Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April / May – 2017**

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| **Code :** | **14BT2054** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BIOENERGY AND BIOMATERIALS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | What are the main feed-stock for biomass energy resources? | CO1 | 1 |
| b. | Exemplify a bioenergy product in thermo-chemical conversion. | CO1 | 1 |
| c. | What are the point of merits for biomass energy in comparison to other energies? | CO2 | 2 |
| d. | Biogas technology can be a key player in rural-India energy security, explain. | CO2 | 2 |
| e. | Discuss the opportunities and challenges in use of coal in India’s energy share. | CO1 | 14 |
| (OR) | | | | |
| 2. | a. | What is meant by “Perennials lignocellulosic crops”? | CO2 | 1 |
| b. | Exemplify use of two energy crops and their products. | CO2 | 1 |
| c. | In what aspect, do you think biomass energy is unique? | CO2 | 2 |
| d. | Illustrate advantages of lignocellulosic crops over food-crops in bioenergy sector. | CO2 | 2 |
| e. | Discuss implications (positive/negative) of large-scale Biomass Production. | CO2 | 14 |
| 3. | a. | What do we understand by bioenergy chain? | CO1 | 1 |
| b. | What are the various thermochemical conversion route? | CO1 | 1 |
| c. | How does Pelletisation improves biomass quality? | CO2 | 2 |
| d. | What do you understand by “co-firing” of biomass? | CO2 | 2 |
| e. | Elaborate different routes for 1st, 2nd and 3rd generation biofuel production? | CO2 | 14 |
| (OR) | | | | |
| 4. | a. | What is torrefaction? | CO2 | 1 |
| b. | Write quality improvement in torrefaction process. | CO2 | 2 |
| c. | Explain how torrecation differs from pyrolysis? | CO2 | 2 |
| d. | How can you manipulate pyrolysis process to have increased yield of bio-oil? | CO2 | 2 |
| e. | Discuss physiochemical properties of biooil, and their various upgradation routes. | CO2 | 14 |
| 5. | a. | Does conversion of biomass to methane increases energy? | CO2 | 1 |
| b. | What is the role of homoacetogenic microbes? | CO2 | 1 |
| c. | Briefly, what are the relevant conversion process in different stages of AD? | CO2 | 2 |
| d. | Why a balance between acid-forming and methanogen is required in AD? | CO2 | 2 |
| e. | What are the causes, mechanism and consequences of ammonia inhibition? | CO2 | 14 |
| (OR) | | | | |
| 6. | a. | Write the reaction involved in hydrogenotrophic methanogenesis. | CO2 | 1 |
| b. | Which microbial group converts VFA to acetate? | CO2 | 1 |
| c. | Can you offer some strategies to overcome rate limiting hydrolysis process? | CO2 | 2 |
| d. | How does temperature and pH influences ammonia toxicity. | CO2 | 2 |
| e. | Explain inhibited steady state and interrelationship between FAN-VFA in AD. | CO2 | 14 |
| 7. | a. | Under steady state, how can you measure growth yield coefficient? | CO2 | 1 |
| b. | At what HRT, ultimate methane yield can be achieved? | CO2 | 1 |
| c. | Why we prefer to study AD process under steady state? | CO2 | 2 |
| d. | What is purpose of AD kinetics modelling? | CO2 | 2 |
| e. | Given Contois kinetics, , how will you graphically calculate ultimate methane yield? | CO2 | 14 |
| (OR) | | | | |
| 8. | a. | Name the enzyme involved in nitrification process. | CO3 | 1 |
|  | b. | What is the consequence of overuse of nitrogen fertilizers? | CO3 | 1 |
|  | c. | What is the obligate intermediate in denitrification? | CO3 | 2 |
|  | d. | How are the nitrification and denitrification processes differing from each other? | CO2 | 2 |
|  | e. | Discuss C exchange processes between ocean and atmosphere? What different form of organic and inorganic carbons are involved? | CO3 | 14 |
|  | | **Compulsory:** |  |  |
| 9. | a. | What do you understand by the term “anthropogenic”? | CO2 | 1 |
|  | b. | Explain bioavailability of any contaminant in soil-water system. | CO3 | 1 |
|  | c. | What are the possible fate of any organic pollutant in soil system? | CO2 | 2 |
|  | d. | Indian mustard can be used for metal extraction, but how is it different from hyperaccumulators? | CO3 | 2 |
|  | e. | What are the desirable properties that the plants should have for phytoextraction? | CO3 | 14 |