A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 99333

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

Elective

Electrical and Electronics Engineering

19UEE933 – POWER SYSTEM OPERATION AND CONTROL

(Regulations 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. A load curve is a plot of CO1- U

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

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

2. Load factor during a period is CO1- U

   (a) Average Load / Installed Capacity (b) Average Load / Maximum Load

   (c) Maximum Load / Average Load (d) Maximum Load / Installed Capacity

3. Plant or generation control related to CO2-U

   (a) HVDC (b) SVR &SVC (c) EDC & UC (d) LFC & AVR

4. The units of speed regulation of governor are CO2-U

   (a) Hz (b) Hz per MVA (c) Hz per MW (d) None of the Above

5. The operation of OLTC does CO3-U

   (a) improve voltage stability (b) improve system stability

   (c) improve power factor (d) all of the above

6. The permissible voltage variation in transmission and distribution system is CO3- U

   (a) ± 0.1% (b) ± 1% (c) ±10% (d) ± 25%.

7. The units for heat rate are CO4- U

   (a) kcal / kWh (b) kWh / k cal (c) kcal / h (d) kW

8. In economic dispatch including transmission losses, the effect of increased penalty is to CO4- U

(a) increased load on that generator (b) decreased load on that generator

(c) keep the load on that generator constant (d) either (a) or (b)

9. Three major function of power system security CO5- U

(a) Economical operation, Economical Dispatch, Load scheduling

(b) State Estimation, Economical Dispatch, Generation Scheduling

(c) System Monitoring, Contingency analysis, Security constrained OPF

(d) all of the above

10. Power system monitoring is usually done by CO5- U

(a) ETAP (b) SCADA (c) Matlab (d) PSPM

PART – B (5 x 2= 10 Marks)

11. Define diversity factor. CO1- U

12. Identify the advantages of pool operation? CO2- U

13. List out the Methods of Voltage Control? CO3 -U

14. Draw the incremental fuel cost curve for a thermal power plant CO4 -U

15. Define state estimation. CO5 -U

PART – C (5 x 16= 80Marks)

16. (a) A power station has to meet the following demand: CO1- U (16)
Group A = 200kW between 8 A.M and 6 P.M
Group B = 100kW between 6 A.M and 10 A.M
Group C = 50kW between 6 A.M and 10 A.M
Group D = 100kW between 10 A.M and 6 P.M and then between 6 P.M and 6 A.M. Plot the daily load curve and determine
(i) diversity factor (ii) units generated per day (iii) load factor

Or

(b) Explain an overview of power system operation and control and the role of computer in the implementation with help of block diagram. CO1- U (16)

17. (a) Two synchronous machines with the following data are operating in parallel to feed a common load of 300 MW. CO2- U (16)

Machine I: Governor speed droop: 4%

Speed changer set to give 75% rated load at rated speed.

Machine II: Governor speed droop: 3%

Speed changer set to give 50% rated load at rated speed.

The nominal frequency of operation of the set is 50 Hz. Determine the load taken by each machine and frequency of operation.

Or

(b) Two 750 kW alternators operate in parallel. The speed regulation of one set is 100% to 103% for full load to no load and that of other is 100% to 104%. How will the two alternators share a load of 1000 kW? What will be the system frequency at this load? Assume free governor action. CO2- U (16)

18. (a) Explain the components of generation and absorption of reactive power in power system. CO3- U (16)

Or

(b) Draw the circuit diagram for a typical excitation system and discuss. CO3- U (16)

19. (a) A power plant consists of two 200 MW units, whose input cost data given by CO4- U (16)

$F1 = 0.004\ P12 + 2.0\ P1 + 80$ Rs./hr

$F2 = 0.006\ P12 + 1.5\ P1 + 100$ Rs./hr

For the total load of 250 MW, what should be the division of load between two units for most economic operation? Also find the total cost.

Or

(b) Derive the co-ordination equation, conditions and inequalities for the economic dispatch problem without losses. CO4- U (16)

20. (a) Draw the block diagram to show the hardware components of a SCADA system for a power system and explain the application of SCADA in monitoring and control of power system. CO5- U (16)

Or

(b) Explain the concepts of energy control centre or load dispatch centre. Also discuss its various functions in detail. CO5- U (16)