Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2024

Subject Code:3170116 Date:28-05-2024

Subject Name:Solar and wind 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Explain brief present scenario of conventional and renewable energy sources worldwide.	**03**
	(b)	Define solar altitude angle, solar zenith angle, solar azimuth angle, declination angle and hour angle.	**04**
	(c)	With a neat sketch explain the solar still.	**07**
Q.2	**(a)**	Explain advantages of renewable energy.	**03**
	(b)	Explain criteria for site selection of wind energy conversion system.	**04**
	(c)	Explain the working of solar drying system with neat sketch. Also discuss the advantages.	**07**
		OR	
	(c)	Short note: OFF - SHORE wind farms.	**07**
Q.3	**(a)**	Compare solar flat plate and concentric collectors.	**03**
	(b)	Advantages of photovoltaic solar energy conversion.	**04**
	(c)	Calculate monthly average of Daily Total Solar Radiation on a Horizontal Surface located in Ahmedabad Gujarat state ($22^{o}.13'$ N, $73^{o}.10'$ 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**
		OR	
Q.3	**(a)**	What is solar chimney system?	**03**
	(b)	Explain economic analysis of solar energy.	**04**
	(c)	With neat sketch explain solar heating system using water heating solar collectors. What are advantages and disadvantages of this system?	**07**
Q.4	**(a)**	Define following terms: Annual cost, present worth value, life cycle cost.	**03**
	(b)	Define following terms: Payback period, Inflation, benefit cost ratio	**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**
		OR	
Q.4	**(a)**	Name the instruments used for solar radiation measurements.	**03**
	(b)	Describe classification of wind power plants.	**04**
	(c)	Explain limitation of solar energy.	**07**

Q.5	**(a)**	Explain in brief passive solar heating system.	**03**
	(b)	Short Note: Solar Refrigeration.	**04**
	(c)	Give step by step procedure for the design of a solar photovoltaic power plant.	**07**

OR

Q.5	**(a)**	Explain the different heat losses in Flat plate Collector.	**03**
	(b)	What are functions of yaw control and pitch control mechanisms in wind turbine?	**04**
	(c)	What are solar ponds? Discuss the working of a solar pond with help of a neat sketch.	**07**

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