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# M.Sc. Examination 2022
## Semester III
## Biotechnology
## Core Course - XI
## (Genetic Engineering)

**Time: 3 hours** **Full Marks: 40**

**Questions are of value as indicated in the margin**

**Answer any four questions**

1. With suitable diagram/s, briefly explain the mechanisms of DNA methylation in *E. coli*. Draw the schematic diagram of a typical yeast expression cum secretion vector with appropriate labelling (No description necessary).

7 + 3 = 10

2. Draw a suitably labelled schematic diagram showing the method of synthesis of total double strand cDNA from the total mRNA sample of an organism (no description necessary). Briefly explain the method of creating a point mutation in a cloned DNA sequence using PCR method.

5 + 5 = 10

3. With a suitably labelled diagram briefly discuss the method of dideoxy sequencing technique of a piece of DNA sample. Briefly state, in bulleted form, three disadvantages of Maxam-Gilbert technique.

7 + 3 = 10

4. Draw a schematic diagram with proper labelling, the general principle of PCR amplification of a DNA sample in a thermal cycler (no description necessary). Briefly discuss in bulleted form the applications of PCR method in forensics and molecular diagnostics (one each).

5 + 5 = 10

5. What do you mean by heterologous gene expression? What is a His-tagged recombinant protein? How you can purify a his-tagged protein using affinity chromatography? Briefly state in bulleted form how you can optimise the expression of a recombinant gene in a bacterial host.

2 + 2 + 3 + 3 = 10

6. Write short notes on any two: 2 x 5 = 10
   a) Southern Blotting.
   b) Non-radioactive labeling of DNA.
   c) Transgenesis using embryonic stem cell.
   d) Klenow enzyme.