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Question Paper Code : 13940

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Third Semester

Power Electronics and Drives

PX 7301 — POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS

(Common to M.E. Energy Engineering, M.E. Power Systems Engineering and M.E. Electrical Drives and Embedded Control)

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention about NOCT & STC of a solar cell.

2. Write about fuel cell and mention its specifications.

3. How to assess the wind energy pattern for a particular location?

4. Enlist the wind turbine used for domestic applications.

5. Mention about SOC and its methods.

6. Specify about power conversion ratio.

7. Mention some of the standards used for grid integration.

8. Write about opti slip concept used in wind energy conversion system.

9. Define charge controller used for wind energy conversion system.

10. Write some of the hybrid systems used in industry.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Brief about some of the renewable energy sources. (6)

(ii) Show how a dc-dc converter can be used as a part of an inverter designed to have a square wave output of 48 V with a 12 V dc input. The idea is to design the inverter without a transformer. Sketch a block diagram, showing design components to clearly express your design. (10)

Or

(b) Two 36 cell PV modules are connected in series. One is shaded and one is fully illuminated, assume ideal IV characteristics for the module

(i) If the output of the two series module is shorted, estimate the power dissipated in the shaded module

(ii) If the two modules are equipped with bypass diodes across each 12 series cells, estimate the power dissipated in the shaded module. (16)

12. (a) Describe the power conditioning schemes used in WECS. (16)

Or

(b) (i) Explain the working and operation of PMSG with neat diagram. (8)

(ii) Draw and explain the characteristics of DFIG. (8)

13. (a) Explain with neat diagram the theory of self excited capacitance used in SEIG. (16)

Or

(b) Explain and classify the working of MPPT in a solar PV system. (16)

14. (a) Design Solar PV pump and clearly explain the accessories required. Also justify the importance of implementing MPT for the pump system. (16)

Or

(b) Explain the grid related problems in wind farms and refer the performance improvements of generator controls. (16)

15. (a) Explain with an example how to control the harmonics and improve the power quality when solar PV is connected to the grid. (16)

Or

(b) Explain the method to integrate hybrid solar PV and Wind energy conversion system to the grid with neat block diagram. (16)
