

MOLECULAR BIOTECHNOLOGY

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which of the following is TRUE about linkers and adaptors? a) Both are single-stranded DNA molecules b) Linkers generate blunt ends, while adaptors generate sticky ends c) Both are used to introduce restriction sites into DNA d) Adaptors are only used in RNA cloning	K1	CO1
	2	Show that Cosmids are hybrid vectors combining features of: a) Plasmids and ribosomes b) Plasmids and bacteriophages c) Plasmids and transposons d) Viruses and introns	K2	CO1
2	3	Which of the following vectors is commonly used for constructing genomic libraries? a) Expression vectors b) Bacteriophage λ vectors c) Shuttle vectors d) Retroviral vectors	K1	CO2
	4	Infer the technique that is typically used to detect cloned genes in HRT a) Southern blotting b) Northern blotting c) Western blotting d) ELISA	K2	CO2
3	5	The reporter gene <i>lacZ</i> encodes which enzyme? a) β-lactamase b) β-galactosidase c) β-glucuronidase d) β-oxidase	K1	CO3
	6	Which gene delivery method is most suitable for large animal embryos? a) Microinjection b) Electroporation c) Biolistic method d) Liposome-mediated transfer	K1	CO3
4	7	How a Liposome-mediated gene delivery works by? a) Using DNA-coated metal particles b) Viral infection c) Fusion of lipid vesicles with the cell membrane to deliver DNA d) Bacterial conjugation	K1	CO4
	8	Which international agreement regulates patents and intellectual property globally? a) GATT b) WTO-TRIPS Agreement c) UN Charter d) Kyoto Protocol	K4	CO4
5	9	What are induced pluripotent stem cells (iPSCs)? a) Stem cells isolated from embryos b) Adult cells reprogrammed to behave like pluripotent stem cells c) Dead stem cells d) Stem cells from umbilical cord only	K1	CO5
	10	Which disease was among the first successfully treated with gene therapy? a) Cystic fibrosis b) Severe Combined Immunodeficiency (SCID) c) Hemophilia A d) Diabetes mellitus	K1	CO5

Cont...

Module No.	Question No.	Question	K Level	CO
1	11.a.	Solve how different types of restriction enzymes cut specific sequence in DNA to create a palindrome sequence with example.	K3	CO1
	(OR)			
	11.b.	Organize the structural features and uses of YAC vector.		
2	12.a.	Explain how colony hybridization helps in identifying colonies that contain the desired recombinant DNA?	K2	CO2
	(OR)			
	12.b.	Summarize the principle and steps involved in preparing a microarray experiment for analyzing gene.		
3	13.a.	Compare and contrast chemical methods (Calcium phosphate precipitation) with physical methods (electroporation) for gene delivery into animal cells.	K4	CO3
	(OR)			
	13.b.	Analyze the steps involved in the nuclear transfer technique indolly the sheep, and evaluate the factors that contributed to the success or failure of this cloning experiment.		
4	14.a.	Deduct how Agrobacterium tumefaciens are used to transfer a foreign gene into a plant cell, and explain the role of the Ti plasmid?	K5	CO4
	(OR)			
	14.b.	Assess the knowledge of genetic engineering to explain how the EPSPS gene can be introduced into a crop plant to develop glyphosate resistance transgenic plants.		
5	15.a.	Analyze the properties of stem cells and evaluate how these properties influence their use in medicine and research.	K4	CO5
	(OR)			
	15.b.	Examine the challenges in using stem cells in Alzheimer's patients, and analyze how these challenges impact therapeutic outcomes.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Summarize the steps involved in constructing a recombinant DNA molecule using restriction enzymes, ligases, and vectors.	K2	CO1
2	17	Organize the steps involved in constructing cDNA library from mRNA.	K3	CO2
3	18	Explain the steps involved in the production and application of transgenic mice.	K5	CO3
4	19	Analyze the different types of IPR and evaluate their significance in protecting biotechnological inventions.	K4	CO4
5	20	Develop a strategy comparing in vivo and ex vivo gene therapy approaches for treating a specific disease, explaining which method would be most effective and why?	K6	CO5

Z-Z-Z

END