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

(An Autonomous Institution affiliated to VTU, Belagavi)

**Eighth Semester, B.E. - Electrical and Electronics Engineering**

**Semester End Examination; May/ June - 2019**

**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. Explain the significance of energy consumption as a measure of prosperity. 5
- b. Explain in brief the world energy scenario. 5
- c. State and explain the advantages and limitations of renewable energy sources. 10
- 2 a. Define the terms :
  - i) Latitude angle                      ii) Declination                      iii) Hour angle 6
  - iv) Inclination angle                      v) Zenith angle
- b. Calculate the angle made by beam radiation with the normal to a flat collector on December 1, at 9.00 AM., Solar time for a location at 28°35' N. The collector is titled at an angle of latitude plus 10°, with the horizontal and is pointing due south. 8
- c. Describe the principle of pyrheliometer with a neat sketch. 6

### UNIT - II

- 3 a. Explain the principle of conversion of solar energy into heat. Explain with a neat diagram how this is employed in flat plate collector. 10
- b. Enumerate the different types of concentrating type collectors. 6
- c. State the advantages and disadvantages of concentrating collector over flat plate collector. 4
- 4 a. What is solar pond? With a neat sketch, explain the working of solar pond power plant. 10
- b. A PV system feeds a DC motor to produce 1 hp power at the shaft. The motor efficiency is 85%. Each module has 36 multi crystalline silicon solar cells arranged in a 9 x 4 matrix. The cell size is 125 mm x 125 mm and the cell efficiency is 12%. Calculate the number of modules required in the PC array. Assume global radiation incident normally to the panel as 1 kW/m<sup>2</sup>. 10

### UNIT - III

- 5 a. Explain world-wide wind energy scenario. 5
- b. Explain the basic principle of wind energy conversion system with a neat sketch. 10
- c. Discuss the advantages and disadvantages of wind energy conversion system. 5
- 6 a. Derive the expression for available power in the wind. 10
- b. Describe the main consideration in selecting a site for wind generators. 10

**UNIT - IV**

- 7 a. With a neat sketch, explain Janta model digester plant. 10
- b. What is biomass? Give a description on classification of biomass resources. 10
- 8 a. Explain clearly the factors affecting the biogas generation. 10
- b. Explain the following as applied to biomass conversion :
- i) Anaerobic digestion 10
  - ii) Photo synthesis
  - iii) Biomass Gassification

**UNIT - V**

- 9 a. What is the basic principle of tidal power? With a neat sketch, explain the operation of double basin tidal power plant. 10
- b. The observed difference between the high and low water tide is 8.5 cm, for a proposed tidal site. The basin area is about 0.5 sq km which can generate power for 3 hours in each cycle. The average available head is assumed to be 8 m and the overall efficiency of the generation to be 70%. Calculate the power in h.p. at any instant and the yearly power output. Average specific weight of sea water is assumed to be 1025 kg/m<sup>3</sup>. 10
- 10 a. Enumerate the advantages and limitations of tidal power plant. 10
- b. With suitable diagram, explain open cycle OTEC system for ocean thermal energy. 10

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