



MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH. END SEMESTER EXAMINATIONS

NOVEMBER/DECEMBER 2019

SUBJECT: BIOFUELS ENGINEERING [BIO 4014]

Date of Exam: **22.11.2019**

Time of Exam: **2.00 pm to 5.00 pm**

Max. Marks: **50**

Instructions to Candidates:

❖ Answer ALL the questions & missing data may be suitable assumed

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|------------|---|----------|
| 1A. | State two advantages and two disadvantages of biodiesel, as compared to petroleum-based diesel. | 2 |
| 1B. | Name any two starch crops, with a short note on their application as a potential feedstock for the production of biofuels. | 4 |
| 1C. | Illustrate the evolution of biohydrogen during the fermentation pathway of glucose. Identify the crucial enzymes necessary for this process. | 4 |
| 2A. | In terms of composition, why is sunflower best suited as a feedstock for biofuel production? | 2 |
| 2B. | What are mechanisms of action involved in the acidogenesis and acetogenesis steps, during the formation of biogas? | 4 |
| 2C. | With a labelled schematic explain the working of a microbial fuel cell. | 4 |
| 3A. | Discuss the use of cell immobilization as a pretreatment technique in the production of biohydrogen. | 2 |
| 3B. | In an industrial setting, what is the best strategy for the complete enzymatic hydrolysis step to achieve optimum bioethanol yield? | 2 |
| 3C. | Perform the life cycle assessment analysis for the production of microalgal biodiesel? Focus on all the steps that involve the evolution of carbondioxide and other greenhouse gases. | 6 |
| 4A. | What types of microbes (metabolic type) are used in a microbial fuel cell? State two examples of such microbes. | 2 |
| 4B. | What is the general composition of biogas derived from manure? What is the C:N ratio, in general? | 2 |
| 4C. | Briefly describe the process for the production of bioethanol by fermentation process of sugar feedstock. Present the general flowsheet outlining these steps. | 6 |
| 5A. | What are the detoxification methods used after the dilute sulfuric acid hydrolysis step in bioethanol production? | 2 |
| 5B. | With a flowchart, explain the major steps involved in the production of biodiesel from animal-based fats. | 8 |