U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

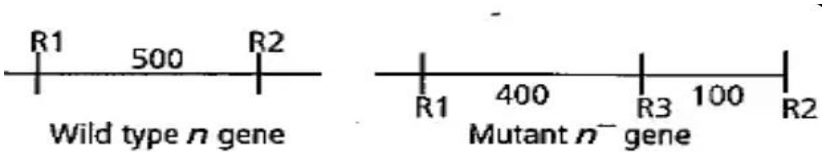
Autonomous Institute Affiliated to VT

October 2024 Supplementary Examinations

Programme: B.E. **Semester: VI**
Branch: Biotechnology **Duration: 3 hrs.**
Course Code: 22BT6PCGAP **Max Marks: 100**
Course: Genomics & Proteomics

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

				CO	*PO*	Marks
			Unit 1			
1	a)	One of the recent developments in DNA sequencing methodologies involves a technique wherein the addition of a nucleotide is detected by chemilumniscence. Identify the technique and explain its working with a neat labelled diagram What is the advantage of adding a nucleotide one after another separately?		*CO* 1	*PO 1,5, 12*	**8**
	b)	It has been observed that there is a significant difference in the genomic content between a fruit fly (1.4x10^8 bp) and a house fly (691Mbp), where the body pattern is more or less the same with the exception of body size. What is this observation called? What could be the probable reasons?		*CO* 1	*PO 1,5, 12*	**4**
	c)	Using *Haemophilus influenzae* as an example, illustrate with neat labelled diagrams how the shotgun method is used to sequence a small bacterial genome.		*CO* 1	*PO 1,5, 12*	**8**
		Unit 2				
2	a)	Differentiate between genetic mapping and physical mapping		*CO* 2	*PO 1,5, 12*	**4**
	b)	The figure shows the restriction enzyme cutting sites (R1-R3) in wild type (n) and mutant (n−) gene. If a radioactively labelled probe (that hybridizes at a sequence close to R1) is used for detecting the presence of DNA fragments after gel electrophoresis and Southern blotting diagrammatically represent the pattern that will be obtained. Give reasons for your answer, Note: L1 : wild type DNA, L2 : mutant DNA 		*CO* 2	*PO 1,5, 12*	**4**
	c)	What is optical mapping? Illustrate its principle and working.		*CO* 2	*PO 1,5, 12*	**6**

		d)	What is FISH and how is it used to construct a physical map? Explain the technique involved.	*CO* 2	*PO 1,5, 12*	**6**
			Unit 3			
	3	a)	Fire et al in 1998 demonstrated that gene inactivation can be brought about by placing *C. elegans* worms in a solution containing the double-stranded RNA and allowing normal uptake processes to transport the molecules into the cells. Why do you think this was feasible? Justify your answers explaining the technique adopted with a neat labelled diagram	*CO* 3	*PO ,5, 12*	**7**
		b)	What is "STS"? What are the criteria for a DNA sequence to qualify as a "STS".	*CO* 3	*PO ,5, 12*	**5**
		c)	"Differential-display reverse transcription PCR (DDRT-PCR) is a PCR-based method that allows extensive analysis of gene expression among several cell populations" Justify this statement illustrating the working and principle of this technique	*CO* 3	*PO ,5, 12*	**8**
			OR			
	4	a)	What are DNA microarrays? How can they be used for determining gene expression levels?	*CO* 3	*PO ,5, 12*	**7**
		b)	Amplified Fragment Length Polymorphism (AFLP) is an invaluable fingerprinting technique for genomic, transcriptomic and epigenetic studies. "Justify this statement explaining the technique involved with neat labelled diagrams	*CO* 3	*PO ,5, 12*	**7**
		c)	Explain why ORF scanning is a feasible way of identifying genes in a prokaryotic DNA sequence	*CO* 3	*PO ,5, 12*	**6**
			Unit 4			
	5	a)	How can ICAT be used for comparison of protein samples rich in cysteine residues? Explain illustrating its workflow. How is it different from iTRAQ?	*CO* 3	*PO ,5, 12*	**12**
		b)	Identify an electrophoresis technique which can be used to compare and analyse two or more protein samples simultaneously. Explain its working with a schematic	*CO* 3	*PO ,5, 12*	**8**
			OR			
	6	a)	What is SELDI ? How is it different from MALDI	*CO* 3	*PO ,5, 12*	**4**

		b)	In tumor microenvironment, interactions among multiple cell types are critical for cancer progression. To understand the molecular mechanisms of these complex interplays, the secreted protein analysis between malignant cancer cells and the surrounding nonmalignant stroma is a good viewpoint to investigate cell-cell interactions. Suggest a suitable quantitative MS based proteome labelling technique that can be used for this study. Illustrate the work flow involved in this technique	*CO* 4	*PO 1, 12*	**10**
		c)	Martin et al (2022) reported the use of MudPIT to analyze plasma proteome of astronauts collected before, during and after spaceflights . (i) What is MudPIT? (ii) Why was MudPIT technology chosen in this study ? (iii) Suggest a workflow for this study.	*CO* 4	*PO 1, 12*	**6**
			Unit 5			
	7	a)	How can Y2H assay be used to detect protein-protein interactions.? Explain with neat labelled diagrams	*CO* 4	*PO 1, 12*	**8**
		b)	"Nano Proteomics "is an emerging area of biomedical research ". Justify this statement explaining the advantages of using Carbon nanotubes in clinical proteomics.	*CO* 4	*PO 1, 12*	**5**
		c)	What is immunoprecipitation? With a neat labelled diagram explain its principle and working	*CO* 4	*PO 1, 12*	**7**

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