Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VII SEMESTER B.TECH (MECHANICAL ENGINEERING)

END SEMESTER (MAKE UP) EXAMINATIONS, DEC 2015/JAN 2016

SUBJECT: RENEWABLE ENERGY SYSTEMS (MME-447)

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A) Define the following with respect to Solar-Earth geometry. **(03)**

(a) Latitude (b) Declination (c) Zenith angle.

1B) Write the two correction need to calculate Local Apparent Time and Determine the LAT corresponding to 1430hour (IST) at Mumbai (19^0 07'N, 720 51'E) on July 1. In India standard time is based on 82.50^0E. Equation of time correction on July 1 is (-3.5 minutes). **(03)**

1C) With neat sketch explain the working of a low temperature Solar power plant. **(04)**

2A) State and explain the Hour angle and Day length with respect to solar earth system. **(03)**

2B) Define the following with respect to Solar liquid flat plate collector **(03)**

(i) Transmissivity absorptivity product

(ii) Collector Efficiency factor

(iii) Collector heat removal factor.

2C) Find the value of $\tau_{r,}$ τ_a and τ with the angle of incidence of 45^0 for the following system. **(04)**

Material = Glass;

Number of cover: 2;

Thickness of each cover=4mm;

Refractive index of glass relative to air =1.2;

Extinction coefficient of glass =15 m^{-1}.

3A) With neat sketch explain the working of Floating drum type biogas plant. **(03)**

3B) With neat sketch explain Wind –electric generating power plant. **(03)**

3C) Derive the expression for maximum power obtainable from a horizontal axis wind turbine. **(04)**

4A) With neat sketch explain the working of suitable OTEC system that makes use of ammonia as working fluid. **(03)**

4B) Explain with neat diagram 'Dolphin type' wave power machine. **(03)**

4C) List the site requirements, advantages, disadvantages of Tidal power plant. **(04)**

5A) With neat sketch explain the working of a 'Thermo electric generator'. **(03)**

5B) With neat sketch explain the construction and working of a closed cycle MHD generator. **(03)**

5C) Explain with neat diagram working of hydrogen-oxygen fuel cell. What are its fields of applications? **(04)**

6A) Explain with neat sketches the bulb type and tube type turbines used in small scale hydroelectric power plants. **(03)**

6B) With neat sketch explain the geothermal energy conversion in liquid dominated reservoir. **(03)**

6C) Write short notes on the following: **(04)**

a) Solar constant (I_{sc}).

b) Pyrheliometer