



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

(An Autonomous Institution affiliated to VTU, Belagavi)

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

Semester End Examination; July - 2023

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 a Maximum of **18** marks from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
1 a.	Define solar constant and mention its value.	2	L1	CO1	PO2
b.	What is a solar pond?	2	L1	CO2	PO2
c.	How is WEC systems classified in accordance to rotational speed?	2	L1	CO3	PO2
d.	What is Biomass gasification?	2	L1	CO4	PO2
e.	What are the main components of tidal power Plant?	2	L1	CO5	PO2
II : PART - B		90			
UNIT - I		18			
2 a.	Write a note on conventional and non-conventional energy sources.	9	L2	CO1	PO2
b.	Determine the average value of solar radiation on a horizontal surface for June 22, at the latitude of 10°N, if constants 'a' and 'b' are given as equal to 0.30 and 0.51 respectively and the ratio $\bar{n}/N = 0.55$.	9	L3	CO1	PO1,2
c.	Explain the operation of pyranometer and pyrheliometer with suitable sketch.	9	L2	CO1	PO2

Contd... 2

UNIT - II					18
3 a.	Explain the working of box type solar cooker with a neat sketch and mention its advantages and disadvantages.	9	L2	CO2	PO2
b.	With a block diagram, explain the operation of grid integrated solar PV system and mention the application of solar PV System.	9	L2	CO2	PO2
c.	With a neat diagram, explain the types of concentrating solar collector.	9	L2	CO2	PO2
UNIT - III					18
4 a.	With a neat sketch, explain the basic principle of wind energy conversion system.	9	L2	CO2	PO2
b.	Derive an expression for maximum power in wind.	9	L2	CO2	PO2
c.	Explain the main consideration in wind site selection.	9	L2	CO3	PO2
UNIT - IV					18
5 a.	Explain the following terms with respect to biomass conversion;				
	i) Thermo chemical Conversion	9	L2	CO4	PO2
	ii) Anaerobic digestion				
	iii) Fermentation				
b.	Write a note on factors affecting biogas generation.	9	L2	CO4	PO2
c.	With a neat diagram, explain the KVIC model of biogas plant.	9	L2	CO4	PO2
UNIT - V					18
6 a.	With a suitable diagram, explain the single basin operation of tidal power plant.	9	L2	CO5	PO2
b.	With suitable diagram, explain open cycle OTEC system.	9	L2	CO5	PO2
c.	A tidal power plant of the simple single basin type has a basin area of $30 \times 10^6 \text{ m}^2$. The tide has a range of 12 m. The turbine however stops operating, when the head on it falls below 3 m. Calculate the energy generated in one filling process in kilowatt hours, if the turbine generator efficiency is 0.73.	9	L3	CO5	PO1,2

* * * *