

Registration no:

Total Number of Pages: 01

M.TECH  
PEPE204

## Second Semester Examination – 2013

### ELECTRICAL ENERGY SYSTEMS

Time: 3 Hours

Max marks: 70

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

1. Answer the followings [2×10=20]
  - a. Name two different resources those can be used for generation of electrical Power.
  - b. What are the dis-advantages of using non-renewable resources for the generation of electrical power?
  - c. Define the term “diffuse radiation”
  - d. What are the different types of rotors used in wind power generators?
  - e. What is meant by angle of attack?
  - f. How cut-out speed is related with electric power generation in wind mills?
  - g. Draw the layout of wind mill connected to grid.
  - h. What is the assessment methods adopted for establishment of a wind mill?
  - i. How geothermal can be used for electrical energy conversion?
  - j. What are the minimum requirement for installation of a tidal power plant?
- 2.a. Write short notes on energy conversion and energy efficiency. [5]
- b. Distinguish the feasibility, merits and demerits of electric power generation using renewable and non-renewable sources of energy [5]
3. Compute the monthly average hourly solar flux received on a flat plate collector facing due south having a slope of  $12.5^\circ$ . The collector is placed at a place  $15^\circ$  North on 20<sup>th</sup> day of October. [10]  
Consider the following data:  
 $H_g = 2405 \text{ kJ/m}^2/\text{h}$ ,  
 $H_d = 1075 \text{ kJ/m}^2/\text{h}$ ,  
Ground reflectivity,  $\rho = 0.25$  ,  $\omega = 7.5^\circ$ .
4. a. Derive an expression for energy that can be extracted from energy. [5]  
b. For an 8 – blade wind turbine, calculate the angular speed of the rotor to lift water from 6-m depth if the radius of the turbine rotor is 1m and the wind speed is 10 m/s. [5]  
Assume  $\lambda = 1$ .
5. a. Explain the planning process for establishment of a wnd power plant. [5]  
b. What is grid interfacing and how can the grid connection be made possible? [5]
6. a. Describe the method of controlling voltage and frequency of electrical power generated from a wind mill. [5]  
b. Compare the sequential operation modes of a single effect tidal scheme with those of the double effect tidal scheme. [5]
7. a. How can the geothermal energy be extracted for electrical power generation? [5]  
b. What are the possibility of installation of geothermal power plants in India? [5]
8. Write short notes on any two of the following: [2×5=10]
  - a. Solar collectors
  - b. Torque –Speed characteristics of wind turbines.
  - c. Tidal wave characteristics
  - d. Biological conversion of energy.