B.E. 7th Semester Electrical Final. Examination, 2011

# RENEWABLE AND NEW ENERGY: SOURCES AND UTILISATION

(ELECTIVE-I: EE-705/3)

Answer *SIX* questions taking *any THREE* from each half

*2-marks reserved for neatness in each half*

Time: *Three Hours* Full Marks: *70*

## FIRST HALF

1 (a) Draw the section of the Sun with labels of the layers and discuss different utilities of these layers, e.g., Sun Spot, Corona, Solar Wind etc. [6 + 5]

(b) Show the graph of distribution of solar radiation wavelengths above the earth's atmosphere and the radiation spectrum after absorption by atmospheric gases, moisture, carbon-dioxide, dust etc. State the measurement of 'Solar Constant' using above curves.

2 (a) Discuss the general design principles of solar radiation measuring instruments and give examples of a few solar-data instruments. [5 + 6]

(b) What is a Pyranometer? Classify this instrument as per different designers and manufacturers. With a labeled diagram, describe construction and working principle of one of these instruments.

3 (a) With a neat sketch, label the parts of a Sun-shine Recorder and describe its working principle. Discuss also its electronic computerized counter-part. [6 + 5]

(b) Explain with a schematic diagram, the working principle of a Solar Refrigerator.

4 (a) With a schematic diagram, describe the construction and operation of a Central Tower-type hot water plant using Heliostat controlled flat mirrors. [5 + 6]

(b) What is a Solar Pond? Describe the operation of a simple Solar Pond Power Plant (SPPP).

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

(a) Alkaline Fuel Cell (FC);
(b) Hybrid Electric Vehicle (HEV);
(c ) Geo-thermal Power Plant (GTPP);
(d) Tidal Power Generation (TPG);
(e) Photo Voltaic Solar Pane (PV-SP)

## SECOND HALF

6.(a) How the wind energy conversion (WECS) systems are classified? (3+3+5)

(b) Explain the planning stages of wind electric generator installation.

(c) What are the mechanical controls used in WECS? Compare constant speed constant frequency scheme of WECS with variable speed constant frequency scheme of WECS. Show the necessary block diagram.

7. (a) Compare small hydro power project with conventional hydro power project? (3+3+5)

(b) How small hydro power project is classified?

(c) Describe a small hydro-project using Tube or Bulb type turbine.

8. (a) What is meant by open cycle and closed cycle ocean thermal energy conversion (OTEC) system? What are the problems associated with this system? (6+5)

(b) Describe the block schematic diagram of OTEC with its corresponding thermodynamic cycle?

9. (a) What is biomass? How Biomass resources are classified? (3+3+5)

(b) Describe different types of biomass conversion process.

(c) Describe any popular type biogas plant used in India.

10. Write short notes on any two: (5.5x2)

(a) Plasma Confinement

(b) Buoy type wave machine and Dolphine type wave energy generator

(c) Magneto-hydrodynamic (MHD) plant