Ahmedabad University

School of Arts and Sciences

BIO500 Recombinant DNA Technology

Mid Term Examination 2022 (Winer Semester)

Total Marks = 30 **Time – 90 Minutes**

Enrolment Number:.....
Date: 19-09-2022
No. of printed pages: 3

Attempt *ALL* the questions

1. SmaI and XmaI two restriction enzymes recognize same sequence CCCGGG, but SmaI digest phosphodiester bond between C and G (CCC/GGG) and XmaI digest phosphodiester bond between C and C (C/CCGGG). So, SmaI and XmaI are _____ of each other.
   a. Star activators
   b. Neoschizomers
   c. Linkers
   d. Isoschizomers

2. Which of the following chemical is used to make recombinant plasmid permeable to Cell?
   a. $CaCl_2$
   b. $CsCl_2$
   c. HCl
   d. NaCl

3. Which of the following discontinuities can be repaired by Ligase enzyme in the cell?
   a. Missing phosphodiester bond in one strand
   b. Absence of Nucleotides in one strand
   c. Absence of Nucleotides in both the strands
   d. Missing phosphodiester bond in both the strands

4. Trisha is performing cloning and sequence of her insert is CCCCCATGCCATTCGATTTCGGCCCCC. Which enzyme will she use to put the correct sticky ends on to the DNA fragments?
   a. Endonuclease
   b. Terminal deoxynucleotide transferase
   c. Ligase
   d. Polymerase

5. Researcher transformed 100ng recombinant plasmid in E. coli cells and spread them on X-gal containing media, He got 10 white color colony and 5 Blue color colony. So, transformation efficiency will be ___
   a. 100
   b. 0.1
   c. 10
   d. 1

6. Which of the following restriction enzymes given below cut the following DNA sequence?

   5'-CCGATATCTCGAGGGC-3'

   P. BamHI (3'-CCTAG-G-5')
   Q. XhoI (3'-GAGCT-C-5')
   R. EcoRI (3'CTTAA-G-5')
   S. EcoRV (3'CTA-TAG-5')
   a. P &Q
   b. P, R & Q
   c. Q & S
   d. P & S

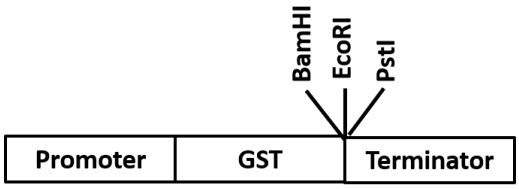
7. Which of the following statements is not correct in regards to competence?
   a. Natural ability to take up the exogenous DNA material
   b. Bacteria may develop new biochemical abilities under special conditions such as nutrient deprivation
   c. It is not limited to particular growth phases
   d. Induction of specific set of bacterial proteins may take place

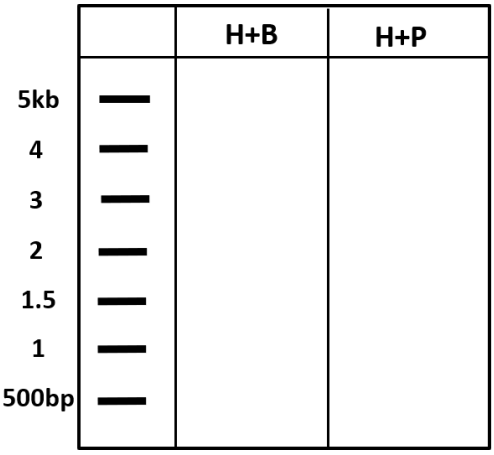
8. Explain Nomenclature **[2 marks]**
   (Answer expected: one line description)
   i. HindIII
   ii. pBR322

9. How ColEI plasmid control it's copy number? Explain briefly **[4 marks]**

10. You are inserting a gene of 2kb length into a vector of 3kb to make a GST fusion protein. The gene is being inserted at the EcoRI site and the insert has a HindIII site 500bp downstream of the first codon. You are screening for the clone with the correct orientation by restriction digestion of the plasmid using HindIII+BamHI (H+B) and HindIII+PstI (H+P). The map of the relevant region of the vector is shown below.
    Explain and Draw expected bands on the given agarose gel **[3 marks]**

(**Answer expected: 4 bands= 2 marks and 1 mark for correct explanation**)





11. What is the significance of the restriction system in bacteria ? How many types of restriction-modification systems have been identified in bacteria ? **(3 marks)**
12. Enlist the different classes of DNA ligases depending upon the co-factor requirement and the organisms in which they are found. **(3 marks)**
13. Distinguish between linkers and adaptors? What is their significance in cloning experiments? **(2 marks)**
14. Why do we use Restriction endonucleases from the type II class for cloning ? **(3 marks)**
15. What are plasmids ? Enlist the desirable qualities of plasmids to be used as cloning vectors. **(3 marks)**