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

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main 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.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	What is Clean development mechanism (CDM)? List and explain the various steps of CDM.	*CO1*	*PO1*	**10**
	b)	Explain the various aspects of energy conservation.	*CO1*	*PO1*	**05**
	c)	What does Energy Conservation and energy Audit mean?	*CO1*	*PO1*	**05**
		OR			
2	a)	List the barriers to the widespread adoption of renewable energy in developing countries?	*CO1*	*PO1*	**10**
	b)	What are the key features of India's National Energy Policy?	*CO1*	*PO1*	**05**
	c)	What are the potential risks of over-reliance on renewable energy sources?	*CO1*	*PO1*	**05**
		UNIT - II			
3	a)	Explain I-V and P-V characteristics of a solar cell with relevant sketches.	*CO2*	*PO1*	**10**
	b)	Explain construction of PV array using solar cells.	*CO2*	*PO1*	**05**
	c)	Sketch and explain construction of solar Flat plate collector	*CO2*	*PO1*	**05**
		OR			
4	a)	What are the key layers and components of a solar cell, and what role does each play?	*CO3*	*PO1*	**10**
	b)	What is solar insolation and how its variation influence the performance of a solar PV cell?	*CO3*	*PO1*	**05**
	c)	How is the fill factor (FF) determined, and what does it indicate about a solar cell's performance?	*CO3*	*PO1*	**05**

			UNIT - III			
	5	a)	Draw a neat labelled vector diagram of the forces acting on an elemental blade section of an aero-turbine and list all the notations used.	*CO4*	*PO2*	**10**
		b)	What are the environmental aspects of using wind energy?	*CO4*	*PO2*	**05**
		c)	What do yaw control and pitch control mean in wind turbines? Which axis wind turbine does not need yaw control?	*CO4*	*PO2*	**05**
			OR			
	6	a)	Explain with sketch Darrieus type vertical axis wind mill	*CO4*	*PO2*	**10**
		b)	Plot the Power generated v/s Wind speed and explain all the regions.	*CO4*	*PO2*	**05**
		c)	What is the necessity of speed control of wind turbine? List any four control strategies	*CO4*	*PO2*	**05**
			UNIT - IV			
	7	a)	Explain the Downdraught gasifier with neat sketch showing various temperature regions and the sequence of reactions	*CO4*	*PO2*	**10**
		b)	Explain the factors on which efficiency of biogas generation depends.	*CO4*	*PO2*	**10**
			OR			
	8	a)	Explain the design, construction and operation of fluidized bed gasifier.	*CO4*	*PO2*	**10**
		b)	Explain the process of Ethanol production from sugarcane using block diagram.	*CO4*	*PO2*	**10**
			UNIT - V			
	9	a)	With block diagram explain Hydrogen Fueled Electricity Generation. List advantages and disadvantages of Hydrogen Fuel Cells?	*CO5*	*PO1*	**10**
		b)	With neat sketches and relevant reactions, explain the following type of Fuel Cells i) Phosphoric Acid Fuel Cell (PAFC) ii) Solid Oxide Fuel Cell (SOFC)	*CO5*	*PO1*	**10**
			OR			
	10	a)	Explain the working principle of an Alkaline Fuel Cell (AFC)	*CO5*	*PO1*	**05**
		b)	How does the PAFC compare to other fuel cells in terms of cost, lifespan, and energy density?	*CO5*	*PO1*	**05**
		c)	Sketch and explain fundamental operating principle of a Polymer Electrolyte Membrane Fuel Cell (PEMFC)?	*CO5*	*PO1*	**10**

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