**TU/CODL**

**TEZPUR UNIVERSITY**

**END SEMESTER EXAMINATION (AUTUMN), 2017**

**DRE 103: BIOMASS ENERGY**

**Time: 3 hrs Total Marks: 70**

*The figures in the right-hand margin indicate marks*

*for the individual question.*

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| **Q** | 1. Choose the correct answer **1x10=10**  (options are given in bold letter) |
|  | 1. The cheapest raw material for producing ethanol from biomass is **saccharine/starchy/cellulosic** material. |
|  | 1. In presence of catalyst at high temperature, Syn gas is converted to **methanol/ethanol/butanol** |
|  | 1. During alkali catalyzed biodiesel production, the requirement of methanol is **three times** **more than** **/ three moles** **of** the vegetable oil. |
|  | 1. In densification, the bulk density of fuel is **increased/decreased** by a factor of 2 or 3. |
|  | 1. Biogas production from organic waste is an **aerobic/anaerobic** process. |
|  | 1. Charcoal yield from biomass is a **pyrolysis/gasification** process. |
|  | 1. **Ethanol/methanol/producer gas** production is a microorganism involved biomass conversion process.   **P.T.O.**   1. Treating hemicelluloses with concentrated inorganic acid produces **furfural/dimethyl ether/starch** instead of pentose sugar required for ethanol production. |
|  | 1. Internal combustion engine may be derated to run by biogas, since biogas has **lower/higher/equal** volumetric energy content than petrol. |
|  | 1. Energy loss in **C4/ C3/CAM** plant occurs due to photorespiration. |

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| **Q2.** | Name the processes by which you can obtain the following end products from biomass. | **1x5=5** |
|  | 1. Producer gas 2. Biogas 3. Hydrogen 4. Charcoal 5. wood gas |  |

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| **Q3.** | Write short notes on ***any four*** of the following | **4x5=20** |
|  | 1. First generation biofuel 2. Aerobic and anaerobic fermentable products of yeast on sugar 3. Main obstacle to widespread use of biodiesel 4. Acid hydrolysis of Cellulosic materials 5. Different types of biomass gasifier |  |

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| **Q4.** | a) What are the major reasons of going for alternative fuels like bio-diesel and bio-ethanol? Discuss the common feedstock used for production of (i) biodiesel and (ii) bio-ethanol.  **5+5=10**    **P.T.O**    b) With the help of neat sketch discuss the transesterification process used for biodiesel production.  **8** |  | |
| **Q5** | a) What are the different options for biogas utilization? Explain.  **7**  b) Discuss the relevance of biomasses as a source of energy in rural areas of our country. **7**  c) What do you mean by densification of biomass? What is its major advantage**? 3** | |  | |

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