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10ME754

Seventh Semester B.E. Degree Examination, Dec.2014/Jan.2015

**Nonconventional Energy Sources**

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting at least TWO questions from each part.**

**PART – A**

- 1 a. Discuss with the help of recent statistics on India's production of electricity from commercial and non-commercial sources of energy. (10 Marks)
- b. Write short notes on oil shale and Tarsands. (06 Marks)
- c. Compare the renewable sources of energy based on quantitative approach. (04 Marks)
- 2 a. Define the following terms:
  - i) Extra-terrestrial radiation
  - ii) Langley's and
  - iii) Global radiation (06 Marks)
- b. Explain the working principle of pyranometer with sketch. (10 Marks)
- c. Determine the local apparent time corresponding to 12.00 noon Indian standard time longitude  $81^{\circ}44'E$  on May 8<sup>th</sup>, 1995 for Delhi. Assume equation of time is 8 minutes and 31 seconds. (04 Marks)
- 3 a. List out the different concentrating solar collector and explain the working principle with schematic diagram of any two concentrating collector. (12 Marks)
- b. Calculate the monthly average hourly radiation falling on a flat plate collector facing south ( $\gamma = 0^{\circ}$ ) with the slope of  $10^{\circ}$ . Given the following data:  
 Location : Trivandrum ( $8^{\circ}29'N$ )  
 Month : October  
 Time : 1300 – 1400 hours  
 $I_g$  : 2508 kJ/m<sup>2</sup>-h  
 $I_d$  : 1073 kJ/m<sup>2</sup>-h  
 Assume ground reflectivity to be 0.23. (08 Marks)
- 4 a. Explain with neat sketch about the description and the working principle of liquid flat plate collector. (10 Marks)
- b. Define the following term:
  - i) Stagnation temperature of absorber plate
  - ii) Instantaneous efficiency
  - iii) Selective surface
  - iv) Collector heat removal factor
  - v) Transmissivity of the glass cover (10 Marks)

**PART – B**

- 5 a. Explain the description of solar photovoltaic cell and list out the various factors to limiting the efficiency of photovoltaic cell. (10 Marks)
- b. List out the various types of wind turbine and explain any one type of vertical axis wind turbine with neat sketch. (10 Marks)

- 6** a. With neat sketch, explain the working principle of oscillating water column wave power device. (10 Marks)
- b. Discuss in details about the choice of working fluid in OTEC power plant. (05 Marks)
- c. List out the geothermal power plant in the world. (05 Marks)
- 7** a. Describe the construction and working principle of bio-gas plants with simple sketch. (10 Marks)
- b. List out the problems involved with biogas production. (05 Marks)
- c. Discuss the application of bio-gas in internal combustion engines. (05 Marks)
- 8** a. What are the various routes of hydrogen production? Explain the hydrogen production through electrolysis of water with simple sketch. (10 Marks)
- b. Discuss in detail about the metal hydride hydrogen storage. (10 Marks)

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