Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2181910 **Date:15/05/2019**

Subject Name:Renewable Energy Engineering

Time:10:30 AM TO 01:00 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)**	Explain brief present scenario of conventional and renewable energy sources worldwide.	**03**
	(b)	Explain the following terms with neat sketches: Air Mass, solar azimuth, Hour angle, solar altitude.	**04**
	(c)	A horizontal shaft, propeller type wind turbine is located in area having following wind characteristics: speed of wind 10m/s at 1 atm and 15°C, Calculate the following: 1. Air density 2. Total power density in wind stream 3. Maximum and actual possible obtainable power density 4. Total power from wind turbine of 120m diameter 5. Torque and axial thrust on wind turbine operating at 40 rpm and at maximum efficiency of 42%.	**07**
Q.2	**(a)**	Explain advances in solar cell modules and arrays used for electricity generation.	**03**
	(b)	Explain methods of improving thermal performance of box type solar cookers.	**04**
	(c)	Calculate monthly average global solar radiation on a horizontal surface located in Ahmedabad, Gujarat state 22° 00´N, 73°10´E for the month of April. Average solar day hours are 10 hrs, Andstrom's constant for Ahmedabad: a=0.28, b=0.48	**07**
		OR	
	(c)	Calculate useful heat gain, exit fluid temperature and collection efficiency for a cylindrical parabolic concentrator system of 2 m width and 8m length. The absorbing cylinder has a diameter of 6 cm and transparent cover has diameter of 9cm optical properties as estimated as ρ=0.85, (τ, α) =0.77, γ=0.94, heat transfer coefficient from fluid inside to surrounding U_o=6.04W/m^2 °C, heat transfer coefficient from absorber cover surface to surrounding U_L=6.98 W/m^2 °C, the incident beam radiation on the aperture of the collector is 698 W/m^2 and ambient temperature is 25°C. The incident beam radiation on the aperture of the collector is 698W/m^2 and the ambient temperature is 25°C. The collector is designed to heat fluid entering absorber at 150°C at a flow rate of 400 kg/ hr. The fluid has C_p=1.25kJ/ Kg°C.	**07**

Q.3	**(a)**	With neat sketch explain solar heating system using water heating solar collectors. What are advantages and disadvantages of this system?	**03**
	(b)	Describe different schemes of electric generation and explain generator control mechanism.	**04**
	(c)	Derive an equation for maximum power, maximum torque, and maximum axial thrust available from wind turbine. What is optimum velocity?	**07**
		OR	
Q.3	**(a)**	Explain site selection criteria of Wind farms.	**03**
	(b)	Write brief note on characteristic curves of wind machines.	**04**
	(c)	List advantages and disadvantages of geothermal energy compared to other energy forms.	**07**
Q.4	**(a)**	With neat sketch explain wave energy conversion by floats and its requirements for high energy conversion.	**03**
	(b)	What is a community bio gas plant? What are the main problems encountered in its operation?	**04**
	(c)	With neat sketch explain closed cycle MHD system. Explain the significance of seeded inert gas in MHD generator.	**07**
		OR	
Q.4	**(a)**	Explain principle of ocean thermal energy conversion and its limitations.	**03**
	(b)	What is meant by energy plantation? What are its advantages and disadvantages?	**04**
	(c)	Explain in brief geothermal energy scenario in India and worldwide. List various research organizations working on geothermal energy.	**07**
Q.5	**(a)**	Define following terms: Payback period, Inflation, benefit cost ratio.	**03**
	(b)	With example explain why a project with a high IRR is not necessarily more attractive than a project with lower IRR?	**04**
	(c)	Write brief note on clean development mechanisms.	**07**
		OR	
Q.5	**(a)**	Define following terms: Annual cost, present worth value, life cycle cost.	**03**
	(b)	Explain site selection criteria of tidal power plants.	**04**
	(c)	With usual notations derive an expression for cumulative savings.	**07**

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