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Question Paper Code : 52939

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2019.

Eighth Semester

Electrical and Electronics Engineering

EE 6009 — POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the merits of renewable energy sources.
2. Mention some of the organic materials used in bio-mass plant.
3. Write the advantages of doubly fed Induction generators used in WECS.
4. What is the basic principle of wind energy conversion?
5. Draw the basic block diagram of wind energy conversion system.
6. What is grid interactive inverter?
7. Define pitch control in wind power system.
8. List out the functions of a charge controller in PV system.
9. List the different types of hybrid system.
10. What is MPPT in PV system?

PART B — (5 × 13 = 65 marks)

11. (a) What is a fuel cell? Mention the different types of fuel cell and explain any three them in detail with neat diagrams.

Or

(b) Explain the operating principle of any four types of renewable energy sources.

12. (a) Draw the equivalent circuit and obtain the steady-state analysis of Induction Generator.

Or

(b) Explain the construction and principle of operation of Double fed Induction Generator in detail with neat diagram. Also discuss its characteristics and limitations briefly.

13. (a) Describe any two power conditioning schemes used in photovoltaic systems.

Or

(b) What is a matrix converter? Explain it in detail. Also briefly state its advantages and limitations.

14. (a) (i) Explain the stand-alone operation of fixed speed wind energy conversion system with neat diagram. (10)

(ii) Discuss the factors that affect the output of a PV system. (6)

Or

(b) Explain in detail about the grid integrated permanent magnet synchronous generator in detail with relevant diagram and also discuss the issues of grid connection in detail.

15. (a) What is a hybrid system? Mention the need for hybrid system. Also explain in detail about the series hybrid system with necessary diagrams in detail.

Or

(b) List the different types of MPPT algorithm. Explain the Incremental conductance MPPT algorithm with a neat flow chart.

PART C — (1 × 15 = 15 marks)

16. (a) A three phase diode bridge is supplied by a synchronous generator whose excitation emf is 1.06 p.u. and synchronous reactance is 0.25 p.u. Assuming continuous load current of 0.8 p.u. Determine the percentage of the dc output voltage of its no-load voltage and the total rating of the rectifier. Neglect diode drops.

Or

(b) A horizontal axis wind turbine has a diameter of 6 m. When the wind speed unaffected by the turbine is 10 m/s, the turbine rotates at 300 rpm and produces 5 kw of mechanical power. Find the tip speed ratio and the power coefficient.