Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institute of Manipal University, Manipal

V SEMESTER B.TECH (MECHANICAL ENGG.) END SEMESTER EXAMINATIONS, DECEMBER 2018

SUBJECT: NON CONVENTIONAL ENERGY SOURCES [MME 4025]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. Sketch, label solar altitude angle, latitude angle and declination angle. **3**

1B. With neat sketch explain the working of a suitable device that can be used to measure beam and diffused radiation from the sun. **4**

1C. Describe with a neat sketch the process of conversion of solar energy into electricity using suitable temperature cycle that makes use of parabolic dish concentrators for harnessing solar energy. **3**

2A. A liquid flat plate collector with single glass cover has the following data:

Length of collector=1.6 m

Width of collector = 1.2 m

Extinction coefficient of glass = 15/m

Glass plate thickness = 2 mm

Refractive index of glass to air=1.526

Beam radiation flux = 400 W/m^2

Diffuse radiation flux = 150 W/m^2

Tilt factor for beam radiation=0.9384

Tilt factor for diffuse radiation=0.9741

Tilt factor for reflected radiation = 0.0052

Transmissivity based on reflection-refraction for beam radiation= 0.8445

Angle of refraction for beam radiation = 18.72^0

Angle of incidence for diffuse radiation = 60^0

Diffuse reflectivity of cover system = 0.2

Glass cover emissivity/absorptivity = 0.7

Find the incident solar radiation flux absorbed by the absorber plate. **5**

2B.	Give the importance of collector heat removal factor and collector efficiency factor in liquid flat plate solar collector.	3
2C.	Mention the applications of selective surfaces.	2
3A.	With a neat sketch and labeling explain the power generation process by oscillating float air pump wave machine?	3
3B.	Explain with a neat sketch the Claude cycle based ocean thermal energy conversion system.	4
3C.	Explain briefly the various site selection criterions for a wind energy plant	3
4A.	With a neat sketch and clear labeling explain the biogas generation process using fixed dome type biogas plant. Emphasize on the various stages of biomass digestion process.	4
4B.	With a neat sketch show the formation of ethanol from molasses.	3
4C.	Mention and explain the stages of biogas production involving anaerobic digestion.	3
5A.	Mention the demerits of thermoelectric power generation.	3
5B.	Briefly describe the four types of fuel cells.	4
5C.	With a neat sketch explain the magneto hydro dynamic system which uses a high temperature inert gas stream to pass through the magnetic field.	3