Ref. No. : Ex/PG/EBT/T/1210F/2018

# M.TECH. ENVIRONMENTAL BIOTECHNOLOGY FIRST YEAR SECOND SEMESTER – 2018

## BIOFUEL TECHNOLOGY

Time: Three hours | Full Marks: 100

***Answer question no. 1 and any five from the rest:***

1. Answer any ten questions:

$2 \times 10 = 20$

a. How to classify the biofuels?
b. Mention the types of biofuel based on resource material.
c. Write down the advantages of biofuel over conventional fossil fuel.
d. Write down the pathway of harvesting solar energy in form of biofuel.
e. Mention the fuel prospect of bioethanol and biobutanol.
f. Compare the Jatropha based biodiesel properties with petro-diesel.
g. Write the compositional feature of biogas.
h. Mention some of the major applications of bio gas as fuel.
i. What are the advantages and limitation of algal biofuel over biodiesel?
j. What is algal turf scrubber?
k. What is mud battery?
l. What is the difference of mediator MFC and mediator free MFC?
m. What is the standard used to assess the emission properties of biofuel?

2. Mention the most biofuels used in automotive sectors. Mention the driving factors for promoting biofuel technology. Write down the strengths and the challenges to meet in biofuel technology.

$2+ 6+8 = 16$

3. Define bioethanol? Briefly describe the methods of getting bioethanol from sustainable resources. Describe the biochemical methods of biomass to energy conversion.

$2+8+6 = 16$

4. Describe the transesterification process of getting biodiesel from sustainable resources? Write in brief about the importance of lipase catalyst in biodiesel synthesis and product purification.

$8+8 = 16$

5. Write down the process steps and principle of biogas synthesis in bio digester. Describe the characteristic feature of floating cover bio digester with technical requirements and biogas purification steps.

6+10 = 16

6. Write the prospect of algal biofuel over other conventional fuel material in terms of energy density and yield value. Describe algal growth controlling factors, algal oil production steps. Mention the characteristics of raceway pond and photo bioreactor.

4+6+6 =16

7. What is microbial fuel cell? Write down the characteristic feature and working principle of microbial fuel cell. Mention the nature of the substrate and the microbes used in microbial fuel cell.

2+8+6 = 16

8. How to use microbial fuel cell as BOD sensor? Describe the role of nanotechnology in biofuel technology.

4+12 = 16

9. Mention the problem and advantage of a) algal fuel technology and b) biogas technology.

8+8 =16