**ST JOSEPH’S UNIVERSITY, BENGALURU - 27**

Registration Number:

Date & Session:

**M.Sc. Biotechnology-II SEMESTER**

**SEMESTER EXAMINATION: APRIL 2024**

**(Examination conducted in May/June 2024)**

**BT 8322: GENETIC ENGINEERING**

**(For current batch students only)**

**Time: 2 hours Max Marks: 50**

**This paper contains TWO printed pages and THREE parts**

**PART-A**

**Answer any SEVEN of the following: 2m x 7 = 14 marks**

1. How are linkers created?
2. State the function of terminal deoxynucleotidyl transferase.
3. State the importance of *Vir* regions in the Ti plasmid.
4. How does transient transformation take place?
5. State the function of the DICER protein.
6. What is ATAC sequencing? Mention one application.
7. How is targeted proteomics performed through selected reaction monitoring?
8. Write a brief note on Flavr Savr tomato.
9. What is metabolic quenching?

**PART B**

**Answer any FOUR of the following: 5m x 4 = 20 marks**

1. You have created a vector for the P element with the insertion site of your gene of interest in the ‘wings clipped’ sequence instead of the R sequence. Will this impact transfection? Justify.
2. Explain the principle and instrumentation of microinjection.
3. How will you create genomic and cDNA libraries?
4. Explain, using an example, how miRNA technology can be used for silencing a gene to confer disease resistance.
5. What is the iTRAQ proteomics approach? Explain.
6. Write four applications of omics technologies in the field of microbiology.

**PART C**

**Answer any TWO of the following: 8m x 2 = 16 marks**

1. Consider this hypothetical situation: You are assessing the effect of drug R on regulation of gene X. You wish to clone the promoter for gene X as your gene of interest into an expression vector. However, you have a faulty expression vector with a mutation in the multiple cloning site, so that it no longer consists of an insertion site for your gene of interest. You did not realize this until you performed the reporter assay. In this context, answer the following:
   1. State the function of an expression vector. (2 marks)
   2. How will the results of the reporter assay look like with the faulty vector? Justify your answer. (4 marks)
   3. What correction strategies would you use to rectify the faulty vector? (2 marks)
2. You wish to study the effect of drug R on relative expression of gene X. Which PCR would you select for this? (1 mark). State the principle and procedure of your selected PCR. (4 marks). Set up a reaction mixture for your selected PCR. (3 marks)
3. What is CRISPR/Cas9 technology? Illustrate with an example of how this could be used to develop an improved crop variety in combination with omics technology.