**TU/ CODL**

**TEZPUR UNIVERSITY**

**SEMESTER END EXAMINATION (SPRING) 2019**

**DRE 103: BIOMASS ENERGY**

Time:**3 Hours** Total Marks: **70**

*The figures in the right-hand margin indicate marks for the individual question.*

*(All questions are compulsory)*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

|  |  |
| --- | --- |
| 1. | Fill in the blank with appropriate word(s): 1x10=10 |
|  | 1. The best solar energy-converting machine available in nature is **-------** 2. Energy density at the point of production for biomass is **------------** than coal. 3. Biomass is more reactive than coal due to the presence of ----------------- 4. Biomass is the general term for organic material ---------------- from growing plants or from animal manure. 5. High ----------------- content is the main drawback of biomass than coal to use as fuel. 6. The source of renewable organic carbon in nature is --------------------- 7. During alkali catalyzed biodiesel production, the requirement of methanol is three moles of----------- 8. Biogas production from organic waste is ----------------process. 9. Treating hemicelluloses with concentrated inorganic acid produces **---------------------------** instead of pentose sugar required for ethanol production. 10. Energy loss in **C3** plant occurs due to --------------------------.   **P.T.O** |
|  |  |
|  |  |
| 2. | Name the conversion processes by which you can obtain the  following end products from biomass. 1x5= 5  a) Producer gas b) Biogas c) Hydrogen  d) Charcoal e) Wood Gas |
| 3. | Write short notes on (**any four**): 5x4= 20  a) First generation biofuel.  b) Raw materials for ethanol production  c) Aerobic and anaerobic fermentable products of yeast on  sugar.  d) Main obstacle to widespread use of biodiesel.  e) Acid hydrolysis of Cellulosic materials  f) Different types of biomass gasifier |
| 4. | a) What are the major reasons to shift towards alternative fuels like biodiesel and bioethanol? Discuss the common feedstock used for production of biodiesel and bioethanol. 5+5=10  b) With the help of neat sketch discuss the transesterification process used for biodiesel production. 7 |
| 5. | a) What is biogas ? What are the different options for biogas utilization? 2+5=7  b) Discuss the relevance of biogas as a source of energy in rural areas of our country. 5 |
| 6. | Explain Why? (**Any two**) 2x3= 6   1. Gasification is more beneficial than open burning of biomass. 2. Air is taken as gasifying agent in the gasifier. 3. Downdraft gasifier is generally   preferred for power generation.   1. Cleaning and cooling are essential before using product gas from gasifier for engine operation. |

\*\*\*\*\*\*