Question Paper

Exam Date & Time: 24-Apr-2018 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
IV SEMESTER B.S. (ENGG.)
END - SEMESTER THEORY EXAMINATIONS APRIL - 2018
DATE: 24 APRIL 2018
TIME: 9:30 AM TO 12:30 PM

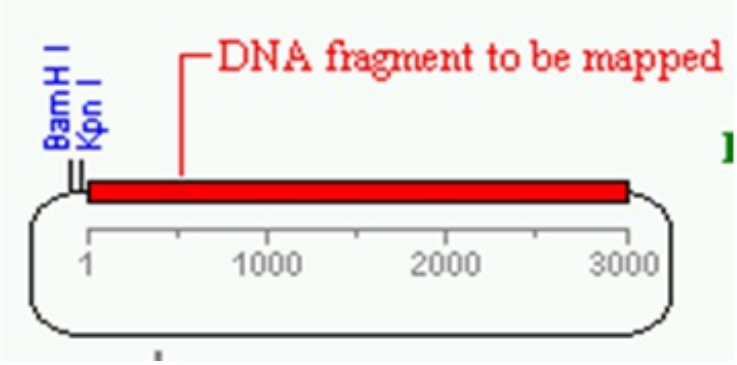
Marks: 100 **Duration: 180 mins.**

Answer 5 out of 8 questions.

1)		What is the difference between a cloning and an expression vector? Draw the sketch of an expression vector?	(6)
	A)		
	B)	What is a restriction-modification system? Why did it evolve in bacterial systems? How could it prove dangerous to the bacterial existence?	(6)
	C)	Compare and contrast the ori sequences in prokaryotes and eukaryotes. What do you mean by the copy number of a plasmid? How should this be for an ideal cloning vector?	(8)
2)		State the salient features of the restriction modification systems I and III.	(6)
	A)		
	B)	What do you mean by nucleic acid hybridization? What is the reverse process called? Write briefly the procedure of hybridization.	(6)
	C)	How is Southern blotting performed? Discuss in detail with the aid of a labelled schematic.	(8)
3)		Discuss the production methods and salient features of synthetic oligonucleotide probes and single-stranded DNA probes.	(6)
	A)		
	B)	What is the necessity for DNA libraries? Using bacteriophage as a vector, discuss the complete method for the creation of a genomic DNA library.	(6)
	C)	What is the Shine-Dalgarno sequence? Explain its significance in an expression vector. Show with a diagram, how its presence influences the binding of different types of RNA.	(8)

4)	A)	Taking your own examples of dNTPs, explain with the help of a diagram, the process of homopolymer tailing.	(6)
	B)	What are the three types of prokaryotic methylases? Explain the activity of methylases with an example each.	(6)
	C)	Name any four radioactive methods of labelling probes. What are the demerits of radioactive methods of labelling? Discuss the method of non-radioactive of labelling using digoxigenin.	(8)
5)	A)	What is the general method followed for mapping the restriction sites on a given DNA fragment? Assume that there are 3 restriction sites: 1 for an enzyme and 2 for another enzyme. What are the precautions to be considered when carrying out interpretations from the agarose gel for restriction mapping?	(6)
	B)	With a brief note on the features of linkers, outline the process of using linkers in genetic engineering techniques. What is the advantage of using linkers?	(6)
	C)	Discuss on the three basic steps of a polymerase chain reaction. Enlist atleast four factors that influence the amplification process in a PCR.	(8)
6)	A)	What is the alternative tool for linkers in genetic engineering? Explain their use in a typical application of your choice. How do you get back the foreign DNA back from the vector, if required, in this case?	(6)
	B)	What is meant by RFLP? What is the technique to determine the location of RFLPs in a given genome?	(6)
	C)	Define SNP. How is it different from a mutation? Why are they significant? What are the different types and sub-types of SNPs?	(8)
7)	A)	What are herbicide-resistant plants? Explain the mechanism of action behind the creation of Roundup Ready plants.	(6)
	B)	What are the two broad types of gene therapy? Discuss on any two non-viral strategies of gene transfer for effective gene therapy.	(6)
	C)	Discuss any three chemical-mediated methods for transfection of plant cells. Add a note on protoplast fusion.	(8)
8)	A)	Write the complete procedure for DNA sequencing using the Maxam-Gilbert Sequencing Method.	(10)
	B)	Consider a plasmid that contains a 3000-bp unknown insert	(10)

DNA fragment. Recognition sites for the enzymes Kpn I and BamH I are present within the vector as shown:



Upon digestion with Kpn I only, a 1000 bp and a larger fragment was obtained. With Bam HI, the fragments were 600 bp, 2200 bp and a larger fragment. Upon using both the enzymes, the fragments were 600 bp, 1000 bp, 1200 bp & a big fragment. With these available data, construct the restriction map in the 3000-bp insert DNA.

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