QPC: RD20BTECH321 AR 20 Reg. No

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fifth Semester – Regular) Examinations, December – 2022

BPCBT5010 – Genetic Engineering and r-DNA Technology

(Biotechnology)

Time: 3 hrs Maximum: 70 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 x 10 =10 Marks)**

Q.1. Answer ***ALL*** questions [CO#] [PO#]

a. The sequence recognized by the restriction enzyme to cut the DNA is called CO1 PO1

(i) Recognition site (ii) Restriction site

(iii) both i and ii (iv) Cleavage site

b. Size of Pbr322 is _____ CO1 PO1

(i) 100 kb (ii) 10 kb

(iii) 4.3 kb (iv) 1 kb

c. Expression vector differs from cloning vectors is having CO1 PO2

(i) An origin of replication (ii) Suitable marker genes

(iii) Unique restriction sites (iv) Control elements

d. Vectors designed to replicate in cells of two different species are called____ CO1 PO3

(i) Cosmid vector (ii) Transfer vectors

(iii) Shuttle vector (iv) Phagemids

e. How many DNA duplexes are obtained from one DNA duplex after 4 cycles of PCR? CO2 PO2

(i) 8 (ii) 4

(iii) 32 (iv) 16

f. Reverse transcription PCR uses _____ CO2 PO2

(i) RNA as a template to form DNA (ii) mRNA as a template to form cDNA

(iii) DNA as a template to form ssDNA (iv) All of the above

g. The DNA fingerprint pattern of a child is CO3 PO3

(i) Exactly similar to that of both of the parents (ii) 100% similar to the father's DNA print

(iii) 100% similar to the mother's DNA print (iv) 50% bands similar to father and rest similar to mother

h. Many mouse models for human disease have been generated by _____ CO3 PO3

(i) Transformation (ii) Gene-targeting

(iii) Gene-knockout (iv) Conjugation

i. The enzyme used in Maxam-Gilbert method for ^{32}P labelling of the DNA at 3'end is CO4 PO2

(i) Polynucleotide kinase (ii) Alkaline phosphatase

(iii) Exonuclease (iv) Terminal nucleotidyl transferase

j. Which phage is used in oligonucleotide directed mutagenesis? CO4 PO1

(i) M13 (ii) Cosmid

(iii) Phagemid (iv) λ – phage

PART – B: (Short Answer Questions) **(2 x 10 = 20 Marks)**

Q.2. Answer ***ALL*** questions	[CO#]	[PO#]
a. Define chelating agent? Give example.	CO1	PO1
b. Differentiate between linkers and adapters?	CO1	PO3
c. What is MCS? Write its functions.	CO1	PO1
d. For the PCR reaction, four number of template DNA were taken for 10 cycles with the probability of 95% amplification. Calculate the number of final PCR products?	CO2	PO2
e. How to create the homopolymer tail in a DNA?	CO2	PO2
f. What is DNA chips and how to prepare DNA chips?	CO3	PO3
g. Define ribozyme? Give examples?	CO3	PO2
h. Emphasize the functions of DICER and RISC in RNAi generation?	CO3	PO3
i. Differentiate between miRNA and siRNA?	CO4	PO1
j. Why Baculovirus is used as a vector for the heterologous protein expression in insect cells and write the name of protein that toxic to insect cells?	CO4	PO1

PART – C: (Long Answer Questions) **(10 x 4 = 40 Marks)**

Answer ***ALL*** questions	Marks	[CO#]	[PO#]
3. a. Explain the steps of isolation and purification of DNA?	5	CO1	PO2
b. Discuss about any three enzymes used in r-DNA technology?	5	CO1	PO1
(OR)			
c. Diagrammatically explain the mechanism of cloning using λ-phage DNA?	5	CO1	PO1
d. Discuss the mechanism of cloning using BAC vector?	5	CO1	PO1
4. a. Discuss the steps to synthesize the C-DNA with diagram?	5	CO2	PO2
b. Explain the principle and steps of PCR?	5	CO2	PO3
(OR)			
c. Explain in details about Microarray technology with diagram?	5	CO2	PO1
d. Discuss the techniques to determine cloning of interacting genes?	5	CO2	PO2
5. a. Explain the principle and applications of DNA finger printing?	5	CO3	PO2
b. How can you express a heterologous gene inside insect cells? Explain with diagram?	5	CO3	PO1
(OR)			
c. What is DNA sequencing? Explain the principle and techniques of Automated sequencing?	5	CO3	PO3
d. Define site directed mutagenesis? Explain the process of mutagenesis using plasmid DNA?	5	CO3	PO2
6. a. How can you silence a gene using antisense RNA? Explain with examples of antisense technology?	5	CO4	PO1
b. What is a molecular marker? Explain the principle and techniques of RFLP?	5	CO4	PO2
(OR)			
c. Discuss the mechanism of gene knockout technology with diagram?	5	CO4	PO3
d. Explain the methods and importance of in vitro transcription and translation?	5	CO4	PO2

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