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Total Number of Pages: 2

B.TECH
PEEL5302

5th Semester Regular / Back Examination 2016-17

RENEWABLE ENERGY SYSTEM

BRANCH(S): EE, EEE

Time: 3 Hours

Max Marks: 70

QCODE: Y310

**Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.**

Q1 Answer the following questions: (2 x 10)

- a) What do mean by energy chain? Differentiate between primary energy and secondary energy?
- b) What are greenhouse gases? What effect does they have to the environment?
- c) Define beam radiation, diffused radiation and global radiation. Name some radiation measurement instruments.
- d) How are electron-hole pairs generated when solar radiation is directed on a solar cell.
- e) Define concentration ratio of a solar collector? What is the value of hour angle at solar noon?
- f) What are direct and indirect band gap materials?
- g) Define solidity. How is it related to speed of the wind turbine.
- h) Differentiate between upwind and downwindtype of wind turbines.
- i) What is gasification?
- j) What is a hybrid energy system? Why are hybrid energy based systems needed?

Q2 a) Discuss briefly about the features of non-renewable energy resources. (5)

b) Differentiate between distributed energy systems and dispersed generation? (5)

Q3 (a) What will happen if you connect two non-identical PV cells in parallel and explain the resulting i-v characteristics? (5)

(b) Draw and explain an equivalent circuit of a practical solar PV cell.

Q4 a) Briefly describe about the different components of wind turbine. Draw and explain Power versus wind speed characteristics of a wind turbine. **(5)**

b) The following data were recorded for a two- blade horizontal axis wind turbine: **(5)**

Average free wind speed at standard height of 10m = 8m/s
Interference factor $\alpha = 0.13$, Air density = 1.226 kg/m^3 , hub height from the ground is = 80m, rotor diameter = 60m and downstream wind velocity is half that of upstream wind. Find:

- i. Power available in the wind
- ii. Power extracted by the turbine
- iii. Axial force on the turbine

Q5 a) What is solar time and why is it different from the standard clock time of a country? **(5)**

b) Calculate the no of daylight hours at banglore on 21st June and 21st December in a leap year. The latitude of Bangalore is $12^{\circ}58' \text{ N}$. **(5)**

Q6 a) Explain the process of production of biogas from biomass. What are the main advantages of anaerobic digestion of biomass? **(5)**

b) What are the main advantages and disadvantages of biomass energy? **(5)**

Q7 a) Discuss about the difference between fixed dome and floating drum type biogas plants. **(5)**

b) Differentiate between wind-diesel hybrid system and wind –PV hybrid system. **(5)**

Q8 Write short notes on any two of the following. **(5 x 2)**

- a) Reactive power compensation.
- b) Grid connected Solar PV system
- c) Solar thermal electrical power plant
- d) Peltier cooling
- e) Power versus wind speed characteristics of Wind turbine