WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 6th Semester Examination, 2021

MCBACOR14T-MICROBIOLOGY (CC14)

RECOMBINANT DNA TECHNOLOGY

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.

Answer Question No. 1 and any *four* from the rest

1. Answer any ***four*** questions from the following: 2×4 = 8

   (a) What will happen if plasmid containing bacteria are maintained in the absence of selection pressure i.e. appropriate antibiotic?

   (b) Why the restriction enzyme does not cleave the DNA of the bacteria from which it is produced?

   (c) During artificial transformation process, after the heat shock step, bacterial cells are usually transferred to nutrient medium and incubated for some time without any antibiotic. What is the reason of it?

   (d) More efficient cloning of insert is achieved by minimizing vector self-ligation. Justify the statement. How this self-ligation is prevented?

   (e) What is the function of the dideoxynucleotides in Sanger's method of DNA sequencing?

   (f) Define 'threshold cycle' (Ct) in Real Time PCR.

   (g) Describe how primer with low Tm and secondary structure affects the PCR yield.

   (h) Discuss the principle of 'Prodrug therapy'.

2. (a) Briefly describe the underlying principle of Real Time PCR. 3

   (b) How can we calculate the initial target copy number and determine the efficiency of Real Time PCR? 2

   (c) PCR is typically used to amplify target DNA that lies between two known sequences. Devise a variation of the usual PCR protocol that would enable you to amplify a target DNA of unknown sequence. 3

3. (a) You want to make a genomic DNA library with DNA fragments of average size 40 kb. Explain which vector will be most suitable for the purpose and why? 2+1

   (b) Elucidate a method for screening a c-DNA library with a nucleic acid probe to find out the desired clone. 3

   (c) What are the differences between c-DNA library and Genomic DNA library? 2

4. (a) What is 'DNA microarray'? 3
   (b) What types of errors are associated with shotgun sequencing of complex eukaryotic genomes? 1
   (c) What do you mean by 'Directional Cloning'? Mention two advantages of this method. 2+2

5. (a) What are the essential features of an expression vector? 3
   (b) Why inducible promoters are preferred over constitutive ones in the construction of an expression vector? 2
   (c) Describe the strategy for the development of baculovirus expression system. 3

6. (a) What are the advantages of pUC vectors over pBR322? 2
   (b) What are 2μM plasmids? Why are they unstable? 2
   (c) What is a reporter gene? Explain with an example. 2
   (d) Give the screening principle of recombinants when you are using YAC vectors. 2

7. (a) What are lambda insertion vectors? How do they differ from replacement vectors? 4
   (b) How many numbers of independent recombinants are required for creation of genomic library of 2.8×10^6 kb genome considering average clone fragment size is 25 kb (ensuring 99% probability of including any particular sequence in random manner). 3
   (c) What is the use of Klenow fragment in RDT? 1

8. (a) What are advantages of stable transfection over transient transfection? 2
   (b) Why microinjection cannot be used to deliver gene into selected plant cell? 2
   (c) Explain with suitable example how can RFLP be used for determining genetic disease. 3
   (d) What better technique can be suggested to replace RFLP? 1

9. (a) Describe the basic principle of site directed mutagenesis. 3
   (b) Why expression of recombinant protein of human origin like insulin is preferred in yeast system than *E. coli*? 2
   (c) Explain two methods by which therapeutic genes can be delivered to patient for the purpose of gene therapy. 3

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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