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# Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

## VI SEMESTER B.TECH MAKEUP EXAMINATIONS JULY 2016

### SUBJECT: RENEWABLE ENERGY SOURCES [ELE 342]

**(OPEN ELECTIVE- II)**

**REVISED CREDIT SYSTEM**

Time: 3 Hours | 08 JULY 2016 | MAX. MARKS: 50

**Instructions to Candidates:**

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitable assumed.

1A. What are primary and secondary energy sources & list the indirect form of solar energy? (03)

1B. Define the following: i) solar constant, solar irradiance, extra-terrestrial and terrestrial radiation ii) what are the reasons for variation in solar radiation reaching the earth than received at the outside of the atmosphere.? (04)

1C. Explain a working and construction of sunshine recorder with neat diagram? (03)

2A. Explain the effect of various parameters on performance on flat plate collector. (03)

2B. With the help of a schematic diagram explain the working of passive space cooling system through ventilation. (03)

2C. With a neat figure explain the construction and working of Flat plate collector. And list out their advantages and disadvantages. (04)

3A. Describe the photoconduction process also draw and explain an equivalent circuit of a practical solar PV cell with the I-V curve characteristics of a solar cell. (03)

3B. With the help of block diagram explain the operation of standalone and also write the importance of MPPT in an SPV system. (03)

3C. Design a PV system: A house has the following electrical appliance usage: One 18 Watt fluorescent lamp with electronic ballast used 4 hours per day. One 60 Watt fan used for 2 hours per day. One 75 Watt refrigerator that runs 24 hours per day with compressor run 12 hours and off 12 hours. The system will be powered by 12 Vdc, 110 Wp PV module. Assume: solar radiation data 3.4h/day of 1000w/$m^2$; for safety, the inverter should be considered 30% bigger size; Days of autonomy = 3 days battery efficiency is 85% & DoD is 60% (04)

4A. Consider a 100 $cm^2$ photovoltaic cell with reverse saturation current $I_0 = 10^{-12}$ A/$cm^2$. In full sun, it produces a short-circuit current of 40 mA/$cm^2$ at 25$^0$C. Find the open-circuit voltage at full sun. Assume Vt=0.0257. (02)

4B. With the help of neat diagram explain the terms: free and relative wind velocity, drag & lift forces, solidity, pitch angle. (04)

4C. Derive the expression for maximum power developed in the wind mill of propeller type with relevant waveforms. (04)

5A. Describe the comparison of HAWT & VAWT. (Atleast 5 points in each) (04)

5B. Explain the Anaerobic digestion in Biomass conversion Technology. (02)

5C. With the help of block diagram explain the working of an MSW incineration plant. (04)

6A. Compare the relative performance of a floating drum and fixed dome type biogas plants. (05)

6B. Describe with the scheme of construction and working of Closed cycle Ocean Thermal Energy Conversion system. (05)