



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

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