Reg. No.					



MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

(A constituent institution of MAHE, Manipal)

VI SEMESTER B.TECH/ II SEM M.TECH OPEN ELECTIVE END SEMESTER EXAMINATIONS, APRIL/MAY 2018 SUBJECT: INTRODUCTION TO BIOFUELS AND BIOPOLYMERS

(BIO 5263)

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A	Prepare a complete life cycle analysis of biodiesel production from microalgae using Photobioreactor. Include all the steps, details and schematic diagram	5
1B	Explain the suitability of the following feedstocks for biofuel – Corn, Rice(broken) and Barley	3
1C	Define with suitable examples -2^{nd} generation biofuels and biorefinery	2
2A	It is required to ferment 1kg of sucrose $(C_{12}H_{22}O_{11})$ to bioethanol. Compute the theoretical volume (Liters) of ethanol produced, if the density of ethanol is 0.8 kg/L Hint : Write the balanced equations for conversion of sucrose to glucose, and glucose to ethanol	2
2B	Write down all the desired characteristics of ethanol producing microorganisms	3
2 C	With a neat flow diagram, explain dry milling process.	3
2D	What are the disadvantages of dilute sulfuric acid treatment? Explain	2
3 A	Highlight the disadvantages of biodiesel	2

3 B	Explain transesterification process and the various factors that affect the process	2
3C	Compare the heterogeneous (acid) catalyzed transesterification with homogenous (base) catalyzed transesterification with regard to cost, recyclability, reaction conditions, FFA and its effect, purification of product and product yield.	3
3D	Explain the various technologies available for extraction of lipids from microalgae	3
4A	 A waste water contains dissolved organic matter with a gross formula – C₁₅H₂₂O₄N. Dissolved organic matter is 35% and taking the basis as 1000 kg of waste water, compute, 1. Theoretical yield of biogas (Nm³) 2. composition of the gas (% methane and % CO₂) 3. Selling price of the gas thus obtained in ₹ Data: Calorific value of Methane is 39 MJ/m³ Gas price = ₹ 178 per mm BTU BTU =1052 J. Coefficients of CO₂ is 1/8(4c-h+2o+3n+2s) 	5
4B	With the help of schematic flow diagram, explain the anaerobic degradation of protein to biogas	2
4C	Explain the various technologies available for harvesting of microalgae	3
5A	Write briefly about the following biopolymers- Polylactic acid, PHA/PHB, and Thermoplastic starch	3
5B	Elucidate the technical requirements of biopolymers in regard to – Fibres and Textiles, Packaging and Convenience Goods	2
5 C	With examples, highlight the role of the following – Additives and Plasticizers	2
5D	From biomedical applications perspective, highlight the advantages and disadvantages of crosslinking of biopolymers.	3