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## Eighth Semester B.E. Degree Examination, June / July 2013

### Renewable Energy Sources

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer any FIVE full questions, selecting atleast TWO question from each part.

#### PART - A

1.
  - a. What are the prospects of renewable energy sources in India? Mention the advantages of renewable energy sources. (10 Marks)
  - b. Explain the significance of energy consumption as a measure of prosperity. (05 Marks)
  - c. Explain briefly the Indian energy scenario. (05 Marks)
2.
  - a. Define the following with respect to solar radiation : i) Latitude angle ii) Altitude angle iii) Zenith angle. (06 Marks)
  - b. Calculate the sunset hour angle and day length at location latitude of  $35^{\circ}\text{N}$  on February 20<sup>th</sup>. (04 Marks)
  - c. What is the difference between a pyr heliometer and pyranometers? With neat sketch, explain the working of Angstrom type pyreheliometer. (10 Marks)
3.
  - a. What are the main components of a flat plate solar collector? With a neat sketch, explain the function of each component. (08 Marks)
  - b. With a neat sketch, explain the working of a solar still. (06 Marks)
  - c. With a neat sketch, explain the working of solar furnace. (06 Marks)
4.
  - a. With a neat sketch, explain the working of a solar pond electric power plant. (08 Marks)
  - b. What are the advantages and disadvantages of solar-PV systems? (06 Marks)
  - c. With a neat sketch, explain any one type of thermal energy storage system. (06 Marks)

#### PART - B

5.
  - a. What is the basic principle of wind energy conversion system? (04 Marks)
  - b. Explain the main considerations in selecting a site for wind energy system. (08 Marks)
  - c. Wind at a velocity of 20m/s, flows through a horizontal axis wind turbine having a diameter of 10m. Calculate i) power available in wind ii) power density iii) maximum power which can be extracted iv) Torque at maximum efficiency if rotor speed is 30 r.p.m. Assume density of air =  $1.293\text{kg/m}^3$ . (08 Marks)
6.
  - a. With a neat sketch, explain the KVIC biogas plant. (10 Marks)
  - b. Explain the factors affecting biogas generation. (10 Marks)
7.
  - a. With a neat sketch, explain the working of open cycle OTEC system for ocean thermal energy. (10 Marks)
  - b. A single basin type tidal power plant has a basin area of  $3\text{km}^2$ . The tide has an average range of 10m, power is generated during flood cycle only. The turbine stops operating when the head on it falls below 3m. Calculate the average power generated by the plant in a single filling process of the basin, if the generator – turbine efficiency is 0.65. Estimate the average annual energy generation of the plant. Density of sea water may be assumed as  $1025\text{kg/m}^3$ . (10 Marks)
8.
  - a. With a neat sketch, explain the working of fuel cell. (08 Marks)
  - b. What are the advantages and limitations of hydrogen energy? (06 Marks)
  - c. What are the advantages and limitations of small hydro resources? (06 Marks)

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