**Roll No.** | | | | | | | | | | | | | **Total No. of Pages : 02**

**Total No. of Questions : 08**

**M.Tech. (EE) (Sem.–1)**

# RENEWABLE ENERGY SYSTEMS

**Subject Code : MTEE-103C-18**

**M.Code : 75219**

**Date of Examination : 19-01-2023**

**Time : 3 Hrs.** **Max. Marks : 60**

**INSTRUCTIONS TO CANDIDATES :**

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWELVE marks.**

1. a) Define Distributed Generation (DG) as per the definition given by various agencies. Discuss the operational issues due to DG penetration. Briefly explain four DG technologies used in india.

2. a) Discuss the various types of flat plate collectors. Write the advantages and disadvantages of concentrating collectors over flat-plate types of solar collectors.

   b) A solar cell (0.9 $cm^2$) receives solar radiations with photons of 1.8ev energy having an intensity of 0.9 $mW/cm^2$. Measurement shows open circuit voltage as 0.6$Vcm^2$, short circuit current as 10$mA/cm^2$ and" maximum current is 50% of short circuit current. Assuming the realistic efficiency of solar cell, calculate the maximum voltage, maximum power that the cell can give and find the fill factor.

3. a) Explain the various sub-systems of a horizontal axis wind turbine.

   b) Wind at one standard atmospheric pressure and 150c has a speed of l0m/s. A 10m diameter wind turbine is operating at 5 rpm with maximum efficiency of 40%. Calculate i) total power density in wind stream, ii) the maximum power density, iii) the actual power density iv) the power output of the turbine v) the axial thrust on the turbine structure.

4. a) How is geo thermal power generation extracted from liquid dominated flashed steam and vapour dominated steam input?

   b) Discuss the wind energy conversion system.

5. Discuss the principle and operation of fuel cell. Derive an expression for emf and efficiency of fuel cell. Discuss the operating characteristics of the same.

6. '*It is seen that high DG injection affects the power quality of the grid*'. Explain.

7. In a country like India where DG penetration can provide solution to power demand problem. Discuss the economics of distributed generation with the help of case study.

8. a) What is a biogas plant? Explain **any two** types of biogas plant.

   b) Explain the modelling of power electronic interface with power grid.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student**.