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

(An Autonomous Institution affiliated to VTU, Belagavi)

**Eighth Semester, B.E. - Mechanical Engineering**

**Semester End Examination; May/June - 2018**

**Renewable Energy Sources**

Time: 3 hrs

Max. Marks: 100

*Note: Answer FIVE full questions, selecting ONE full question from each unit.*

## UNIT - I

- 1 a. Briefly discuss the importance of non-conventional energy sources in the present context. 8
- b. Mention the advantages and limitations of non-conventional sources of energy. 6
- c. Explain with a neat sketch, solar radiation data. 6
- 2 a. Discuss with the help of recent statistics on India's production of electricity from commercial and non-commercial sources of energy. 8
- b. Define the following :
  - i) Solar constant 6
  - ii) Extra-terrestrial radiation
- c. Write a note on beam and diffuse radiation. 6

## UNIT - II

- 3 a. Define the terms :
 

i) Declination angle	ii) Latitude	iii) Zenith angle	
iv) Hour angle	v) Solar azimuth angle	vi) Altitude angle	
- b. Explain the working principle of Pyranometer with sketch. 8
- 4 a. Sketch and explain the working of shading ring Pyrheliometer. 10
- b. Determine Local Apparent Time (LAT) and declination corresponding to 13.30 hrs (IST) on July 16 at a location latitude  $28^{\circ}35'$  N, longitude  $77^{\circ}23'$  E. The equation of the time correction is - 6 minutes. IST at the local civil time corresponding to  $82^{\circ}5'$  E. 10

## UNIT - III

- 5 a. With the help of schematic diagram, explain solar water heating and solar refrigeration. 10
- b. What is solar pond? Explain with sketches the working principle of a solar pond. 5
- c. State the environmental problems associated with geothermal energy conversion. 5
- 6 a. List out the different concentrating solar collector and explain the working principle with schematic diagram of any two concentrating collector. 12
- b. Discuss nature and characteristic of Indian geothermal reservoirs and its possible utilization. 8

**UNIT - IV**

- 7 a. State the merits and demerits of tidal energy. 4
- b. Give classification of wind machines and state the advantages and disadvantages of wind power. 8
- c. Explain with neat sketch OTEC (closed) plant. 8
- 8 a. Draw neat figures and label the parts of :
- i) Horizontal axis wind machine 8
- ii) Vertical axis wind machine
- b. How can wind energy be converted into electrical energy? Write down the criteria of site selection of wind energy systems. 8
- c. What are the problems associated with OTEC? 4

**UNIT - V**

- 9 a. Write a short note on :
- i) Anaerobic fermentation 10
- ii) Photosynthesis
- b. Describe hydrogen production through electrolysis of water with simple sketch. 10
- 10 a. Describe the construction and working principle of bio gas plants with simple sketch. 8
- b. Discuss the application of bio gas in internal combustion engines. 4
- c. Why hydrogen is more versatile than fossil fuels? What are the various methods of hydrogen storage? 8

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