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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eight Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; July/August - 2022

Renewable Energy Sources

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Need for knowing importance of the electrical energy the various factors contributing for the demand and supply of electrical energy.

CO2: Conversion principles, potential of the solar energy, various types of solar energy working with solar energy.

CO3: Scenario of the wind energy. Wind energy conversion systems different types of assemblies, applications.

CO4: Photosynthesis process, biomass conversion technologies. Solid waste conversion and management systems.

CO5: Basic energy conversion principle of tidal and ocean energy. Different types of tidal power plant, ocean thermal energy conversion systems and applications.

***Note: I)PART - A** is compulsory. **Two** marks for each question.*

***II)PART - B**: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
I a.	Define Zenith angle.	2	L1	CO1	PO2
b.	Enlist the applications of solar thermal system.	2	L1	CO2	PO2
c.	Enlist the limitations of WECS.	2	L1	CO3	PO2
d.	Describe biomass gasification.	2	L1	CO4	PO2
e.	Enlist the advantages of tidal power generation.	2	L1	CO5	PO2
	II : PART – B	**90**			
	UNIT – I	**18**			
1 a.	Discuss any 3 conventional types of energy sources.	9	L2	CO1	PO2
b.	Explain the advantages and limitations of non-conventional energy sources.	9	L2	CO1	PO2
c.	Determine the local solar time and declination at a local latitude 23^0 15' N, longitude77^0 30' E at 12.30 IST on June19. Equation of time correction is given from standard table/chart = - (1′ 01″)	9	L3	CO1	PO1,2

Contd….2

	UNIT - II	**18**			
2 a.	What is a green house? Explain different types of green houses.	9	L2	CO2	PO2
b.	Describe the working principle of a solar photo-voltaic cell. Explain the working of a solar photo-voltaic power generation system with a neat diagram.	9	L2	CO2	PO2
c.	With a neat sketch, explain solar water pumping system.	9	L2	CO2	PO2
	UNIT - III	**18**			
3 a.	Derive an expression for the maximum power in the wind.	9	L3	CO3	PO1,2
b.	Wind at 1 standard atmospheric pressure and 15^0 C has velocity of 15m/sec. Calculate: i) The total power density in the wind stream. ii) The maximum obtainability power density. iii) The total power. iv) The torque and axial thrust. |Given turbine diameter = 120 m, turbine operating speed = 40 rpm at maximum efficiency, propeller type WT.	9	L3	CO3	PO1,2
c.	Explain the factors used for wind site selection considerations.	9	L3	CO3	PO2
	UNIT - IV	**18**			
4 a.	Describe the following processes for biomass conversion: i) Anaerobic digestion ii) Fermentation iii) Pyrolysis	9	L2	CO4	PO2
b.	Enlist and explain the factors affecting biodigestion.	9	L2	CO4	PO2
c.	Explain KVIC and Janatha models of biogas plant unit diagram.	9	L4	CO4	PO2
	UNIT - V	**18**			
5 a.	Describe components of tidal power plants.	9	L2	CO5	PO2
b.	A tidal power plant of the simple single basic type has a basin area of $30\times10^6 m^2$. The tide has a range of 12 m. The turbine however, stops operating when the head of it falls below 3 m. Calculate the energy generated in the filling process in KWhr. If the turbine generator efficiency is 0.73.	9	L3	CO5	PO1,2
c.	Explain the Anderson type OTEC cycle with diagram.	9	L2	CO5	PO2

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