



CBCS SCHEME

21BT754

Seventh Semester B.E./B.Tech. Degree Examination, June/July 2026 Biofuels and Bioenergy

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Describe the basic concepts of biofuels. Explain how they are classified based on feedstock and processing methods. (10 Marks)
- b. Discuss the challenges and opportunities in integrating biofuels into the global energy matrix. (10 Marks)

OR

- 2 a. Explain the biochemical pathways involved in the production of ethanol from lignocellulosic biomass. (10 Marks)
- b. Discuss the significance of biodiesel in reducing greenhouse gas emissions and improving energy security. (10 Marks)

Module-2

- 3 a. Explain the process of anaerobic digestion for biogas production. Include a schematic diagram of a typical biogas plant. (10 Marks)
- b. Discuss the factors affecting the efficiency of biogas production and how they can be optimized. (10 Marks)

OR

- 4 a. Compare and contrast the thermochemical conversion methods : pyrolysis , gasification and combustion. (10 Marks)
- b. Explain the environmental implications of utilizing thermochemical processes for bioenergy generation. (10 Marks)

Module-3

- 5 a. Describe the process of trans-esterification in biodiesel production. Include the reaction mechanism and factors influencing yield. (10 Marks)
- b. Discuss the role of algae as a feedstock for biodiesel production. What are the advantages and limitations? (10 Marks)

OR

- 6 a. Explain the concept of hydrogen as a biofuel. Discuss the biological methods of hydrogen production. (10 Marks)
- b. Compare the use of first – generation and second – generation biofuels in terms of efficiency, sustainability and scalability. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Explain the role of microbial fuel cells in bioenergy production. Include the mechanism and key components. (10 Marks)
b. Discuss the challenges and future prospects of integrating microbial fuel cells into the energy grid. (10 Marks)

OR

- 8 a. Describe the methods of producing bioelectricity from organic waste using bioprocess technologies. (10 Marks)
b. Explain the use of advanced biotechnological approaches in enhancing bioelectricity production. (10 Marks)

Module-5

- 9 a. Discuss the techno – economic aspects of scaling up biofuel production processes from lab to industrial scale. (10 Marks)
b. Explain the role of policy frameworks and subsidies in promoting biofuel adoption globally. (10 Marks)

OR

- 10 a. Describe the Life Cycle Assessment (LCA) methodology for evaluating the environmental impact of biofuel production. (10 Marks)
b. Explain the role of biofuels in achieving Sustainable Development Goals (SDGs). (10 Marks)
