

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**SECOND SEMESTER M.TECH DEGREE EXAMINATION, MAY 2016**

**Electrical & Electronics Engineering**

(Control Systems, Guidance and Navigational Control, Power Systems, Electrical Machines,  
 Power Control & Drives, Power System and Control)

**01EE6412 New and Renewable Sources of Energy**

Max. Marks: 60

Duration: 3 Hours

(Answer any two full questions from each part)

**Part A**

1. a) Describe the principle of operation of a solar pond. (5)
- b) What are the main applications of a solar pond? Describe them. (4)
2. Explain the working principle of a solar photovoltaic cell. Describe a basic photovoltaic system for power generation. (9)
3. Describe the layout & working of a solar water heating system. (9)

**Part B**

4. Wind at 1 atmospheric pressure and 15°C has a velocity of 15m/s. Calculate: (9)
  - i. Total power density of the wind stream
  - ii. Maximum obtainable power density
  - iii. Reasonably obtainable power density
  - iv. Total power and
  - v. Torque and axial thrust

Given: turbine diameter = 120m, and turbine operating speed = 40 rpm at maximum efficiency. Propeller type wind turbine is considered.
5. Describe the main considerations in selecting a site for wind power plants. (9)
6. a. Explain the basic principle of Tidal power generation. (6)
- b. Explain the advantages of Tidal power generation (3)

**Part C**

7. Describe the basic civil work design considerations for small scale hydroelectric plants with neat diagram (12)
8. Briefly explain (12)
  - i) Fuel cells
  - ii) Alcohol energy
9. Explain different types of turbines and generators used for small hydroelectric plants (12)

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