GUJARAT TECHNOLOGICAL UNIVERSITY M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 713907N Date: 10-01-2013 Subject Name: Renewable Energy System (Inter Disciplinary Elective - I) **Total Marks: 70** Time: 02.30 pm – 05.00 pm **Instructions:** 1. Attempt all questions. 2. Make suitable assumptions wherever necessary. 3. Figures to the right indicate full marks. 07 0.1 (a) List the advantages & short falls of solar energy system. (b) Explain the different parameters affecting the biogas generation. 07 **Q.2** (a) Prove that in case of horizontal axis wind turbine obtained maximum power 07 when: Exit velocity = 1/3 Incoming wind velocity. 07 (b) Describe the analysis of aerodynamic forces acting on wind generated blade. OR (b) Describe with a neat sketch the working of wind energy conversion system 07 (WECS) with main components. Q.3 (a) Explain working of liquid flat plate collector with a neat sketch and find out 07 the collector efficiency. (b) (1) Define following term: 02 • Declination Angle • **Incidence** Angle (2) Find out an incidence angle made by a beam radiation with normal to a flat 05 plate collector on 1st December at 9 A.M. The collector is located at a place (28.58 N & 77.20 E) and tilted at an angle 38⁰ with horizontal and pointing due south. OR Q.3 (a) List the advantages & disadvantages of concentrating collector over flat plate 07 collector. (b) Explain working of solar still with a neat diagram & list the parameters 07 affected the output of still. **Q.4** (a) A family biogas digester volume is to be design when biomass is available 07 from 5 Cows. The other data is given below: • Retention time= 20 days, Temperature = 30° C. • Day biomass consumed = 1 kg/day/Cow(1 kg water is added to 1 kg dry dung for slurry) • Density of slurry = 50 kg/m^3 . • Biomass generated = $0.25 \text{ m}^3/\text{kg}$ • CH₄ percentage in biomass= 80% • Calorific value of methane=28000 kJ/m³. • Efficiency of burning the gas used =75% Also find out the energy available from the digester.

(b) Explain Deenbhandhu biogas plant with a neat sketch.

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- Q.4 (a) Explain Photosynthesis process & which conditions are necessary for it.

	(b)	Explain Updraft gasifiers with a neat sketch.	07
Q.5	(a)	Explain with a neat diagram the working of vapour dominated geothermal system.	07
	(b)	Distinguished between	07
		1. Combustion & Pyrolysis	
		2. Aerobic & Anaerobic Biochemical conversion process	
	OR		
Q.5	(a)	Describe a binary cycle system for liquid dominated system.	07
	(b)	List the advantages & disadvantages of geothermal energy over other energy	07
		forms.	
