U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2024 Supplementary Examinations

Programme: B.E. **Semester: V**
Branch: Mechanical Engineering **Duration: 3 hrs.**
Course Code: 20ME5DERES **Max Marks: 100**
Course: Renewable Energy Sources

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

		UNIT - I	CO	PO	Marks
1	a)	Explain the general principles of energy conservations with examples	*CO1,2*	*PO1*	**10**
	b)	List any major advantages and disadvantages of Renewable Energy Sources	*CO1,2*	*PO1*	**10**
		UNIT - II			
2	a)	What are solar collectors? Explain flat plate and parabolic collector?	*CO2*	*PO1*	**08**
	b)	A PV system feeds a dc motor to produce 1 hp power at the shaft. The motor efficiency is 85%. Each module has 36 multi-crystalline silicon solar cells arranged in 9 × 4 matrix. The cell size is 125 mm × 125 mm and the cell efficiency is 12%. Calculate the number of modules required in the PC array. Assume global radiation incident normally to the panel as 1 kW/ m2. Represent the system in the form of a block diagram?	*CO2*	*PO2*	**12**
		UNIT – III			
3	a)	Define the following terms with relevant expressions; i) Power Coefficient ii) Lift coefficient iii) Tip speed ratio iv) Solidity v) Drag coefficient	*CO3*	*PO1*	**05**
	b)	Draw a neat labeled vector diagram of all the forces acting on an elemental blade section of an aero-turbine and list all the notations used	*CO3*	*PO1*	**05**
	c)	With the help of block diagram, explain the functions of various components of Wind Energy Conversion Systems (WECS)	*CO5*	*PO1*	**10**
		OR			
4	a)	Give the classification of wind energy conversion systems (WECS) based on Axis of rotation, size, output power, and rotational speed	*CO3*	*PO1*	**05**

		b)	Explain any four design considerations of Horizontal Axis Wind Turbine (HAWT)?	*CO3*	*PO1*	**05**
		c)	Sketch and explain Horizontal Axis Wind Turbine (HAWT-single-blade) and also state its advantages and disadvantages?	*CO3*	*PO1*	**10**
			UNIT-IV			
	5	a)	With a neat labeled diagram explain the common circular-fixed dome type of biogas digester.	*CO4*	*PO1*	**10**
		b)	Explain with a neat sketch, the cross-draft type of gasifier showing the various zones.	*CO4*	*PO1*	**10**
			OR			
	6	a)	Explain the major problems associated with the development of gasifier technology	*CO4*	*PO1*	**05**
		b)	Explain environmental effects of Biogas.	*CO4*	*PO1*	**05**
		c)	A plant produces 1200 litres of biogas daily. Calculate the size of the gas holder and the gas holder capacity for a biogas plant that feeds a constant load during the following periods daily assuming uniform consumption of gas; From 0600 to 0800 hours (2 hours) From 1200 to 1400 hours (2 hours) From 1900 to 2100 hours (2 hours)?	*CO4*	*PO2*	**10**
			UNIT - V			
	7	a)	With a neat sketch, explain the construction and working of a Polymer Electrolyte Membrane Fuel Cell with relevant reactions?	*CO5*	*PO1*	**10**
		b)	Explain with a block diagram, fuel cell based electric power plant	*CO5*	*PO1*	**10**

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