KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF MASTER OF SCIENCE IN BIOTECHNOLOGY

SBC 530 – PRINCIPLES OF GENETIC ENGINEERING

DATE: FRIDAY, 30TH MARCH 2012 **TIME: 9.00 A.M. – 12.00 P.M.**

INSTRUCTIONS

ANSWER ALL QUESTIONS – 5 MARKS EACH

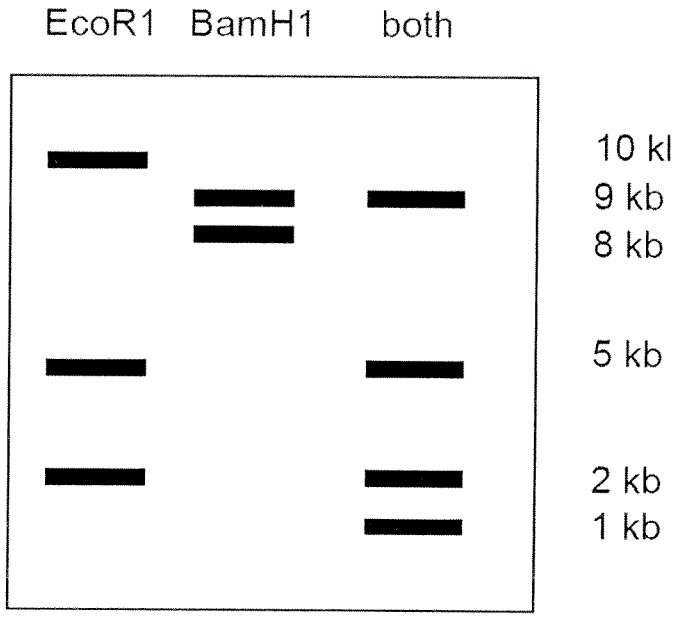
1. A linear DNA molecule is subjected to complete restriction digestion by (1) EcoR1 alone, (2) BamHI alone, and (3) both enzymes together.

The fragments are run on a gel. Results are shown below.

(a) How long is the original DNA molecule? (2MKS)

(b) How many EcoR1 recognition sites does it have? (2MKS)

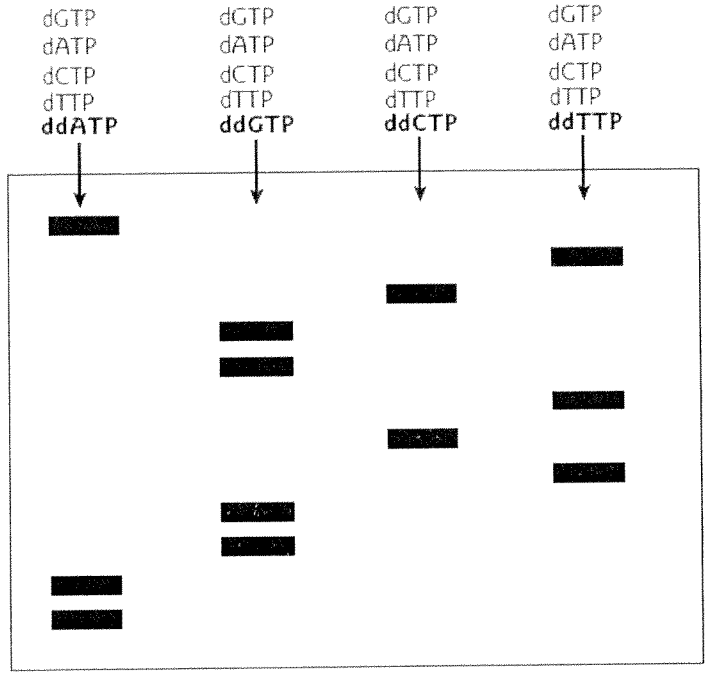
(c) Does the longest EcoR1 fragment contain a BamH1 restriction site? (1 MK)



2. What are the key features of a plasmid vector when considering their use in recombinant clone production?

3. A chromatographic column in which oligo-dT is linked to an inert substance is useful in separating eukaryotic mRNA from other RNA molecules. On what principle does this column operate?

4. The nucleotide sequence of a DNA fragment was determined by the Sanger (dideoxy) DNA sequencing method. The data are shown below. What is the 5′ → 3′ sequence of the nucleotides in the original DNA fragment?



5. Some diseases that have gene therapy studies in clinical trials, describe how delivery of DNA to target cells is achieved and the pros and cons for the delivery vectors.

6. List FIVE therapeutic proteins produced by recombinant DNA technology

7. Outline the basic steps in a DNA extraction procedure

8. Outline the steps involved in using bacteria to produce human insulin

Section B – answer any THREE questions

1. Recent work has shown that double stranded RNA mediated silencing holds promise in controlling crop pathogens.
   a) Explain the basic principle of RNA interference (10 mks)
   b) Describe – using an example how RNAi can be used to control pathogens. (10 mks)

2. a) Describe the process of constructing a genomic DNA library using a Bacteria Artificial Chromosome (BAC) vector (10 mks)
   b Why are BAC desirable as vectors? (5 mks)
   c) Differentiate between a genomic and an expression library (5 mks)

3. Outline the Cyclic reversible termination method as it is used in imaging in Illumina/Solexa sequencing

4. The three principal methods used for the creation of transgenic animals (20 mks).

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