P P SAVANI UNIVERSITY

Seven Semester of B. Tech. Examination

December 2022

SEME4021 Renewable Energy Sources & System

28.11.2022, Monday **Time: 10:00 a.m. To 12:30 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

			CO	BTL
Q - 1	Fill in the Blanks (Any Five)	**[05]**		
(i)	Which of the following is a disadvantage of renewable energy?		**1**	**1**
	A. High Pollution B. Available Only in few places			
	C. High Running Cost D. Unreliable Supply			
(ii)	Nuclear Energy is falling under which category?		**1**	**1**
	A. Renewable Energy B. lower Energy			
	C. Conventional Energy D. No one			
(iii)	Maximum efficiency is obtained in		**2**	**2**
	A. Flat plate collector B. Evacuated tube collector			
	C. Line focussing collector D. Paraboloid dish collector			
(iv)	Global radiation =		**2**	**2**
	A. Direct radiation – Diffuse Radiation B. Direct radiation + Diffuse Radiation			
	C. Direct radiation / Diffuse Radiation D. Diffuse Radiation / Direct radiation			
(v)	Solar radiation flux is usually measured with the help of a		**2**	**1**
	A. Anemometer B. Pyrheliometer			
	C. Sunshine recorder D. All of the above			
(vi)	The hour angle is equivalent to		**2**	**2**
	A. 10° per hour B. 15° per hour			
	C. 20° per hour D. 25° per hour			
(vii)	The declination angle at equinox considers as		**2**	**1**
	A. -23.5° B. +23.5° C. Zero D. Positive			
Q - 2 (a)	Explain the working Principal of Pyrheliometer with a neat sketch	**[05]**	**2**	**2**
Q - 2 (b)	Explain the principal of energy generation using PV Panel and Elements of PV System with neat sketch.	**[05]**	**2**	**2**
	OR			**3**
Q - 2 (a)	Give the Classification of Solar based power plants and explain any one in detail with neat sketch.	**[05]**	**2**	**4**
Q - 2 (b)	List out and explain any seven parameters affecting the performance of flat plate collectors.	**[05]**	**2**	**3**
Q - 3 (a)	Describe solar water heater with neat sketch.	**[05]**	**2**	**2**
Q - 3 (b)	List different types of concentrating collector. Explain any one with figure.	**[05]**	**2**	**3**
	OR			
Q - 3 (a)	Explain solar chimney concept in detail.	**[05]**	**2**	**2**
Q - 3 (b)	Explain the concept of Solar Pond in detail.	**[05]**	**2**	**2**

Q - 4	Attempt any one/two.	[05]		
(i)	Explain solar based refrigeration system in detail with neat sketch.		2	3
(ii)	Mention any 5 solar angles with definition.		2	3

SECTION – II

Q - 1	Answer the following questions (Any Five)	[05]		
(i)	What is pitch control of wind turbine?		1	1
(ii)	Define: Lift		1	1
(iii)	Define: Coefficient of Drag		1	1
(iv)	Define: Biomass		1	1
(v)	What is biochemical conversion of Biomass?		1	1
(vi)	Define: Wave energy		1	1
(vii)	What is the basic principle of OTEC?		1	1
Q - 2 (a)	Write a short note on: Types of vertical axis wind turbine rotors.	[05]	1	4
Q - 2 (b)	Derive the one-dimensional momentum theory and Beltz's limit for the wind mill. Also state the assumption in theory and draw the variation of pressure and velocity in wind mill.	[05]	3	4
	OR			
Q - 2 (a)	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.	[05]	3	2
Q - 2 (b)	Explain the significance of following terms related to wind axis machines (i) Solidity (ii) Tip speed ratio (iii) Cut in , cut out speed	[05]	3	2
Q - 3 (a)	Discuss the following factors affecting the biogas generation (1) pH (2) Nutrient (3) Temperature (4) Diameter to Depth ratio (5) Carbon – Nitrogen ratio.	[05]	2	4
Q - 3 (b)	Explain with neat sketch the three stage scheme for methane fermentation.	[05]	2	2
	OR			
Q - 3 (a)	Distinguish between Fixed dome plant and floating dome type biomass plant.	[05]	2	2
Q - 3 (b)	Explain upward draft gasifier with diagram.	[05]	2	3
Q - 4	Attempt anyone.	[05]		
(i)	Explain with neat sketch the vapour dominated geothermal system.		3	6
(ii)	Explain single basin, two-way tidal power plant.		3	6

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CO : Course Outcome Number BTL : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create