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Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **1759**

Unique Paper Code : **2492013603**

Name of the Paper : **Fundamentals of Recombinant DNA Technology**

Name of the Course : **B.Sc. (Hons.) Biochemistry (NEP)**

Semester : **VI**

Duration : **2 Hours**

Maximum Marks : **60**

(Write your Roll No. on the top immediately on receipt of this question paper.)

There are **6** questions.

Attempt **4** questions in all.

All questions carry equal marks.

Question No. **1** is compulsory.

1. (A) State true or false and justify your answer :

   (*i*) Isoschizomers of restriction enzymes recognize the same DNA sequence but have different cleavage sites.

   (*ii*) Using adaptors provide an advantage over using linkers.

   (*iii*) pGEM3Z vector carries two promoters for heterologous protein synthesis.

P.T.O.

(*iv*) Using *E.coli* as a host to make mammalian proteins poses some problems.

(*v*) The DNA sequencing gel is read from bottom upwards.

(*vi*) In site directed mutagenesis, selection against parental DNA cannot be carried out.

(B) (*i*) Give *one* example each of a high and low copy number plasmid.

(*ii*) What is the Kozak sequence ? 12,2,1

2. (A) Which enzyme would you use for the following ?

(*i*) Filling a recessed 3' end of a partially double stranded DNA molecule

(*ii*) Adding a radiolabel at the 5' ends of a double stranded DNA molecule

(*iii*) Automated DNA Sequencing by Sanger's method

(*iv*) Making the first strand of cDNA

(*v*) Protecting a restriction site from unwanted cleavage.

(B) Differentiate between the following :

(*i*) Lac promoter and lac UV5 promoter

(*ii*) S1 nuclease and Type-II restriction enzymes

(*iii*) λ replacement vectors and λ insertional vectors

(*iv*) Standard PCR and qPCR

(*v*) Direct selection and marker rescue 5,10

3. (A) What do you understand by the term expression cassette ? What are the features of a good expression vector ? Explain with the help of a diagram, one vector that is used for protein expression in *E.coli*.

(B) Draw a plasmid vector with a unique BamHI site (5' G/GATTC 3'). Cleave it with BamHI. Now ligate a DNA segment also cleaved with the same enzyme, into the cleaved vector.

(C) What is pyrosequencing and how is it better than conventional DNA sequencing by Sanger's method ? 6,4,5

4. (A) *Agrobacterium tumefaciens* is a naturally occurring genetic engineer. Explain in detail.

(B) Explain the steps involved in the overlap extension method of site directed mutagenesis that is used as a method of making industrially useful proteins.

(C) Discuss a method of screening a DNA library, in detail. 6,4,5

5. (A) What are the components of a PCR reaction ? Primer designing is considered as a very important factor in determining the success of a polymerase chain reaction. Explain the various steps taken while designing primers.

(B) Both pBR322 as well as the pUC vectors are cloning vectors. Yet, they differ from one another. Discuss their differences.

(C) Both genomic and cDNA libraries are a large collection of clones :

(*i*) What is the formula for determining the number of clones in a genomics DNA library ?

(*ii*) Give a detailed account of the differences between cDNA and genomic DNA libraries. 5,5,5

6. Write short notes on :

(*i*) Fusion tags

(*ii*) High Capacity Vectors

(*iii*) Different methods of DNA uptake by cells. 5,5,5