Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

V SEMESTER B.TECH. (MECHANICAL ENGINEERING)

END SEMESTER MAKE UP EXAMINATIONS, DEC 2016/JAN 2017

SUBJECT: PE II: NON CONVENTIONAL ENERGY SOURCES [MME 4025]

REVISED CREDIT SYSTEM
(05/01/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. Sketch and explain the working principle of solar absorption refrigeration system. **04**

1B. With the help of a neat labelled diagram explain the working of an open cycle OTEC plant. **04**

1C. List out the merits of solar energy over wind and biomass energy. **02**

2A. Sketch and explain the working of a downdraft gasifier. **04**

2B. Find τ_r, τ_a and τ with the angle of incidence of 20° for the following cover system. **04**

Material: Glazed Glass
Number of covers: 3
Thickness of each cover: 2mm
Refractive Index of glass relative to air: 1.50
Extinction coefficient of glass: 12 per meter

2C. Write the appropriate formulae with proper notations for finding the angle of incidence of beam radiation over: **02**

(a) Tilted surface
(b) Vertical surface facing due south

3A. Sketch and explain the characteristics of a Savonius rotor. **03**

3B. State and prove the Betz criterion for wind turbines. **03**

3C. With the aid of a neat sketch explain the working of a single flash steam geothermal power plant. **04**

4A. Explain in detail the various steps involved in anaerobic digestion. Also write the important chemical reaction equation associated with each step. **06**

4B. Explain any two parameters that affect the performance of a flat plate collector. **02**

4C. Write a note on the working principle of MHD. **02**

5A. Find the monthly average hourly global radiation on a horizontal surface at the location (20˚35'N, 77˚11'E) for the time 0930-1000h (IST) using following data.
Month: March 15th
Average sunshine hours per day: 9
Sunrise hour angle: 95.18˚
Equation of time correction= (- 4min)
Standard longitude for the location = 82.5˚E
Monthly average solar radiation indicated by a Pyranometer at the location is 600W/m^2. Assume solar constant as 1367W/m^2 and constants a=0.698 and b= 0.386. **05**

5B. Explain any three factors that affect biogas generation through anaerobic fermentation. **03**

5C. Sketch and explain the working principle of an oscillating water column. **02**