

Centre for Rural Development and Technology, IIT Delhi

Name and Number of Course: Rural Energy Systems (RDL722)

Name of Exam: Major; Date: 03/May/2019 (01:00–03:00 PM)

Time: 2.0 h

Maximum Marks: 30.0

- Q1. Discuss the effect of following parameters on anaerobic digestion process, (i) Temperature, (ii) Loading rate, (iii) pH, (iv) HRT, (v) Nature of biomass. 5.0
- Q2. Derive the fuel formula and fuel weight for following parameters of ultimate analysis (dry weight basis) of a wood; Carbon: 53%, Hydrogen: 6%, Nitrogen: 0.5%, Sulphur: 0.5%, Oxygen: 40%. 5.0
- Q3. Calculate the densities of biogas (kg/m^3), calorific values of biogas and Wobbe Index of biogas for the following compositions; Raw biogas having 60% methane and 40% carbon dioxide in it. The same biogas is upgraded to a methane content of 90% and 10% carbon dioxide level. What will be the density of upgraded biogas (kg/m^3)? The density of methane and carbon dioxide is given as 0.71 kg/m^3 and 1.98 kg/m^3 , respectively. 5.0
- Q4. Describe the role of animal energy in meeting out the demand of energy in rural areas. 3.0
- Q5. What are the solar energy application technology? Describe the fundamental principle of working of natural convention solar water heating system with neat sketch. 3.0
- Q6. Describe the components and working of photovoltaic system of electricity generation? What are possible applications where solar photovoltaic system can be used in rural areas? 5.0
- Q7. Describe the learnings from your field visit in order to meet out the energy demands in rural areas. 4.0

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