



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

(An Autonomous Institution affiliated to VTU, Belagavi)  
 Seventh Semester, B.E. - Mechanical Engineering  
 Semester End Examination; February - 2022  
 Renewable Energy Technology

Time: 3 hrs

Max. Marks: 100

### Course Outcomes

The Students will be able to:

- CO1: Explain renewable energy sources and their utilization and discuss the availability of solar radiation.
- CO2: Discuss solar energy with the help of solar radiation measuring instruments and solar collectors for harnessing solar energy.
- CO3: Discuss characteristics of geothermal energy and elucidate solar photovoltaic systems for harnessing solar energy.
- CO4: Explain different types of wind mills and their design principles. Discuss characteristics of tidal energy, ocean thermal energy.
- CO5: Discuss characteristics of biomass energy and describe the methods of production of hydrogen for utilization as a renewable form of source of energy.

**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
<b>I : PART - A</b>		<b>10</b>			
I a.	Define zenith angle.	2	L1	CO1	PO1
b.	State Geothermal energy.	2	L2	CO3	PO1
c.	Define Global radiation.	2	L1	CO2	PO1
d.	What is anaerobic digestion?	2	L1	CO4	PO1
e.	What is Electrolysis?	2	L1	CO5	PO1
<b>II : PART - B</b>		<b>90</b>			
<b>UNIT - I</b>		<b>18</b>			
1 a.	What are conventional and non conventional energy sources? Describe briefly. Give the classification of energy sources.	9	L3	CO1	PO3
b.	With a neat sketch of solar pond, explain the process of thermal energy extraction.	9	L2	CO1	PO2
c.	Write a short note on solar realization at the Earth's surface.	9	L2	CO1	PO2
<b>UNIT - II</b>		<b>18</b>			
2 a.	What is the difference between pyrheliometer and pyranometer? With necessary sketch, describe the principle of Augstrom type pyreheliometer.	9	L3	CO2	PO3
b.	Enumerate the different types of concentrating type's collectors. Describe a collector used in power plant for the generation of energy in power station.	9	L4	CO2	PO3
c.	What are the main components of a flat plate collector? Explain the function of each.	9	L2	CO2	PO2

**UNIT - III****18**

- 3 a. Enumerate the different types of photo voltaic systems. With a neat sketch, explain any one of them. 9 L2 CO3 PO2
- b. With a schematic diagram of typical solar cell, explain the production of current. 9 L2 CO3 PO2
- c. Draw the schematic diagram of Hot dry rock system and explain its working. 9 L2 CO3 PO2

**UNIT - IV****18**

- 4 a. With block diagram, explain the basic components of Wind Energy Conversion System (WECS). 9 L2 CO4 PO2
- b. Enumerate the different types of single basin arrangement in tidal system. With schematic diagram, explain any one of it. 9 L2 CO4 PO2
- c. Explain the working of open cycle OTEC / Clande cycle. 9 L2 CO4 PO2

**UNIT - V****18**

- 5 a. List the factors affecting biogas generation and explain each. 9 L2 CO5 PO2
- b. Differentiate between single stages and double stage process in biogas plant also draw the necessary sketch. 9 L3 CO5 PO3
- c. With a neat sketch, explain the working of unipolar tank type electrolyser. 9 L2 CO5 PO2

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