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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belgaum)
Eighth Semester, B.E. – Mechanical Engineering
Semester End Examination; June/July - 2015
Non Conventional Energy Sources

Time: 3 hrs   *Max. Marks: 100*

***Note*:**   i) *Answer any **FIVE** full questions selecting at least **TWO** full questions from each **part**.*
ii) *Any missing data may be suitably assumed.*

PART - A

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.	State the advantages and limitations of non conventional sources of energy.	6
c.	What is energy conversion? Compare Renewable and non – renewable energy sources.	8
2 a.	What is solar constant? With the help of neat diagram, explain the angles related to solar radiation geometry.	10
b.	Write a note on following : i) Beam radiation and diffuse radiation ii) Solar radiation data.	10
3 a.	Differentiate between pyrheliometer and pyranometer?	6
b.	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 28°35′ N, longitude 77°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 82.5° E longitude. Also calculate the declination.	8
4 a.	Describe the principle of energy conversion in a flat plate collector. With a neat labeled diagram discuss the function of each component of liquid flat plate collector.	10
b.	Explain with sketches the working principle of a solar pond.	5
c.	Explain with neat diagram working of solar still.	5

PART - B

5 a.	Draw neat figures and label the parts of, i) Horizontal axis wind machine ii) Vertical axis wind machine.	10
b.	Wind at 1 standard atmospheric pressure and 15° C. Temperature has a velocity of 10m/sec. The turbine has diameter of 120 m and its operating speed is 40rpm at maximum efficiency calculate, i) The total power density in the wind stream ii) The maximum obtainable power density assuming $\eta = 40\%$ iii) The total power produced and torque.	10

6 a. Explain the method of harnessing tidal energy using the double basin system.   8

  b. Explain with a neat sketch Rankin cycle OTEC plant.   8

  c. Discuss the problems associated with OTEC.   4

7 a. Differentiate Biomass and Biogas.   4

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

  c. State advantages and disadvantages of geothermal energy.   6

8 a. Why hydrogen is more versatile than fossil fuels? What are the various methods of hydrogen
      storage briefly explain?   10

  b. Explain the production of hydrogen by thermal decomposition of water.   6

  c. State merits and demerits of hydrogen energy.   4

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