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 (2024 - 2025)

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. Which of the following is the correct nomenclature of a restriction enzyme obtained from the first activity of strain R of Escherichia coli? (CO1, K1) 1

(a) EcoR11

(b) EScRI

(c) EcOrI1

(d) EcoRI

1-b. How is phosphatase related to the ligation reactions? (CO1, K1) 1

(a) Phosphate group is not required for the ligation reaction to take place, thus phosphatase is helpful

(b) It is helpful in ceasing the unwanted ligation

(c) Phosphatases are not at all related to ligation reactions

(d) They act as a catalyst in case of the ligation reaction

1-c. Excision and insertion of a gene is called (CO2, K1) 1

(a) Biotechnology

(b) Genetic engineering

(c) Cytogenesis

(d) Gene therapy

1-d. PCR technique was invented by (CO2, K1) 1

(a) Karry Mullis

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(b) Boyer
(c) Sanger
(d) Cohn

1-e. Melting temperature is given by _____ (CO3, K1) 1

(a) 4(G+C) + 2(A+T)
(b) 2(G+C) + 4(A+T)
(c) 2(A+G) + 4(C+T)
(d) 4(A+G) + 2(C+T)

1-f. Why internal secondary structures are not preferred for primers? (CO3, K1) 1

(a) Internal structures are very bulky and thus elongation is not preferred
(b) Because of it, primer may fold back on itself and won't be available for template
(c) Internal secondary structures require more amount of template
(d) If internal structures are present, no proof reading would be observed

1-g. In screening for pUC8 recombinants, which color colonies will be the desired recombinants? (CO4, K1) 1

(a) Blue
(b) Colorless
(c) White
(d) Yellowish

1-h. Natural humoral immune response against a pathogen leads to the production of (CO4, K1) 1

(a) polyclonal antibodies
(b) monoclonal antibodies
(c) macrophages
(d) none of these

1-i. What is the deposition of cDNA into the inert structure called? (CO5, K1) 1

(a) DNA probes
(b) DNA polymerase
(c) DNA microarrays
(d) DNA fingerprinting

1-j. The shotgun approach _____ sequences clones from _____ of cloned DNA. (CO5, K1) 1

(a) randomly, one end
(b) randomly, both ends
(c) specifically, both ends
(d) specifically, one end

2. Attempt all parts:-

2.a. What are uses of synthetic linkers? (CO1, K2) 2

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2.b.	Which vector has the highest cloning capacity? (CO2, K2)	2
2.c.	When is the fidelity of DNA Ploymerase important? (CO3, K2)	2
2.d.	What are chromogenic substrates? (CO4, K2)	2
2.e.	What is shotgun sequencing? (CO5, K2)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Why are plasmids effective vectors in recombinant DNA technology ? (CO1, K2)	6
3-b.	What is the use of homopolymer tailing? (CO1, K2)	6
3-c.	Is cloning a violation of human rights, express your thoughts about this ? (CO2, K2)	6
3-d.	What are phage particles? What properties makes them suitable to be use as vector molecule? (CO2, K2)	6
3.e.	What is RT-PCR? Describe the steps of RT-PCR process and its applications. (CO3, K3)	6
3.f.	Give detailed account on the construction of a C-DNA library and its applications. (CO4, K3)	6
3.g.	What are recombinant proteins? Give a general approach to produce a recombinant protein. In which step of the recombinant protein purification process do we get purified protein? (CO5, K3)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Explain in detail is it possible to isolate a His -tagged protein which has high prevalence of non- polar residues. (CO1, K3)	10
4-b.	Explain the process of cloning with a suitable example. What ethical concerns are related to Human cloning? (CO1, K3)	10

5. Answer any one of the following:-

5-a.	A mixture of the fragmented DNA was run on agarose gel. The gel was stained with ethidium bromide but no bands were observed . What would be the cause? (CO2, K3)	10
5-b.	What are the properties of an ideal host cell? Why would a scientist choose yeast as their cloning host instead of bacteria? (CO2, K3)	10

6. Answer any one of the following:-

6-a.	Explain the basic technique of PCR and its modifications citing their uses in genetic engineering. (CO3, K3)	10
6-b.	Explain in detail the principal, procedure and application of PCR. Add a note on real time PCR. (CO3, K3)	10

7. Answer any one of the following:-

7-a.	What is blotting? Explain about western blotting with a diagrammatic representation. (CO4, K3)	10

7-b.	Give an overview of genetic selection strategies that may be used for various applications? (CO4, K3)	10

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

8-a.	What is bacterial transformation? Give a detail note on the process and applications of bacterial transformation. (CO5, K3)	10
8-b.	What is Maxam-Gilbert sequencing? Explain the process and limitations of this sequencing method. How advanced methods of sequencing techniques overcome the limitations? (CO5, K3)	10

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