



 **ST JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU - 27**

**B.Sc. Biotechnology- VI SEMESTER**

**SEMESTER EXAMINATION: APRIL 2024**

**(Examination conducted in May 2024)**

**BT6223: PLANT, ENVIRONMENTAL AND ANIMAL BIOTECHNOLOGY**

**(For current batch students only)**

**Time: 2 Hours Max Marks: 60**

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

**INSTRUCTIONS: Draw diagrams wherever necessary using black or blue ballpoint pen.**

**PART A**

**Answer any TEN of the following 2m x 10 = 20 marks**

1. When supplied with excess aromatic amino acids, plants accumulate large amounts of anthocyanins, phenolics and alkaloids. What could be the reason for this phenomenon?
2. Why are Bt crop varieties resistant to Bollworm infestation?
3. Why are left and right borders in a plant transformation vector important for *Agrobacterium*-mediated plant transformation?
4. Mention two advantages of using plants as bioreactors.
5. What is the role of serum in cell culture media?
6. What are the various methods employed for mechanical tissue disaggregation in cell culture techniques?
7. What is pharmacokinetics and pharmacodynamics? Why are they important in the development of biopharmaceutical products?
8. How is transgenic technology applied in mammalian gene therapy? Explain using an example.
9. Name any one environment related government board/agency in India.
10. Why is biodiversity important?
11. State any two criteria for an organism to be used as a bioremediation agent.
12. What happens in the chemical method of wastewater treatment? Give two examples of the methods used.

**PART B**

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

1. Briefly explain how Roundup ready soy was generated. Why are the Roundup ready varieties resistant to glyphosate?
2. A. Explain the concept of plantibodies using an example. (3 marks)

B. A plant variety rich in alkaloid content was found to be resistant to herbivores. What could be the reason for this phenomenon? (2 marks)

1. What are the key advantages of using transgenic mouse models in cancer research? How have these models contributed to our understanding of cancer biology? (3+2)
2. Discuss the significance of scorable and selectable markers in animal gene constructs. Provide examples of each type of marker.
3. What are biocontrol agents? State two examples of biocontrol agents. Mention two advantages and disadvantages of the same. (1+1+3)
4. Explain any three characteristics of a biosensor. Mention two applications of biosensors in environmental biotechnology. (3+2)

**PART C**

**Answer any TWO of the following: 10m x 2 =20 marks**

1. A. *Caffeine synthase* (*CS*) isan important gene involved in caffeine biosynthesis in tea and coffee plants. Imagine that you are required to generate a transgenic tobacco variety overexpressing *CS*. Using a flowchart, represent the major steps involved in generating the *CS* overexpressing transgenic tobacco. (6 marks)

B. *Hypocotyl elongated 5* (*Hy5*) is a transcriptional activator of photosynthesis-related development of plant tissues. Propose a way to exploit this gene towards food security using transgenic means. (4 marks)

1. A. What were three different sheep involved in the creation of Dolly through nuclear transfer? What is the significance and the shortcomings associated with Dolly cloning? (5 Marks)

B. Discuss the methods involved in generating transgenic fish. Provide an example of their application in studying human diseases and drug development. (5 Marks)

1. Using a diagram, briefly explain the process of bioethanol production from lignocellulosic biomass.