

M. Sc. (BIOTECHNOLOGY) EXAMINATION, 2023

(2nd Year, 1st Smester)

SUBJECT : PLANT AND MICROBIAL BIOTECHNOLOGY

PAPER : MSBT 332

Time : Four hours

Full Marks : 80

Questions:

Group A: Answer any 8 questions:

5 X 8

1. What are the major advantages of using chloroplast transformation over nuclear transformation?
What are the different methods of chloroplast DNA transformation? 3+2
2. Briefly describe any one commonly used method for development of transplastomic plant. 5
3. Why *Arabidopsis thaliana* is used as a model plant species? Name two accessions of this plant widely used for genetic experiments. 3+2
4. What is a reporter gene? How GFP and GUS are used as reporter genes? 1+4
5. Schematically represent the method of AFLP. Why this method is popular as a molecular marker? $2\frac{1}{2} + 2\frac{1}{2}$
6. Mention the different applications of RAPD and SSR in plant breeding. $2\frac{1}{2} + 2\frac{1}{2}$
7. What are the different gene transfer method in plants? What are the advantages of *Agrobacterium*-mediated transformation? What is a binary vector? 2+2+1
8. What are plant R genes? Schematically represent how plant R genes interact with avr genes of pathogen. 1+4
9. Briefly describe the different classes of plant R genes. 5
10. What are Cry proteins obtained from *Bacillus thuringiensis*? Briefly discuss the structural features of cry proteins. 1+4
11. Briefly discuss the use of fused insecticidal proteins as biopesticides. 5
12. What are the strategies of multistep metabolic engineering in plants? How metabolic engineering can be used for improving stress tolerance in plants? 3+2

[Turn over

[2]

Group - B

Answer any two (10 × 2)

13. Why identification of bacterial strains is named as “polyphasic approach” for bacterial systematics? Write a note on the four important genotypic methods for bacterial identification. 2+8
14. Mention the important differences in anaerobic chambers, GasPak system, and the Roll tube method for isolating the anaerobic bacterial strains. Why and what are the reducing agents and redox indicators used in these methods? 6 +4
15. What are the possible causes for the low success rate of bacteria cultivation? Write down three important characteristics between Co-Culture, Direct Interspecies Electron Transfer, and Micromanipulator. Describe the high-throughput culturing methods with examples, 3 + 3+ 4

Group C: Answer any four questions: (4 x 5 =20)

16. (a) Explain the term upstream and downstream processing? (b) What is the name of the process that lies in between them? (c) Why *Zymomonas mobilis* is preferred over *S.cerevisiae* in ethanol production? [2+1+2=5]
17. (a) What are xenobiotics? (b) Why are they harmful? (c) Mention the differences between *in situ* and *ex situ* management of solid waste. [1+2+2=5]
18. (a) what are factors that contribute to the spoilage of food? (b) How to control food spoilage? (c) Mention two food borne diseases of humans. [2+2+1=5]
19. (a) Discuss about industrial enzymes with a few examples (b) what are the merits and demerits of enzyme immobilisation? (b) What are the advantages of cell immobilization?. [2+2+1=5]
20. (a) Penicillin is an idiolite : Point it in a graph plot, what is meant by this statement? (b) Which microbe is used nowadays to produce penicillin? (c) How the strain was improved for better production of penicillin? [1+1+3=5]
21. Write short notes on any two : (i) Goal of industrial microbiology , (ii) Fermented food (iii) Role of *Acidithiobacillus ferrooxidans* in bioleaching of copper , (iv) secondary treatment of waste water.