

GUJARAT TECHNOLOGICAL UNIVERSITY**ME – SEMESTER – III (New)– EXAMINATION – WINTER-2019****Subject Code: 3730009****Date: 14-11-2019****Subject Name: Waste to Energy****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What is pyrolysis? Discuss types of pyrolysis process based on processing time and temperature of the biomass. **07**
- (b) Explain charcoal production using multistage pyrolysis process. **07**
- Q.2** (a) How is Bio-oil produced? **07**
- (b) Why is pyrolysis getting interesting in recent time? **07**
- OR**
- (b) Highlight the advantages of biomass gasification technologies. **07**
- Q.3** (a) Discuss Fluidized bed gasifier and Entrained-flow gasifier as lean phase bio-reactors. **07**
- (b) Discuss opportunities and challenges for waste to energy concept in India. **07**
- OR**
- Q.3** (a) What are dense phase reactors? Discuss types of dense phase reactors in detail. **07**
- (b) Simulation of gasification using either kinetic or equilibrium model requires three important parameters. (i) Temperature of gasification (ii) Pressure of gasification (iii) Type of biomass. Discuss significance of these parameters in detail. **07**
- Q.4** (a) Discuss Inclined grate combustor for solid biomass waste with the help of schematic diagram. **07**
- (b) What is biogas technology? How does a biogas plant work? Which process is responsible for production of biogas in a biogas plant? **07**
- OR**
- Q.4** (a) What is the composition of biogas? Can biogas be used in place of fossil fuels? How? What are the environmental impacts of producing/using biogas? **07**
- (b) Compare Combustion, Gasification and Pyrolysis process. **07**
- Q.5** (a) What is waste derived fuel? List out the classification of waste as fuels. **07**
- (b) Will be a contemporary alternative the biomass energy for the near future renewable energies? How does the production of biomass and ethanol affect the environment? **07**
- OR**
- Q.5** (a) Enlist Biomass resources and their classification. How Biomass conversion does occur? What are the different Biomass conversion technologies? **07**
- (b) How ethanol is produced from biomass? Discuss briefly on environmental benefits of bio-chemical and thermo chemical process. **07**