Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- VII EXAMINATION-SUMMER 2023

Subject Code: 3170116 Date: 28/06/2023

Subject Name: Solar and wind Energy

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	List the advantage and limitation of Renewable Energy.	**03**
	(b)	Define terms : Solar Azimuth Angle, Solar Altitude Angle, Hour Angle Declination	**04**
	(c)	Explain construction and working of Pyranometer with schematic diagram	**07**
Q.2	**(a)**	List the factors affecting for the performance of flat plate collector.	**03**
	(b)	Explain the working of indirect solar drying system with neat sketch. Also discuss the advantages.	**04**
	(c)	Describe a natural circulation solar water heating system?	**07**
		OR	
	(c)	Discuss performance analysis of a solar cell?	**07**
Q.3	**(a)**	Differentiate Beam and Diffuse Radiation.	**03**
	(b)	Explain Domestic solar cooker and state the dis-advantages of it.	**04**
	(c)	Explain with the help of neat sketch solar heliostat.	**07**
		OR	
Q.3	**(a)**	Write a short note on solar saving	**03**
	(b)	Explain solar furnace with neat sketch?	**04**
	(c)	Describe solar constant and derive its equation.	**07**
Q.4	**(a)**	Explain method of simple payback period. What are its limitations?	**03**
	(b)	Explain criteria for site selection of wind energy conversion system	**04**
	(c)	Describe the effect of different parameter on the power generating capacity of wind mill. Also explain control mechanism of a wind turbine	**07**
		OR	
Q.4	**(a)**	List the basic component of wind mill and draw the wind energy conservation system.	**03**
	(b)	Explain importance of drag and lift force in wind power generation.	**04**
	(c)	Prove that in case of horizontal axis wind turbine maximum power can develop when exit velocity=1/3 of wind velocity and $P_{max}=8\ \rho A V_i^3/27$.	**07**

Q.5	**(a)**	List the need for economic analysis of renewable energy system.	**03**
	(b)	Explain with neat sketch the geometry of airfoil terminology. Also explain with neat sketch indicating the direction of lift force, drag force, pitching moment coefficient.	**04**
	(c)	Write a short note on (i) Savonius rotor (ii) Darrieus rotor	**07**

OR

Q.5	**(a)**	Define (1) Payback time (2) Return on investment (3) Life cycle cost	**03**
	(b)	What do you understand by "energy management" and "energy audit"? Classify the energy audit and discuss them in brief.	**04**
	(c)	What are functions of yaw control and pitch control mechanisms in wind turbine?	**07**

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