Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent Institution of MAHE, Manipal)

VI SEMESTER B. TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL 2018

SUBJECT: RENEWABLE ENERGY [ELE 4024]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 24 April 2018** **Max. Marks: 50**

Instructions to Candidates:

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

1A. Calculate the angle of incidence of beam radiation on a plane surface, tilted by 45° from the horizontal plane and pointing 30° west of south located at Mumbai at 1:30 P.M. (IST) on 15th November. The longitude and latitude of Mumbai are 72°49' E and 18°54' N respectively. The standard longitude for IST is 81° 44' E. ***3M***

1B. Define the following:
(i) Solar constant (ii) Declination angle (iii) Beam radiation (iv) Diffused radiation . ***4M***

1C. Describe the Liquid flat-plate collector with the help of a Suitable diagram. ***3M***

2A. With the help of block diagram explain the operation of stand-alone and Grid-Interactive Solar PV systems. ***4M***

2B. What is the importance of Maximum power point tracking in a solar PV system? Using Buck-Boost converter, derive the expressions of power and voltage for maximum power point tracking. ***6M***

3A. Explain the operation and main features of Solar PV-Wind hybrid generating systems with a neat diagram. ***5M***

3B. Explain various designs of blades of Horizontal axis wind turbines and their relative features. ***5M***

4A. With a neat figure explain the construction and working of the following

a. Up draught gasifier
b. Down draught gasifier ***5M***

4B. Find the size of a cow-dung based biogas plant required for a house having the following requirements:

(a) Cooking for two adults and two children.

(b) Lighting for three hours daily, using three gas mantle lamps, each of 100 CP power.

(c) Also, calculate the number of cows required to feed the plant, Gas produced per day, daily feeding of cow dung, slurry volume added per day and required volume of digester for 50 day retention time.

(Note: Two children may be considered as equivalent to one adult for cooking energy purpose. Assume weight of dry solid mass (18%) in cow dung, collectable cow dung (70%), slurry density- 1090 kg/m^3) ***5M***

5A. With a neat diagram explain the working of following OTEC technology.

(a) Open cycle

(b) Hybrid cycle ***5M***

5B. Explain the following a) Single-basin, single-effect tidal energy conversion scheme with its sequence of operation. b) Pumped Hydroelectric Storage ***5M***