B. E.(EE) Part- IV 7th Semester Examination, Dec. 2012

Renewable and New Energy : Sources and Utilization

Elective – I : EE-705/3

Time : 3 hours | Full Marks : 70

Use separate answer script for each half

Answer SIX questions, taking THREE from each half

Two marks are reserved for neatness in each half

FIRST HALF

1. (a) What is Sun? What are the two sets of chemical reaction cycles taking place inside the Sun as a source energy? - Discuss with the help of chemical reactions and molecular diagrams.

(b) With the help a diagram show the anatomy of the Sun. Name its different layers and describe their functions. [6 + 5]

2. (a) What is Solar Constant and how it is estimated? Draw pattern of curves showing solar radiation received by the earth surface.

(b) Explain the general principle of operation of Solar Instruments for measurement of Solar Radiation. Name five such instruments and describe their functions. [6 + 5]

3. (a) What is a Sunshine recorder? With the help of a neat sketch describe its construction and operation.

(b) With a labeled diagram, explain the operation of a centralized water heater, useful for city/municipality of a cold country. [6 +5]

4.(a) Draw the electromechanical arrangement for heliostat type control of mirrors for central tower type water heating system.

(b) Describe the process of depth optimization in determining a saline water sallow heating. [6 + 5]

5. Write Technical notes on *any two :* [5 ½ x 2]

(a) Solar Photo voltaic cell and its construction;

(b) Operation of acidic and alkaline full cell;

(c) Solar Pond Power Plant.

(d) Hybrid Electric Vehicle

SECOND HALF

6. (a) Justify the following statement :

"Use of Renewable/ Non-conventional energy sources is more desirable in our country."

(b) Explain with suitable block diagram the wind energy conversion system (WECS) where the output is connected to i) DC load ; ii) Rural hospital; iii) Grid. [5 + 6]

7. (a) Compare i) Horizontal axis wind turbine with vertical axis wind turbine;

ii) Multi-blade wind turbine with three blade wind turbine.

(b) Draw the block diagram of wind electric energy conversion system (WECS) and explain in brief the essential components of it. [6 + 5]

8. (a) Draw and describe the block schematic of ocean thermal energy conversion (OTEC) system and the corresponding thermodynamic cycle. What are the problems associated with OTEC system?

(b) Ocean waves on Indian coast have an amplitude 1m with a period of 5s, calculate Wave area, Energy density and Power density. Take wave width 100m and water density 1000 kg/m^3. [6 + 5]

9. (a) Compare small hydro power project with conventional hydro power project?

(b) How small hydro power project is classified?

(c) Describe a small hydro project using Turbo or Bulb type turbine. [3+3+5]

10. Write short notes on *any two :* [5 ½ x 2]

(a) Magnetic confinement of plasma;

(b) Buoy type wave machine;

(c) Magneto hydrodynamic (MHD) Generator.
