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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 11225

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Elective

Power Electronics and Drives

PS 4091 – DISTRIBUTED GENERATION AND MICRO GRID

(Common to: M.E. Power Systems Engineering)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How the distribution generation can be employed in transmission system?
2. Interpret the need of distributed generation in current power system scenario.
3. What do you mean by co-generation?
4. Identify any two renewable energy sources except wind and solar in distributed generation List the merits of the same.
5. What are the protection strategies followed in distributed generation?
6. Construct a flow chart for the distributed generation planning.
7. Define microgrid and write the role of energy manager module.
8. Interpret the factors to be considered for reliable operation of microgrid.
9. Outline the communication standards followed in microgrid.
10. Interpret the challenges in implementing and operating the microgrid.

PART B — (5 × 13 = 65 marks)

11. (a) (i) How the distributed generation is differed from central power generation? (6)

(ii) Explain how the distributed generation can be implemented in electric power distribution system. (7)

Or

(b) (i) Interpret the impact of distributed generation on the transmission system. (5)

(ii) Infer the technical and economical factors influenced by the implementation of distributed generation on distributed system. (8)

12. (a) Develop the block diagram of wind energy conversion system and explain it by considering (i) aerodynamic principle (ii) Types of wind turbine control (iii) Generator control scheme and (iv) Storage devices (13)

Or

(b) (i) Illustrate the equivalent circuit of a solar cell and explain the importance of each component in the circuit with relevant equations. (8)

(ii) Explain about the small scale hydroelectric power generation. (5)

13. (a) (i) Identify the types of internal faults and explain how the equipment for generating electrical power is protected from the faults. (7)

(ii) Explain about the impact of distributed generation on the electric power network design. (6)

Or

(b) (i) Outline the protection schemes for existing distribution system and explain the distributed generation impacts on the same. (6)

(ii) Infer the types of planning in distributed generation and explain the factors involved in the planning. (7)

14. (a) (i) Find the impact of microgrid in power market. (5)

(ii) How is the network management of microgrid done by central controller and microsource controller? (8)

Or

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(b) (i) Recall the protection scheme for grid connected micro grid. (7)

(ii) Write the significance of islanding and relate any two types of islanding methods. (6)

15. (a) What are the factors involved in analyzing the impacts of microgrid on

(i) environment (4)

(ii) heat utilization and (4)

(iii) process optimization and (5)

Or

(b) (i) List the pros and cons of employing microgrid in electrical power system. (5)

(ii) What is techno economic analysis of microgrid? Relate the power system economics of conventional grid and microgrid. (8)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Analyze the factors and design parameters for incorporating grid connected solar PV system. (7)

(ii) Develop a microgrid by incorporating the controllers, CHP, RES and protection schemes and analyze the protection issues. (8)

Or

(b) (i) Explain the role of energy storage system in distributed generation. (8)

(ii) Explain the impact on communication standards and protocol in microgrid. (7)

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