

Code No: **RT41021****R13****Set No. 1****IV B.Tech I Semester Supplementary Examinations, February - 2019****RENEWABLE ENERGY SOURCES AND SYSTEMS****(Electrical and Electronics Engineering)****Time: 3 hours****Max. Marks: 70***Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any THREE questions from Part-B*

PART-A(22 Marks)

1. a) Define the terms Altitude angle and Zenith angle pertaining to Solar-Earth geometry. [4]
- b) Give the application of Concentrating type Solar Energy Collectors. [4]
- c) Calculate the number of 36 V, 10A PV modules required to supply a dc load at 400V and 40A. [4]
- d) What is lift- to- drag ratio for a wind turbine. [4]
- e) Identify different types of turbines for hydel power plants. [3]
- f) What are the factors which determine the efficiency of a fuel cell? [3]

PART-B(3x16 = 48 Marks)

2. a) Discuss the factors attenuating the solar radiation on the earth's atmosphere. [8]
- b) Determine the Local solar time and declination at a location latitude $23^{\circ} 15' N$, longitude $77^{\circ} 30' E$ at 12.30 PM IST on June 19, time correction = $-(1^{\circ} 01'')$. [8]
3. a) Describe each component of Liquid heating Flat-plate collector. [8]
- b) Describe Transmittance- Absorptance Product of a Flat-plate collector. [8]
4. a) Explain the principle of photo-voltaic effect with neat sketches. [8]
- b) Describe the Perturb & Observe method of tracking maximum power transfer from PV array. [8]
5. a) Discuss different types of horizontal-axis turbines. [8]
- b) Derive the expression for maximum wind power extracted by a wind turbine. [8]
6. a) A Pelton wheel is to be installed in a site with $H = 20m$, $Q_{min}=0.05m^3 s^{-1}$. Neglecting friction, find (i) the jet velocity (ii) the maximum power available (iii) the radius of the nozzles (assuming there are two nozzles). Assuming that the wheel has shape number= 0.1 find (iv) the number of cups (v) the diameter of the wheel (vi) the angular speed of the wheel in operation. [8]
- b) Describe in detail the operation of double basin type tidal power plant. [8]
7. a) Differentiate between the following methods of biogas generation
i. Pyrolysis ii. Combustion iii. Gasification iv. Anaerobic Digestion. [8]
- b) Describe all the types of geo-thermal resources with their applications. [8]