MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)
PROCTORED ONLINE MAKEUP EXAMINATIONS, MARCH 2022

RENEWABLE ENERGY [ELE 4306]
REVISED CREDIT SYSTEM

Time: 75 Minutes + 10 Minutes **Date: 01 MARCH 2022** **Max. Marks: 20**

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.
- Time: 75 minutes for writing + 10 minutes for uploading.

1A. Calculate the angle made by beam radiation with the normal to a flat plate collector, pointing the south location in New Delhi (27 ^{0} 30' N, 76^0 42' E) at 10.00 hour solar time on October 29. The collector is tilted at an angle of 35^0 with the horizontal. Also calculate the day-length. ***(03)***

1B. Explain with a neat diagram Describe the working of double-basin, paired-basin scheme briefly. ***(03)***

1C. Calculate the average value of global radiation on a horizontal surface for March 21, at the latitude of 12^0 N if the constants are given as equal to a = 0.28, and b = 0.50 respectively. The ratio of average length of solar day (bright sunshine hours) and length of the longest solar day (the day length of the average day of the month) is 0.68. ***(04)***

2A. Classified the different types of wind turbines. With neat diagram explain the doubly fed induction generator (DFIG) wind turbine system. ***(04)***

2B. The synchronous speed of generator is 1200rpm. The generator has a torque range from 600 to 3200NM. Estimate the range of the developed power of the generator slip is -0.02. The Average wind speed is 13m/s at 50m hight above the ground level. The elevation of the area is 900m above the sea level. The average temperature is 17° C. Calculate the power density of wind at these average values. ***(04)***

2C. with neat diagram explain the common circular fixed dome digester ***(02)***