Indian Institute of Technology Delhi
Department of Biochemical Engineering and Biotechnology

Course Code: BEL718
Major
Time: 2 hours

Course Name: Combinatorial Biotechnology
Date: 8th May 2016
Marks: 40 Marks

Answer all the following questions

Q. 1 Identify the mistakes and correct the paragraph below 3

A transcriptional fusion of the protein of interest with the cDNA encoding for the repA protein was made. For preparation of library Pfu polymerase was used and real time PCR was performed. The library prepared was transformed in E. coli for achieving display.

Q. 2 What is the role of mRNA component and tRNA component in tmRNA? A new drug which mimics methionyl tRNA was discovered. Discuss whether it can be used for mRNA display. What will happen if the same drug is used under in vivo conditions? 4

Q. 3 Filamentous phages can be used for display of cytoplasmic proteins. Discuss? 2

Q. 4 What are carrier and passenger proteins in bacterial cell surface display. Which one should be used for smaller peptides and which one should be used for larger proteins? Diagrammatically show them. 2

Q. 5 Why lac operators are required in the plasmid for Plasmid display. Describe plasmid display. 3

Q. 6 In IVC, artificial compartments are created. Can we have display of peptides possible on the surface of an artificial compartment? Explain. 2

Q. 7 Why in CIS display there is a non covalent bond whereas in CAD display there is a covalent bond between DNA and protein? To understand the role of CIS sequences following experiments were done. Write the expected results 4

a) Deletion of CIS

b) Changing the position of CIS to downstream of oriR

c) Putting more copies of CIS

d) Randomizing the CIS so that the terminator is disrupted

Q. 8 For expressing eukaryotic proteins, you would prefer bacteriophages or baculoviruses or both. Give reasons? 2

Q. 9 Describe a deconvolution method in which a positive compound is selected based on negative results. 2

Q. 10 An investigator wants to prepare a fluorescent labelled peptide. Suggest which method will be used for the synthesis if the length is 30 aa and label is Cy5. 3

Q. 11 What are Raman labels? Discuss how they can be used for encoding peptide libraries. 2

Q. 12 What are PNAs? Describe two methods by which PNA can be used for determination of the peptide sequence 3

Q. 13 If 6 amino acids and 3 non natural amino acids are used to prepare a nonamer (peptide drug). To prepare true combinatorial libraries, describe which method you will use and write the number of library members formed. After screening the library, around 100 peptides were shortlisted and were now required in more amounts for performing experiments on rats. Describe the method that should be used. After performing animal experiments one of the peptide was shortlisted, a drug company decided to purchase the product. The aim was to synthesize in kilograms quantities. Describe the method that should be used. 4.5

Q. 14 Show diagrammatically binary light directed parallel synthesis. Describe the steps involved in synthesis. Write the number of library members and the length that can be synthesized using this approach. Write the name of the photolabile protecting group used for peptide synthesis and the one used for oligonucleotide synthesis. 2.5

Q. 15 Describe SpotDS method. 1