

(7 pages)

Reg. No. :

Code No. : 5688 Sub. Code : WMBE 41

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2025.

Fourth Semester

Microbiology – Elective VI

BIOENERGY

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (15 × 1 = 15 marks)

Answer ALL questions.

Choose the correct answer :

1. The term biomass most often refers to _____
- (a) Inorganic matter
 - (b) Organic matter
 - (c) Chemicals
 - (d) Ammonium compounds

2. Biomass is useful to produce _____
- (a) Chemicals
 - (b) Fibres
 - (c) Biochemicals
 - (d) Transportation fuels
3. Which of the following forestry materials can be used as biomass?
- (a) Logging residues
 - (b) Tallow
 - (c) Fish oil
 - (d) Manure
4. What is the end product of esterification
- (a) FAME
 - (b) Biogas
 - (c) Lipid
 - (d) None of the above
5. What is the blend ration of biodiesel with conventional fossil fuels
- (a) 20%
 - (b) 25%
 - (c) 35%
 - (d) 60%
6. Biodiesel is produced from _____
- (a) Tallow
 - (b) Vegetable oil
 - (c) Waste oil
 - (d) All the above

7. The organism used in commercial bioethanol production plant is
- (a) Protozoans
 - (b) *Saccharomyces cerevisiae*
 - (c) *Zymomonas digitalis*
 - (d) None of these
8. Bio ethanol is denatured alcohol that is also called as _____
- (a) Ethylene
 - (b) Methylated spirit
 - (c) Ethylene glycol
 - (d) Methylene
9. To make transport fuel the bio ethanol is blended with _____.
- (a) Diesel
 - (b) Petrol
 - (c) Oil
 - (d) Kerosene
10. Which of the following is used to produce biogas from biomass?
- (a) Anaerobic treatment
 - (b) Aerobic treatment
 - (c) Fermentation
 - (d) Pyrolysis

11. Which of the following best indicates the steps inside an anaerobic digester?
- (a) Hydrolysis → methanogenesis → acetogenesis → acidogenesis
 - (b) Hydrolysis → acidogenesis → methanogenesis → acetogenesis
 - (c) Hydrolysis → acidogenesis → acetogenesis → methanogenesis
 - (d) Methanogenesis → acidogenesis → acetogenesis → hydrolysis
12. What are the two main products of anaerobic digestion?
- (a) Carbon monoxide and hydrogen
 - (b) Methane and carbon dioxide
 - (c) Methane and carbon monoxide
 - (d) Hydrogen and carbon dioxide
13. What is the major drawback of steam-methane reforming technique to produce hydrogen?
- (a) Capital intensive
 - (b) Releases greenhouse gases into atmosphere
 - (c) A niche technology
 - (d) Poor efficiency

14. What is the main problem in using hydrogen as fuel for vehicles?
- (a) Capital intensive
 - (b) Storage
 - (c) Fuel cell technology is not well established
 - (d) Cars will become heavy
15. What does hydrogen fuel cell emit?
- (a) Water
 - (b) Steam
 - (c) Greenhouse gas
 - (d) Methane

PART B — (5 × 4 = 20 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

16. (a) What are bioenergy conversion methods?
- Or
- (b) List microorganisms of bioenergy producers.
17. (a) Explain the role of feed stock in biodiesel production.
- Or
- (b) Characterize biodiesel.

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18. (a) Illustrate distillation of ethanol.
- Or
- (b) What are bio methanol? Explain.
19. (a) Give the effect of biogas in engine performance.
- Or
- (b) Describe applications of biogas production.
20. (a) What are biohydrogens? Give its advantages over fossil fuels.

Or

- (b) Evaluate the role of chlorella in biohydrogen production.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 600 words.

21. (a) Explain mechanisms by which cellulose biomass conversion into energy.
- Or
- (b) Explain bioenergy by enzymatic mechanism by bacteria.

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22. (a) Analyse the quality of biodiesel.

Or

(b) Assess the role of genetic engineering in biodiesel production.

23. (a) Write an essay on biochemical conversion of ethanol from organic compounds.

Or

(b) How do you quantify ethanol in different samples?

24. (a) Explain construction of Biogas plant.

Or

(b) Write an essay on application of biogas slurry.

25. (a) Give a short note on production of hydrogen from algae.

Or

(b) Explain the importance of Microbial fuel cells.