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

Question Paper Code: 47302

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

Seventh Semester

Electrical and Electronics Engineering

14UEE702 – POWER SYSTEM OPERATION AND CONTROL

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Load factor is defined as

(a) Average load / peak load (b) Peak load / installed capacity

(c) Average load / installed capacity (d) Peak load / average load

2. The load factor for domestic loads may be taken as

(a) about 85% (b) 50-60% (c) 25-50% (d) 20-15%

3. In an ALFC loop, the frequency deviation can be reduced using _____controller.

(a) Differential (b) Integral (c) Proportional (d) All of these Plan

4. The time constant of power system when compared to a speed governor is

(a) Less (b) More (c) Same (d) None of these

5. The different types of tap changing transformers are _____

(a) Off-load (b) On load (c) Both (a) and (b) (d) Either (a) or (b)

6. An excitation system should have

(a) Low time constant (b) high transient response

(c) high reliability (d) all the above

7. The optimum allocation of the generator at each generating station at various station load levels is called _____.

(a) State estimation (b) Unit commitment (c) Economic dispatch (d) None of these

8. When load on a thermal unit is increased, then fuel input

(a) Increases (b) Does not change (c) Decreases (d) None of these

9. A State estimation scheme is_____

(a) Lagrangian function method (b) Negative gradient method
(c) Lyapunov method (d) Weighted least square method

10. The heart of EMS system is _____.

(a) RTU (b) Master station (c) SCADA (d) Security control

PART - B (5 x 2 = 10 Marks)

11. Define the term diversity factor. .

12. Differentiate static response from dynamic response of an ALFC loop.

13. Give any four static compensator devices

14. Draw the incremental fuel cost curve for a thermal plant.

15. Define state estimation of a power system.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) The maximum demand of a power plant is 40 MW. The capacity factor is 0.5 and the utilization factor is 0.8.
Find (a) load factor (b) plant capacity
(c) reserve capacity (d) annual energy production. (8)

(ii) A 100 MW power station delivers 100 MW for 2 hours, 50 MW for 6 hours and is shut down for the rest of each day. It is also shut down for maintenance for 45days each year. Calculate its annual load factor. (8)

Or

(b) State the importance of load forecasting in power system. Explain any three methods to forecast the load in an interconnected power network. (16)

17. (a) (i) What is a tie-line? How it is modeled? (8)

(ii) Discuss the advantages of power system interconnection (8)

Or

(b) Two alternators operate in parallel to supply a load of 400 MW. The capacities of the machines are 200 MW and 500 MW. Each has a droop characteristic of 4%. Their governors are adjusted so that the frequency is 100 % on full load. Calculate the load supplied by each unit and the frequency at this load. The system is a 50 Hz system. (16)

18. (a) Develop a mathematical model of an excited system and brief on its control action (16)

Or

(b) Briefly discuss the various methods for voltage control in a power system with necessary equations and diagrams. (16)

19. (a) Derive the coordination equation of a power system for optimal economic dispatch including transmission losses. (16)

Or

(b) A power plant has 3 units with the following input output curves

$Q_1 = 0.002\ P_1^2 + 0.86\ P_1 + 20$ tons / hour

$Q_2 = 0.004\ P_2^2 + 1.08\ P_2 + 20$ tons / hour

$Q_3 = 0.0028\ P_3^2 + 0.64\ P_3 + 36$ tons / hour

(16)

Fuel cost is Rs. 500 per ton. Maximum and minimum generation level for each unit is 120 MW and 36 MW. Find the optimum scheduling for a total load of 200 MW.

20. (a) Briefly discuss the functions of energy control centre (16)

Or

(b) (i) Discuss the main functions of EMS in detail (8)

(ii) Write short notes on state estimation of power systems. (8)

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