Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2181910 **Date: 26/11/2018**

Subject Name: Renewable Energy Engineering

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.**

			MARKS
Q.1	**(a)**	Write needs of renewable energy.	**03**
	(b)	Explain criteria for site selection of wind energy conversion system.	**04**
	(c)	Describe solar constant and derive its equation.	**07**
Q.2	**(a)**	List factors affecting production of biogas.	**03**
	(b)	Compare solar flat plate and concentratic collectors.	**04**
	(c)	Prove that in case of Horizontal Axis Wind Turbine maximum power can develop when exit velocity = 1/3 of wind velocity and Pmax = 8 * (ρAVi^3 / 27)	**07**
		OR	
	(c)	Calculate monthly average of Daily Total Solar Radiation on a Horizontal Surface located in Ahmedabad Gujarat state (22°.13' N, 73°.10' E) for the month of March. Average Solar day hours are 10.1 hrs. Angstrom's constants for Ahmedabad, a = 0.28, b = 0.48	**07**
Q.3	**(a)**	Explain Declination angle in detail.	**03**
	(b)	Explain working of solar cooker.	**04**
	(c)	List instruments used for measurement of solar radiation intensity. Explain any one with neat sketch.	**07**
		OR	
Q.3	**(a)**	What are functions of yaw control and pitch control mechanisms in wind turbine?	**03**
	(b)	Explain the different heat losses in Flat plate Collector.	**04**
	(c)	List components of wind energy conversion system, show them with neat sketch. Compare horizontal axis wind turbine with vertical axis wind turbine.	**07**
Q.4	**(a)**	Explain principle of MHD generation.	**03**
	(b)	Draw neat sketches of Open and Closed cycle OTEC systems.	**04**
	(c)	Explain Construction & working of Floating drum type biogas plant with neat sketch.	**07**
		OR	
Q.4	**(a)**	Explain principle of OTEC.	**03**
	(b)	What are the advantages and applications of geothermal energy.	**04**
	(c)	Explain with sketchs the various methods of tidal power generation. What are the limitations of each method?	**07**
Q.5	**(a)**	Define: Net present value, Internal rate of return, Return on Investment	**03**
	(b)	For an 12,00,000/- investment in solar energy equipment which meets 55% of annual load of 155 GJ. If first year fuel cost is Rs. 750 per GJ and expected to inflate at 10% per year. Calculate (1) undiscounted payback time (2) discounted payback time if discount future cost at rate 9%.	**04**

	(c)	Explain the working of vapour dominated geothermal system with neat sketch.	**07**

OR

Q.5	**(a)**	Explain method of simple payback period. What are its limitations?	**03**
	(b)	A 100 liter per day domestic solar water heater saves consumption of electricity in an electrical geyser on 100 days of the year by heating 100 liters of water from 15oC to 60oC. The useful life of the solar water heater is estimated as 10 years. Determine the present worth of saving through the use of the solar water heater, if the efficiency of electrical geyser is 90% and the cost of electricity is Rs 4 per kWh. Assume interest rate as 12%.	**04**
	(c)	What are solar ponds? Discuss the working of a solar pond with help of a neat sketch.	**07**

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