Printed Page:- 04

Subject Code:- ABT0405

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2023 - 2024)

Subject: rDNA Technology

Time: 3 Hours Max. Marks: 100

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A 20

1. Attempt all parts:-

1-a. For the production of a DNA copy, the enzyme which uses RNA is called? (CO1) 1

(a) DNA polymerase

(b) RNA polymerase

(c) DNA ligase

(d) reverse transcriptase

1-b. There are various methods to distinguish whether a colony contains a recombinant or not. One such method is _____ (CO1) 1

(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-c. Which is a genetically modified crop? (CO2) 1

(a) Bt-cotton

(b) Bt-brinjal

(c) Golden rice

(d) All

1-d. The human genome project was launched in the year? (CO2) 1

(a) 1980

(b) 1973

(c) 1990

(d) 1989

1-e. Which of the following is favored for primer design? (CO3) 1

(a) The melting temperature should be different for both the primers

(b) Primers should be long in length

(c) Primers should not be complementary to each other

(d) Matching should be of whole primer to the template

1-f. Polymerase can be defined as _____ (CO3) 1

(a) an enzyme used to synthesize a new DNA or RNA strand on the basis of pre-existing strand or at times without a pre-existing strand

(b) an enzyme used for removal of nucleotides from the DNA or RNA strand

(c) an enzyme which can synthesize only a new DNA strand, not an RNA strand

(d) an enzyme which can synthesize either a new DNA or an RNA strand but only when a strand is there

1-g. HGPRT- mutant cells are raised by inducing mutations using?(CO4) 1

(a) 5-bromouracil

(b) 8-azaguanine

(c) colchicine

(d) 6-methy isocyanate

1-h. Choose the correct statement for genomic libraries. (CO4) 1

(a) Genomic libraries include the representation of the whole genome of the organism

(b) Sequences such as telomeres are also represented

(c) Telomeres can be readily cloned

(d) The larger the size of the insert of genomic DNA in recombinants, the more is the number of recombinants required to represent the genome in the library

1-i. Which of the following is incorrect about oligonucleotide design in a microarray? (CO5) 1

(a) DNA microarrays are generated by fixing oligonucleotides onto a solid support

(b) The oligonucleotide array slide represents thousands of preselected genes from an organism

(c) The length of oligonucleotides is typically in the range of twenty-five to seventy bases long

(d) The oligonucleotides don’t react with cDNA samples

1-j. Which of the following is incorrect about classification of microarray data? (CO5) 1

(a) For microarray data, clustering analysis identifies coexpressed and coregulated genes

(b) For microarray data, clustering analysis identifies coexpressed but not coregulated genes

(c) For microarray data, clustering analysis identifies and coregulated but not

coexpressed genes

(d) Genes within a category have more similarity in expression than genes from different categories.

2. Attempt all parts:-

2.a.	What is Vector? (CO1)	2
2.b.	What are the three essential components of a cloning vector? (CO2)	2
2.c.	What are the three main functions of DNA Polymerase? (CO3)	2
2.d.	Use a diagrammatic model to explain western blotting. (CO4)	2
2.e.	What is microarray used for? (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Why bacteria cannot express insulin if cloned from the genome DNA? (CO1)	6
3-b.	Why is sticky end ligation more efficient? (CO1)	6
3-c.	Draw the structure of YAC and BAC vectors and explain their important properties. (CO2)	6
3-d.	Discuss the M13 phage genome structure. (CO2)	6
3.e.	Show the processes involved in reverse PCR. (CO3)	6
3.f.	With a diagrammatic illustration provide a brief comment on plaque hybridization. (CO4)	6
3.g.	How electrophoresis can be used in protein purification and characterization? (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	What is an expression vector? Describe the properties of an expression vector molecule? (CO1)	10
4-b.	How to develop and produce mABs for a novel antigen? (CO1)	10

5. Answer any one of the following:-

5-a.	If the " denaturation " step is missing during PCR, what would be its effects on the entire process. (CO2)	10
5-b.	A gene was being ligated to the plasmid vector to prepare a recombinant DNA bacterial transformation. An exonuclease was added to the tube accidently. How will it affect the next step of the experiment ? (CO2)	10

6. Answer any one of the following:-

6-a.	What are the different types of PCR. Give applications of each type. (CO3)	10
6-b.	How we can perform Quantitative Real Time PCR and what are its requirements? (CO3)	10

7. Answer any one of the following:-

7-a.	What are monoclonal antibodies? What is the significance of using HAT media	10

for production of monoclonal antibody? (CO4)

7-b. What are the process of selection of recombinant cells? (CO4) 10

8. Answer any <u>one</u> of the following:-

8-a. What is automated DNA sequencing and how does it work? (CO5) 10

8-b. Discuss in detail shotgun method in cloning genomic DNA. (CO5) 10