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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; June - 2017
Non-Conventional Energy Sources

Time: 3 hrs   Max. Marks: 100

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
ii) Missing data, if any, may be suitably assume.

UNIT - I

1 a.	Write a descriptive note on the current energy scenario of conventional and non-conventional energy sources with respect to Indian context.	6
b.	What is energy conversion? Compare renewable and non-renewable energy sources.	8
c.	State the advantages and limitations of non-conventional sources of energy.	6
2 a.	With a neat sketch explain spectral distribution of solar radiation geometry.	5
b.	Write a note on the following:	
	i) Solar radiation data ii) Beam and diffuse radiation iii) Insulation.	15

UNIT - II

3 a.	Differentiate between pyrheliometer and pyranometer.	6
b.	With a neat sketch describe the principle of angstrom type pyrheliometer.	6
c.	Calculate the local apparent time (LAT) corresponding to 13.30 hrs (IST) on July 16 at a location Latitude 28º35′N, Longitude 77º 12′E. The equation of the time correction on July 16 is (-6) Minutes. Indian standard time (IST) as the local Civil time corresponding to 82.5º E longitude. Also calculate the declination.	8
4 a.	With a neat sketch define the following :	
	i) Latitude ii) Delineation angle iii) Surface azimuth angle	15
	iv) Hour angle v) Zenith angle vi) Solar altitude angle.	
b.	Explain with neat sketch, the working principle of sunshine recorder.	5

UNIT - III

5 a.	Describe the principle of energy conversion in a flat plate collector. With neat labeled diagram discuss the function each component of it.	10
b.	With neat diagram explain working principle of a solar pond and draw a temperature and concentration profile for a typical solar pond.	10
6 a.	Explain with neat diagram working of a solar power generation system.	6
b.	Explain the working principle with schematic diagram of any two concentrating collectors.	8
c.	With a neat sketch and T-S diagram, explain the working principle of vapour dominated geothermal system.	6

UNIT - IV

7 a. List the various types of wind mill and explain any one type from horizontal axis and vertical axis wind mill.   10

  b. List out major problems associated with wind power generation.   6

  c. Explain the principle of OTEC system.   4

8 a. Wind at 1 standard atmosphere pressure and 15°C. temperature has a velocity of 10 m/s the turbine has diameter of 120 m and its operating speed of 40 rpm, at maximum efficiency calculate;

    i) The total power density in the wind stream

    ii) The maximum obtainable power density assuming efficiency of 40%.

    iii) The total power produced and torque.   10

  b. Explain method of harnessing tidal energy using the double barin system.   6

  c. Explain problems associated with OTEC   4

UNIT - V

9 a. Explain the principle of operation of KVIC biogas digester with a neat sketch.   10

  b. Explain the process of anaerotric formentation. List the advantages.   10

10 a. Explain the production of hydrogen by thermal decomposition of water.   6

  b. What are the various methods of hydrogen storage briefly explain.   8

  c. Why hydrogen is more versatile fossil fuels? State merits and demerits of hydrogen energy.   6

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