Shahjalal University of Science and Technology, Sylhet

Department of Biochemistry and Molecular Biology

Full Marks: 20 **BMB 328 Genetic Engineering** **Time: 1 Hour**

1. Explain what is meant by the following terms in Genetic Engineering: **.75x5=3.75**
   (a) Recombinant DNA
   (b) A Plasmid
   (c) Restriction enzyme
   (d) Linkers
   (e) Shuttle vector

2. Scientists use restriction enzymes isolated from bacteria for DNA cloning. How do bacteria prevent restriction enzymes from dicing up their own DNA? **1.0**

3. When plasmid vector is treated with restriction enzyme to create the cohesive ends for joining a foreign DNA fragment into it, the major difficulty arises at that time. The cohesive ends of broken plasmid join with each other instead of joining with foreign DNA and get recircularized. How we overcome this difficulty? **1.25**

4. You have been working on cloning a very long segment (typically 100 to 300 kbp) of DNA into a cloning vector and would expect to detect your recombinant plasmid from the color of the colonies grown on culture plate. Which vector system can you use to ensure your criteria and how? **2.5**

5. Insulin is a hormone produced by the pancreas, which reduces the concentration of glucose in the blood. People, who cannot produce insulin, or not enough of it, are called diabetics. Many diabetics need daily injections of insulin. For many years this insulin has been extracted from the pancreas of pigs, sheep and cattle. Human insulin can now be produced by chemically synthesizing the DNA sequence responsible for insulin production and transfer it to *E. coli* host along with pBR322 cloning vector system through genetic engineering technique.

   (a) Explain the important features of using pBR322 vector in compare with other cloning vector for insulin production. **1.0**

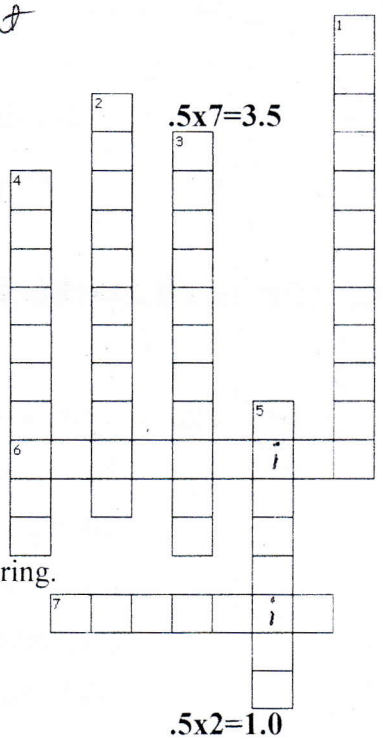
   (b) Explain how, pBR322 plasmid can be used to clone insulin producing DNA sequence in *E. coli* and identify cells containing it? **2.5**

   (c) Explain the properties of *E. coli* cells that make it competent to use as host for cloning the pBR322 plasmid. **1.0**

Screening
~~Blue~~ selection
Screanning

1. Modification 2000p00
2. Restriction
3. Recombinant
4. Screanning
5.
6. Isolation

6. Genetic Engineering Crossword **.5x7=3.5**



Down

1. Genetic engineering is defined as the _____ and alteration of genes.
2. The type of enzyme used to cut strands of DNA
3. The DNA that has been changed in the process of genetic engineering is called _____ DNA
4. The final stage in the process of genetic engineering
5. The sticking of the target gene in to the plasmid is referred to as _____

Across

6. The first stage in genetic engineering.
7. The extra chromosomal DNA in the bacteria cell, used in genetic engineering.

7. In each of the following which is the correct answer: **.5x2=1.0**

(a) Genetic engineering:

1) Is a natural process
2) Only takes place in micro-organisms
3) Happens when cells divide
4) Involves combining DNA from different species

(b) Which of the following is not associated with genetic engineering?

1) Translation
2) Transformation
3) Cloning
4) Expression

8. Select the best word from the list below to fill in the blanks. Not all words will be used and each word should be used only once. **.5x6=3.0**

A YAC vector includes an origin of replication (*ori*), a **(a)**_____, **(b)** _____, and selectable **(c)**_____. Digestion with *Bam*HI and *Eco*RI generates two separate **(d)**_____, each with a telomeric end and one selectable marker. A large segment of DNA (e.g., up to **(e)**_____ from the human genome) is ligated to the two arms to create a yeast artificial chromosome. The YAC transforms yeast cells (prepared by removal of the cell wall to form spheroplasts), and the cells are selected for **(f)**_____; the surviving cells propagate the DNA insert.

Telomere (TEL)	Marker X	DNA arms	$3x10^8$ bp	Markers (*X* and *Y*)	Two telomeres (TEL)
X and Z	$2x10^6$ bp	*X* and *Y*	Arms	$3x10^8$ kbp	Centromere (*CEN*)