CBCS SCHEME

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15EE832

Eighth Semester B.E. Degree Examination, Aug./Sept. 2020
Operation and Maintenance of Solar Electric Systems

Time: 3 hrs. Max. Marks: 80

Note: *i) For Regular Students: Answer any FIVE full questions irrespective of modules.*
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define irradiation, diffuse radiation and air mass. **(06 Marks)**
b. Compare different solar technologies with help of a tabular column. **(04 Marks)**
c. In an array, 3 PV modules are connected to form a string and 3 such strings are connected in parallel. The rating of string 1 is V_{mp} = 240V and I_{mp} = 5 Amps, string 2 is V_{mp} = 210V and I_{mp} = 6 Amp and string 3 is V_{mp} = 180V and I_{mp} = 4 Amps. Find the total voltage, current and power of the array with diagram. **(06 Marks)**

2 a. Define azimuth angle, solar altitude angle and tilt angle. **(06 Marks)**
b. What are the standards, certifications and warranties applicable to PV modules? **(06 Marks)**
c. Explain the I-V characteristics and power-voltage characteristics of PV cells. **(04 Marks)**

Module-2

3 a. What are the basic functions of grid – interactive inverters? **(04 Marks)**
b. Explain different types of grid – interactive inverters. **(06 Marks)**
c. Briefly explain the types of roof mounting systems. **(06 Marks)**

4 a. Write short notes on lightering protection and wind loading. **(04 Marks)**
b. Briefly explain inverter protection systems. **(06 Marks)**
c. Explain the types of meters used in PV systems. **(06 Marks)**

Module-3

5 a. What are the roof specifications to be considered in site assessment? **(04 Marks)**
b. When is string fuse protection required? Give examples. **(06 Marks)**
c. What are the losses in utility – interactive PV systems? **(06 Marks)**

6 a. What are the potential sources of shading? Describe solar path finder. **(06 Marks)**
b. Write the importance of fault current protection when designing a PV system. **(06 Marks)**
c. Mention the two voltage specifications need to be met in sizing a PV system with graphical representation. **(04 Marks)**

Module-4

7 a. Explain interconnection of PV array with utility grid using net metering and gross metering arrangements. **(08 Marks)**

b. Briefly explain the testing of PV systems. **(08 Marks)**

8 a. What are the safety measures in installation of PV systems? **(08 Marks)**

b. Explain in detail about identifying a fault and troubleshooting PV arrays and inverters. **(08 Marks)**

Module-5

9 a. What are the various costs involved in PV systems? Explain in detail with a curve. **(08 Marks)**

b. Discuss the general guidelines that should be provided to the owners on completion of PV system installation. **(08 Marks)**

10 a. State the method to calculate upfront costs and simple pay back method. **(04 Marks)**

b. What are the positive and negative attributes of PV systems need to be considered while marketing? **(12 Marks)**

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