M.TECH. ENERGY SCIENCE AND TECHNOLOGY EXAMINATION
FIRST YEAR SECOND SEMESTER – 2018

SUBJECT: PHOTOVOLTAIC ENERGY SYSTEMS

Time : Three hours | Full Marks : 100

Use a separate Answer-Script for each part

PART - I (40 MARKS)

Attempt any two (2) from Questions 1 to 3 the following: (2x20)

1. a. State the various resources from which Si can be extracted. Discuss the various processes for refinement of Si and use it for p.n junction formation for device applications.
b. Describe the technology for fabricating amorphous-Si (a-Si) solar photovoltaic cells and the photovoltaic modules integration procedure.

2. Discuss about the design of a MWp level grid connected phovoltaic power plant at a site in western part of India where insolation is varying from 5-6 $kWh/m^2/day$ for a day. Draw a neat block diagram of each component of that plant and their integration procedure. Calculate how much energy per year will be exported into the grid from that plant by considering various losses.

3. Write short note on any two of the followings;

a. Technology for fabrication of CdTe based thin film PV module

b. Roof mounted and roof integrated of PV power plants

c. Carbon footprint of a PV power plant

d. String inverting and centralized inverting systems

[Turn over

Ex/PG/EST/T/128A/2018

MASTER OF TECHNOLOGY IN ENERGY SCIENCE & TECHNOLOGY EXAMINATION, 2018

(2^{nd} Semester)

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PART-II (60 marks)

Answer ***any three*** from the following questions. [20X3 = 60]

1. (a) What are the effects of Radiation and Temperature on SPV cell/module?

   (b) What are different losses in a Module? Explain in detail.

   (c) Explain the fabrication process/steps involved in the production of laminated PV Module starting from solar cell.

   [4 + 4 + 12]

2. (a) What is the effect of partial or complete shadowing of a cell in a PV module?

   (b) With the neat sketch explain the principle of series regulation of a stand-alone SPV system. Also explain its merit and demerits.

   (c) With neat sketch explain the different components of a Stand Alone SPV power plant. How it helps to improve the quality of life in remote areas?

   [4 + (6+2) + (6+2)]

3. (a) State the different performance testing methods of SPV modules.

   (b) Explain the methods of performance test of SPV modules/panels in NOCT and STC conditions.

   (c) Explain the function of bypass diode connected with the panel.

   [6 + 10 + 4]

4. Write short notes on the followings:

   (a) Building mounted SPV system

   (b) Charge Controller

   (c) Grid-Tied SPV power system

   (d) Monitoring and Maintenance of SPV system

   [5 X 4 = 20]