Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VI SEMESTER B.TECH END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: RENEWABLE ENERGY SOURCES [ELE 342]

(OPEN ELECTIVE – II)

REVISED CREDIT SYSTEM

Time: 3 Hours | 16 MAY 2016 | MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.

1A. Define the following:

Altitude angle, incident angle, zenith angle, solar azimuth angle, hour angle, declination angle ***(03)***

1B. With a neat diagram explain the construction and working of Pyrheliometer? ***(04)***

1C. Explain the depletion process of solar radiation as it passes through the atmosphere to reach the surface of the earth. ***(03)***

2A. Define i) Concentration ratio & collector efficiency of solar collector.

ii) Discuss the principle of solar collector. How can collector coating be used to improve the performance of a collector. ***(03)***

2B. Describe with neat diagram the construction and working of flat plate air heating collector. ***(03)***

2C. Describe the Point focusing collector working principle with a neat diagram. Mention the merits and demerits of concentrating collectors over Flat plate collector. ***(04)***

3A. Draw and explain an equivalent circuit of a practical solar PV cell also the I-V curve characteristics of a solar cell also comment on the significance of fill factor? ***(03)***

3B. With a neat diagram explain the working of the various components of photovoltaic systems integrated with a grid. And also write the importance of MPPT in an SPV system. ***(03)***

3C. Design a PV water pumping system which is required to draw $25m^3$/day from a depth of 12m. Take water density=$1000kg/m^3$, Acceleration due to gravity=$9.81m/s^2$, Solar PV module used =75Wp, Operating factor=0.75, Pump efficiency=30%, Mismatch factor=0.85. ***(04)***

4A. What are the various factors contributing to solar cell losses and also explain fabrication steps of PV module. ***(03)***

4B. With block diagram explain the basic components and operation of wind energy conversion system. ***(03)***

4C. Wind at 1 standard atmospheric pressure and 15^0 C temperature has a velocity of 15 m/s. The turbine has diameter of 120 m and its operating speed is 40 rpm at maximum efficiency. Propeller type is considered. Calculate

a. The total power density in the wind stream.

b. The maximum obtainable power density

c. The total power produced in kW, assuming the efficiency=35%

d. The torque at maximum efficiency and maximum axial thrust ***(04)***

5A. i) What do you understand by teetering of rotor? In what case it is required?
ii) Evaluate the suitability of various types of generators of wind power generation. ***(03)***

5B. Derive the expression for maximum axial thrust experienced by propeller wind turbine. ***(03)***

5C. Enumerate and explain the different types of biomass conversion technologies. ***(04)***

6A. With a neat diagram explain the construction and working of Down drought gasifier. ***(04)***

6B. Describe with the scheme of construction and working of open cycle Ocean Thermal Energy Conversion system. ***(03)***

6C. Describe the basic principle of tidal power generation. With a neat diagram explain the working of single basins tidal power. ***(03)***