

Seat No.:	Q. Paper Code: FTC-A-020			SET	A	
	Fabtech Technical Campus, College of Engineering & Research, Sangola					
	(An Autonomous Institute)					
	Mechanical Engineering					
	Academic Year: -2025-26, Semester-I					
Solar & Wind Energy (25PME11273)						
Regular End Semester Examination Winter 2025-26 [Dec./Jan]						
Class:	F. Y. M. Tech.	Day & Date:	Wednesday, 07/01/2026			
Duration:	03 Hrs.	Max. Marks:	60 Marks			
Time:	11:00 AM TO 02:00 PM					
Instructions:						
1) All Questions are compulsory.						
2) Figures to the right indicate full marks.						
3) Draw neat diagram wherever necessary.						
4) Make suitable assumptions if necessary and state it clearly.						
5) Use of non-programmable calculator is allowed.						
Q. No.	Questions			Marks	CO	BL
Q. 1	Attempt any two of the following			12		
1	Define the Following Term. i) Inclination angle ii) Zenith angle iii) Azimuth angle			6	1	1
2	Describe the mechanisms of absorption, scattering, and refraction of solar radiation in the atmosphere.			6	1	2
3	Explain the construction and working of a Pyranometer for measuring global radiation.			6	1	2
Q. 2	Attempt any two of the following			12		
1	Explain construction and working of Liquid Flat plate collector.			6	2	2
2	With a neat diagram, explain the construction and working principle of a Parabolic Trough Collector			6	2	2
3	List the different types of solar air heaters and discuss their advantages and limitations.			6	2	4
Q. 3	Attempt any two of the following			12		
1	Define Thermal Energy Storage (TES). List the major categories of TES systems with examples.			6	3	2
2	Explain the performance analysis of a solar pond, including heat extraction rate, thermal efficiency, and energy balance.			6	3	4
3	A solar thermal system costs Rs.5, 00,000 and saves Rs.90, 000 annually on energy. Determine the simple payback period and the annual rate of return.			6	3	3
Q. 4	Attempt any two of the following			12		

1	What are Weibull parameters? Explain their physical meaning with respect to wind speed characteristics.	6	4	2
2	State the difference between Rayleigh and Weibull wind speed distributions.	6	4	4
3	Derive the expression for the maximum power output from an ideal wind turbine (Betz Limit).	6	4	4
Q. 5	Attempt any two of the following	12		
1	With a neat diagram, explain the working principles of a Solar–Wind Hybrid Energy System.	6	5	2
2	Evaluate the steps involved in site selection and resource assessment for a hybrid power plant.	6	5	5
3	Develop a comprehensive environmental lifecycle assessment for a solar–wind hybrid energy system, addressing impacts during manufacturing, installation, operation, and disposal.	6	5	6