Name: Enrolment No:	

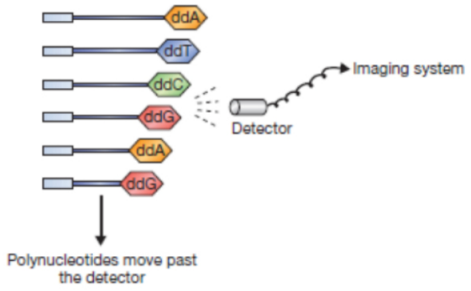
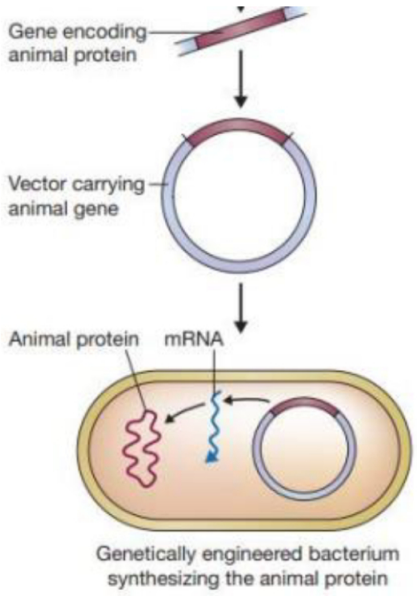
UPES
End Semester Examination, December 2024

Course: Biotechnology — Semester: III
Program: B. Tech Biotechnology — Time: 03 hrs
Course Code: HSMB 8003 — Max. Marks: 100
Instructions: Answer all questions

Q. No	Section A MCQs/True &False	(20x1.5= 30 Marks)	COs
Q	Statement of question (each question carries 1.5 marks)		CO
1.	What is the primary function of restriction enzymes in biotechnology? a) DNA ligation b) DNA replication c) DNA transcription d) DNA fragmentation	1.5	CO1
2.	Which technique is used to separate and analyze DNA fragments based on their size in biotechnology? a) Gel electrophoresis b) DNA sequencing c) Southern blotting d) Polymerase chain reaction (PCR)	1.5	CO1
3.	What gives shape to the plant or microbial cells? a) Cytoplasm b) Exoskeleton c) Nuclear membrane d) Nucleus	1.5	CO2
4.	What are designed to detect specific target DNA molecules? a) Ammonia probes b) Phosphodiester bond probes c) Nucleic acid probes d) Ribose sugar probes	1.5	CO1
5.	The term ‘endonuclease’ refers to cutting the DNA sequence from _____ a) only within the polynucleotide chain, not at the ends b) the ends of the chain c) anywhere in the chain d) exactly in the middle of the chain	1.5	CO2
6.	Direct alteration of particular parts of protein as a way of probing the relationship between structure and function is termed as: a) genetic engineering b) protein engineering c) alteration of protein function d) structure engineering	1.5	CO3
7.	If a functional gene is disrupted while disrupting a restriction site _____ is created. a) frameshift mutation b) point mutation	1.5	CO2

	c) either of the mutations d) any other kind of mutation		
8.	Mobile genetic elements can be transferred from one DNA portion to another. The enzyme carrying out this is _____ a) Ligase b) Transcriptase c) Transposase d) Endonuclease	1.5	CO2
9.	There are various methods to distinguish whether a colony contains a recombinant or not. One such method is _____ a) blue-white screening b) checking whether replication is taking place or not c) checking the number of copies d) looking for the multiple cloning site	1.5	CO3
10.	Often PCR can be performed in order to confirm whether an insert is present in the plasmid. Cells are taken directly and PCR is performed, this type of PCR is known as _____ a) direct PCR b) colony PCR c) quantitative PCR d) in-situ PCR	1.5	CO3
11.	What will be the consequence of not having an origin of replication (ori) in the vector? a) If an ori is absent, replication of vector would not take place b) As the cells divide after taking up the vector, both the daughter cells would have the vector c) A colony of transformed colonies is observed d) The vector won't be taken up by the cell	1.5	CO2
12.	Multiple cloning site (MCS) is defined as _____ a) site within the plasmid which contains a site for many restriction enzymes b) site within the plasmid which contains a site for many restriction enzymes and they are not present anywhere else in the plasmid c) as the site contains many sites for only one restriction enzyme d) cloning many inserts together	1.5	CO3
13.	If a high copy number is there, the replication is called _____ and if a low copy number is there the replication is called _____ a) stringent, relaxed b) relaxed, stringent c) relaxed, relaxed d) stringent, stringent	1.5	CO2
14.	GFP is one of the markers which is used for screening libraries in hosts other than E. coli. Choose the incorrect statement for GFP. a) It stands for Green Fluorescent Protein b) It is obtained from a bio-luminescent jellyfish and produces protein aequorin which emits blue light c) The blue light is produced because of binding of sodium ions d) The absorbed blue light produces green light which can be detected further	1.5	CO3
15.	Insertional and replacement vectors are types of _____-based vectors. a) Lambda b) M13 c) Yeast d) BAC	1.5	CO4

