



PAPER ID-310210

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Subject Code: KBT501

Roll No:

BTECH-BIO
(SEM V) THEORY EXAMINATION 2023-24
GENETIC ENGINEERING

TIME: 3 HRS

M.MARKS: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

Q no.	Question	Marks	CO
a.	What do you understand by the copy number of a plasmid? A bacterial strain contains a plasmid with a copy number of 20. If you start with 5 bacterial cells, how many plasmid copies will be present after 3 rounds of cell division?	2	1
b.	Why the filamentous phage M13 is a cloning vector?	2	1
c.	What is the significance of reverse transcription in cDNA library construction?	2	2
d.	Define BACs and YACs.	2	2
e.	Describe the principles and advantages of Hot Start PCR.	2	3
f.	Compare and contrast Maxam-Gilbert and Sanger sequencing methods.	2	3
g.	Define gene therapy. Name a genetic disorder that can be treated using gene therapy.	2	4
h.	Describe DNA drug and its application.	2	4
i.	Differentiate between autocrine, paracrine, and endocrine signaling.	2	5
j.	Compare and contrast the characteristics of membrane receptors and intracellular receptors.	2	5

SECTION B

2. Attempt any three of the following:

Q no.	Question	Marks	CO
a.	Explain the role of different restriction enzymes in molecular biology and gene cloning.	10	1
b.	Explain the process of constructing a genomic library. What challenges might arise in constructing a genomic library from a eukaryotic organism compared to a prokaryotic one?	10	2
c.	Discuss the role of molecular markers in genetic mapping and diversity studies.	10	3
d.	Discuss the role of genetic engineering in the development of novel vaccines. Provide examples of vaccines that have been developed using genetic engineering techniques.	10	4
e.	Discuss the differences between local and long-distance signaling mechanisms in cells. Explain how the mode of transport of signaling molecules influences the distance over which they can act.	10	5

SECTION C

3. Attempt any one part of the following:

Q no.	Question	Marks	CO
a.	Discuss the implications and potential pitfalls of using viral vectors for the introduction of recombinant DNA into mammalian cells compared to other methods. What safety concerns should be taken into account?	10	1



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b.	Explain the importance of selection methods in identifying transformed cells. Compare antibiotic selection with other methods used for selecting transformed cells.	10	1
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4. Attempt any one part of the following:

Q no.	Question	Marks	CO
a.	Explain the steps involved in cloning the insulin gene. If you were to modify certain regions of the insulin gene during cloning for enhanced expression, what ethical considerations should be taken into account?	10	2
b.	Explain how chromosome walking is used to sequence a specific region of DNA. If you encounter repetitive DNA sequences during chromosome walking, how might this impact the success of your sequencing efforts, and what strategies could you employ to overcome this challenge?	10	2

5. Attempt any one part of the following:

Q no.	Question	Marks	CO
a.	Discuss how PCR is used in the diagnosis of genetic diseases. Compare and contrast the SYBR Green assay and Taqman assay in real-time PCR.	10	3
b.	Describe the key steps involved in automated DNA sequencing. Discuss the advantages of automated DNA sequencing over manual methods.	10	3

6. Attempt any one part of the following:

Q no.	Question	Marks	CO
a.	Distinguish between therapeutic cloning and reproductive cloning. What are the primary purposes and potential applications of each? Discuss the ethical considerations associated with reproductive cloning.	10	4
b.	How can genetic engineering be employed in conservation efforts to protect endangered species? Provide specific examples and discuss the potential benefits and challenges.	10	4

7. Attempt any one part of the following:

Q no.	Question	Marks	CO
a.	Enumerate and explain the major classes of extracellular signal molecules.	10	5
b.	Describe the process of signal transduction from the cell surface to the nucleus. How do intracellular signaling proteins relay the signal to induce a cellular response?	10	5