams wherever necessary

Question No. 1:

A) Choose the correct answers of the following:

[5 x 1 = 5]

1. Significance of using two primers (forward and reverse) is to:
 - a. increase the stability of DNA-Polymerase complex
 - b. amplify a limited segment of DNA, the template
 - c. to activate DNA polymerase
 - d. to precipitate PCR product
2. Following could be a better tool for genetic transformation of monocot plants:
 - a. *Agrobacterium tumefaciens*
 - b. Bacteriophages
 - c. *Salmonella typhi*
 - d. Biolistics/gene gun
3. A cDNA library is:
 - a. a complex library of DNA helices
 - b. a library with books on DNA literature
 - c. a combination of cloned complementary DNA produced from fully transcribed mRNA.
 - d. sum total of all the mRNA transcripts in a cell
4. DNA shuffling is:
 - a. an in vitro random recombination method to generate mutant genes for directed evolution and to enable a rapid increase in DNA library size
 - b. an efficient technique of gene sequencing
 - c. used to restrict DNA and re-arrange their combinations
 - d. a method of isolating any specific gene from the cell
5. A typical vaccine contains:
 - a. Antibodies
 - b. mRNA of pathogen that cannot be translated to the protein
 - c. Antigenic protein(s)
 - d. Mixture of human albumin and keratin

[5 x 1 = 5]

B) State whether the following are True or False:

- a) Episome is the genetic material found in the cytoplasm of bacteria (TRUE/FALSE)
- b) Alkaline phosphatase has the physiological role of phosphorylating compounds (TRUE/FALSE)
- c) Protein engineering is possible only through genetic engineering (TRUE/FALSE)
- d) Random mutagenesis is a useful technique to study the functions of different gene products (TRUE/FALSE)
- e) Yeast artificial chromosomes (YACs) are naturally occurring chromosomes in the yeast cells (TRUE/FALSE)

[5 x 1 = 5]

C) Fill in the Blanks:

- a) The enzyme _____ can cut both strands of the DNA helix simultaneously in order to manage DNA tangles and supercoils.
- b) Technique in which an electrical field is applied to cells in order to increase the permeability of the cell membrane, allowing DNA to enter the cell is called _____.
- c) _____ proteins are created through the joining of two or more genes.
- d) _____ involves the creation and implosive collapse of bubbles as a result of continuous expansion and recompression in a liquid medium, using sound energy.
- e) Plasmid found in pathogenic species of *Agrobacterium* is called as _____.

Question No. 2:

[3 x 5 = 15]

Attempt any THREE of the following:

- A. Write a note on the role of bacteriophages as cloning vectors.
- B. Describe the roles of linkers and adaptors in the process of gene cloning.
- C. Write a detailed note on structure and applications of Yeast Artificial Chromosomes (YACs).
- D. Describe the principle and steps of PCR. What is RT-PCR?
- E. Describe DNA finger printing with a few important applications.

Question No. 3:

[3 x 5 = 15]

Attempt any THREE of the following:

- A. How can we use rDNA technology to develop vaccines? Discuss.
- B. What are Restriction Endonucleases? Write a note on the classification of endonucleases.
- C. How Genomic library differs from cDNA library? Mention significance of both.
- D. Explain the process for production of transgenic plants.
- E. Write a note on production and important applications of transgenic mice.

Question No. 4:

Attempt any ONE of the following:

[1 x 15 = 15]

- A** Describe the process of Protein Engineering with appropriate examples.
- B** What is site-directed mutagenesis? Discuss various methods to achieve it.

Question No. 5:

Attempt any ONE of the following:

[1 x 15 = 15]

- A** Describe important physical method of gene transfer in plants along with advantages and disadvantages.
- B** Describe in detail the mechanism and process of Agrobacterium-mediated genetic transformation.

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