16.	What modifications are done to the phage vector for creating derivative vectors? a) Origin replacement b) Deletions c) Antibiotic resistance incorporated d) Hybridization	1.5	CO4
17.	Which among the following are the smallest plasmid and an ideal cloning vector? a) ColE1 b) RP4 c) PUC8 d) F	1.5	CO3
18.	Degradative plasmid TOL, responsible for the metabolism of toluene is present in which of the organisms? a) E. coli b) Saccharomyces cerevisiae c) Staphylococcus aureus d) Pseudomonas putida	1.5	CO4
19.	Genomic library construction is concerned with _____ a) Gene isolation b) Protein production c) Antibiotics d) Regeneration	1.5	CO4
20.	How can conjugative and non-conjugative plasmids be differentiated? a) based on size b) Presence of antibiotic resistance c) Number of cloning and digestion sites d) Presence of transfer genes	1.5	CO3
	Section B	(4x5=20 Marks)	CO
Q	Statement of question (each question carries 5 marks)		
1.	(a) Draw a well-labeled restriction map for a bacteriophage. (b) Discuss two major challenges while designing Cloning vectors based on lambda-phages.	2+3	CO1
2.	Compare the following citing relevant examples and restriction maps: a) Insertion vectors b) Substitution vectors	2+3	CO2
3.	a) What are COSMIDS? b) With the help of a diagrammatic flowchart, briefly discuss how COSMIDS are used to clone long fragments of DNA.	2+3	CO3
4.	a) What are YACS? b) Discuss the applications of YAC vectors in cloning.	2+3	CO4
	Section C	(2x15=30 Marks)	
Q	Statement of question (Case studies) (each question carries 15 marks)		CO
1.	In relevance to the diagram below, answer the following techniques: a) What is the technique shown in the diagram? Briefly explain the principle of this technique.	15	CO3

	b) Name the first, i) Single-celled eukaryote ii) Multi-celled eukaryote, whose genomes were first sequenced. c) Briefly discuss the role of the following reagents in this technique. i). Primer ii). dNTP iii). ddNTP d) Discuss all the steps involved while performing this technique. e) Name the specialized enzyme and its unique characteristic trait that makes it an ideal polymerase for the technique, in question.  	(2+2+3+4+4)	
2.	Regarding the diagram below, answer the following questions: a) Differentiate between cloning and expression vectors. b) Briefly discuss the three essential regions that form a cassette in an expression vector. c) Outline the characteristic traits of the promoter to be used in an expression vector. Give an example of one such promoter. d) What are fusion proteins? Discuss the advantages and disadvantages of fusion proteins. e) Interpret the significance of Cyanogen Bromide in the production of recombinant proteins.  	15 (2+6+2+3+2)	CO4

	Section D	(2x10=20 Marks)	
Q	Statement of question (each question carries 10 marks)		CO
1.	Briefly outline the aim, principle, and steps involved in the following techniques: i) Pyrosequencing ii) Western Blotting	5+5	CO2
2.	Briefly discuss the cloning vectors used for transformations in: a) Higher Plants b) Insects	5+5	CO4