Reg. No. : E N G G T R E E . C O M

Question Paper Code : 20969

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Fifth Semester

Electrical and Electronics Engineering

EE 3034 — DESIGN AND MODELING OF RENEWABLE ENERGY SYSTEMS

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Specify the areas of research required in renewable energy systems.
2. List the advantages of technologies in renewable energy system.
3. What are the power converter techniques involved in single phase PV systems?
4. Mention the advantages of transformer less AC Module Inverters.
5. On what basis, the control building blocks are framed for PV Inverters?
6. Mention the different modulation strategies adopted in 3 phase PV systems.
7. Specify the selection criteria adopted for generators in small scale wind systems.
8. What are the benefits of magnus Turbine?
9. Mention the advantages of doubly fed Induction generator.
10. Specify the applications of doubly fed Induction Generators.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss the state of art of Solar PV Technology.

Or

(b) Examine the challenges and future trends in renewable energy systems.

12. (a) Design a Transformer less Single-Stage PV Systems and discuss its modeling and control strategy.

Or

(b) Design a Transformer less Double-Stage PV Systems and discuss its modeling and control strategy.

13. (a) Explain the modulation strategies for three phase PV Inverters.

Or

(b) Suggest the ways to synchronize the three phase PV systems with grid and Illustrate the implementation of PLL for Grid Synchronization.

14. (a) Discuss the stationary stator reference frame model in direct and quadrature axes separately adopted in self-excited induction generators for small wind energy applications.

Or

(b) Design a Permanent Magnet Synchronous Generators for Small Wind Power Applications and explain it in detail.

15. (a) Examine the arbitrary reference frame theory for Induction machines.

Or

(b) Discuss the modelling of Doubly-fed Induction Generator for WECS.

PART C — (1 × 15 = 15 marks)

16. (a) Evaluate the MPPT techniques and its solution to achieve the voltage oriented control of self-excited induction generator for wind energy system.

Or

(b) Analyze the modeling and control of voltage/frequency in Permanent Magnet Synchronous Generators for small wind power applications.
