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

Question Paper Code: 47302

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018
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. A load curve is a plot of

(a) Load versus generation capacity (b) Load versus current

(c) Load versus time (d) Load versus cost of power

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

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

3. If the real power demand is suddenly increased, frequency of system will.

(a) Increase (b) decrease (c) remains same (d) none of these

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 system is in secure condition, even the occurrence of all possible outages, the system remain secure then the operating mode of power system is

(a) Alert mode (b) normal mode (c) Extremis mode (d) blockout

PART - B (5 x 2 = 10 Marks)

11. Draw a typical load duration curve.
12. Differentiate static response from dynamic response of an ALFC loop.
13. The gain and time constants of an exciter are 100 and 0.8 seconds respectively. Compute the transfer function of this exciter.
14. Draw the incremental fuel cost curve for a thermal plant.
15. What are the states of power system?

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Why is the load on a power station variable? What are the effects of variable load on the operation of the power station? (8)

(ii) 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)

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) Derive the transfer function model of load frequency control of a Single area power system with necessary equations. (16)

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) Draw the circuit diagram of a typical excitation system of an alternator and derive the transfer function model for the same. (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) The fuel costs of two units are given by:

$F_1 = 1.8 + 20\ P_{G1} + 0.12\ P_{G1}^2$ Rs/hr., $F_2 = 1.9 + 30\ P_{G2} + 0.12\ P_{G2}^2$ Rs/hr. P_{G1} and P_{G2} are in MW. Compute optimum scheduling neglecting losses for a demand of 200 MW. (16)

20. (a) With a neat diagram, explain the various components involved in computer control Of power systems using SCADA (16)

Or

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

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

47302