MASTER OF TECHNOLOGY IN ENERGY SCIENCE &

TECHNOLOGY EXAMINATION, 2019

(2nd Semester)

PHOTOVOLTAIC ENERGY SYSTEMS

Time: Three hours   Full Marks: 100

Answer *any five* from the following questions.

1. (a) Explain operating principle with its figure of merits of Solar PV cells.

   (b) Why Silicon is considered for solar cell material mostly? Explain its merit and demerits.

   [12 + 8]

2. (a) What do you understand by thin film solar cell?

   (b) What are the different materials for commercials thin film solar cell? Explain their merits and demerits.

   (c) State and explain the method of extracting metallurgical grade 'Si' from Quartz.

   [3 + 10 + 7]

3. (a) Explain the fabrication process of solar cell starting from silicon wafer.

   (b) Using the simple design method, design a PV system using 60 W, 12 V panels and 150 Ah, 12 V batteries. The PV system is required to offer 2 days of storage, the battery efficiency is 75%, and the depth of discharge is 70%. The location where the system is located has 6 h of daylight during wintertime and the application is 24 V with a load of 3000 Wh per day.

   [12 + 8]

4. (a) What do you understand by Cell, Module and Array in SPV system? With neat sketch explain the function of by-pass diode and safety diode.

   (b) With the neat sketch explain the principle of shunt 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?

   [(2+4) + (5+2) + (4+3)]

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

[5 + 10 + 5]

6. Write short notes on the followings (any four):

(a) Grid-Tied SPV power system

(b) Inverter

(c) Czochralski Technique

(d) Monitoring and Maintenance of SPV system

(e) Hybrid SPV system.

(f) Auto or self regulation of SPV system

[5 X 4 = 20]