Name: Enrolment No:	

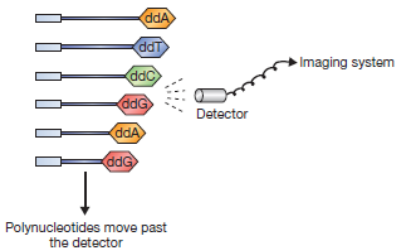
UPES

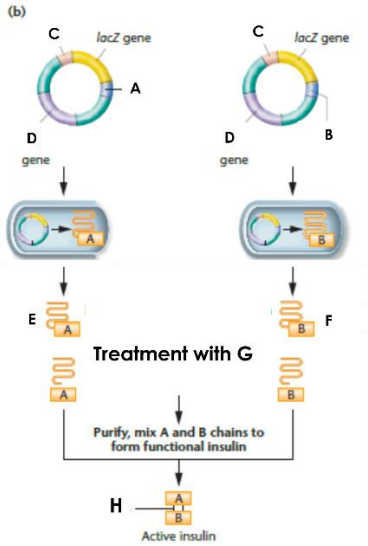
End Semester Examination, May 2024

Course: Genetic Engineering and Omics — Semester: VI
Program: B. Tech Biotechnology — Time: 03 hrs
Course Code: HSMB 3027 — 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.	Plasmids and _____ can replicate within bacterial cells independent of the control of chromosomal DNA. a) bacteriophages b) fragments c) bacteria d) clones	1.5	CO1
2.	What helps in identifying successful transformants? a) Ori b) Viruses c) Selectable markers d) Enzymes	1.5	CO1
3.	The process by which a foreign DNA is introduced into bacteria is called _____ a) amplification b) transformation c) infection d) digestion	1.5	CO1
4.	Insertion of recombinant DNA within the gene encoding for β–galactosidase leads to _____ a) amplification b) transformation c) insertional inactivation d) cloning	1.5	CO2
5.	Which organism can transfer 'T-DNA' within plants? a) Agrobacterium tumifaciens b) E.coli c) Aspergillus niger d) S. typhi	1.5	CO2
6.	Which plasmid of Agrobacterium tumifaciens leads to tumor formation in dicots? a) F plasmid b) Ti c) pUC d) pBR	1.5	CO3
7.	At times, the gene which is cloned is not well known for the protein encoded by it. To access the function, the endogenous gene for the mutant strain is inactivated. This technique is called as _____ a) reverse genetics b) protein engineering	1.5	CO2

	c) mutation d) location of function		
8.	The presence of insert in a phage genome leads to inactivation of which gene? a) cII b) cI c) cIII d) both cII and cIII	1.5	CO2
9.	A portion of phage is removed and in place of it, the DNA of interest is inserted. This type of vector is called as _____ a) displacement vector b) insertion vector c) substitution vector d) transposition vector	1.5	CO3
10.	The fragment inserted in the place of the central portion of the genome is known as _____ a) insertion fragment b) substitution fragment c) stuffer fragment d) displacement fragment	1.5	CO3
11.	Lambda-EMBL4 is an example of _____ a) Insertion vector b) Replacement vector c) Hybrid vector d) Mammalian vector	1.5	CO2
12.	Which of the following is not an important signal for the E.coli genes? a) Promoter b) Terminator c) Inducer d) Ribosome binding site	1.5	CO3
13.	What could be a possible reason for the non-expression of a foreign gene in an E. coli host? a) Recognition of expression signals b) Non-recognition of expression signals c) Indefinite size d) Inefficient ligation	1.5	CO2
14.	Chimeras in cloning science refer to _____ a) Plural molecules b) Single Entity c) Admixture of proteins d) Composite molecule	1.5	CO3
15.	The protein bands transferred by the western blotting are previously _____ a) Electrophoresed b) Heated c) Calibrated d) Mixed	1.5	CO4
16.	The labeled nucleic acid used for detection is called _____ a) Probe b) Gene c) Analyte d) Sample	1.5	CO4
17.	Chain-termination is a type of _____ a) Sequencing	1.5	CO3

	b) Vector Generation c) Antibiotic production d) Gene manipulation		
18.	Which of the following acts as a chain terminator? a) Exogenous RNA b) DNA c) Deoxynucleotides d) Dideoxynucleotides	1.5	CO4
19.	Which DNA is restricted to making a genomic library? a) Genomic b) Plasmid c) Phage d) Plant	1.5	CO4
20.	State True or False: ChIP is used to determine DNA-protein interactions.	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 of pBR322. b) Discuss the advantages and disadvantages of using pBR322 as a cloning vector.	2+3	CO1
c)	a) Compare between Linkers and adaptors? b) Discuss the issues that arise while using adaptors in the cloning experiments and what strategy would you opt to resolve the same?	2+3	CO2
d)	(a) Draw a well-labeled diagram of the genome organization in λ-bacteriophage. (b) Citing examples from the λ-genetic map, discuss what are clustered genes?	3+2	CO3
e)	(a) With the help of relevant examples compare lambda-based i). Insertion vectors ii). Substitution vectors	5	CO4
	Section C	(2x15=30 Marks)	
Q	Statement of question (Case studies) (each question carries 15 marks)		CO
1.	 In relevance to the given diagram answer the following questions: a) What is the technique shown in the diagram above? Who discovered it? b) What information does this technique give you?	15 (2+2+3+2+2+2+2)	CO2

	c) Briefly explain the principle on which the technique works. d) What are the reagents and template you would need to perform the technique? e) Compare between dNTPs and ddNTPs. f) What is a fluorophore? Which molecule is tagged with a fluorophore in this technique and why? g) What is the role of polyacrylamide slab gel, or a capillary gel system in this technique?		
2.	 In relevance to the given diagram answer the following questions: a) Label A-H b) What is the biomolecule being produced and the type of vector being used in this setup? c) What are fusion proteins? Highlight the fusion proteins being synthesized here. d) List a few advantages that the fusion proteins offer. e) What is a major drawback associated with fusion proteins? f) Briefly describe the challenges met with E.coli as a host for eukaryotic recombinant protein synthesis.	15 (4+2+2+3+1+3)	CO3
	Section D	(2x10=20 Marks)	
Q	Statement of question (each question carries 10 marks)		CO
1.	a) What is an expression vector? With the help of a well-labeled diagram briefly describe the expression signals that form a cassette. b) How P-elements are used for cloning in insects? Explain with the help of a diagram.	5+5	CO2
2.	a) Describe the role of the following reagents while running an SDS-PAGE (i) Ammonium persulphate (ii) TEMED (iii) SDS (iv) B-Mercaptoethanol (v) Coomassie Brilliant Blue b) Compare between BACs and YACs	5+5	CO4