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

Question Paper Code : 70482

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Sixth Semester

Electrical and Electronics Engineering

EE 6603 – POWER SYSTEM OPERATION AND CONTROL

(Regulations 2013)

(Common to : PTEE 6603 – Power System Operation and Control for
B.E. (Part-Time) – Electrical and Electronics Engineering – Sixth Semester
(Regulations – 2014)

Time : Three hours — Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What is the need for frequency regulation in power system?

2. Define load duration curve.

3. What is the need for integral controller in ALFC?

4. What do you understand by control area?

5. What are the sources of reactive power? How it is controlled?

6. What is the use of off-load tap changer and TCUL?

7. What is meant by priority list method?

8. Define incremental transmission loss.

9. What are the priorities for operation of modern power system?

10. Define weighted least-square criterion?

PART B — (5 × 13 = 65 marks)

11. (a) (i) A generating station has following daily load cycle: (8)

Time in Hrs	0-6	6-10	10-12	12-16	16-20	20-24
Load in MW	20	25	30	25	35	20

Draw the load curve and Calculate

(1) Maximum Demand

(2) Units generated per day

(3) Average load

(4) Load factor.

(ii) Explain any one load forecasting method in power system operation. (5)

Or

(b) (i) The quantity of fuel used in KWhr by an electric utility is given below. Forecast the Quantity of fuel to be used in the year 2030 by fitting the following trend curve and Extrapolating method of Exponential curve. (8)

Year :	1980	1990	2000	2010	2020
Fuel Quantity :	90	95	110	135	150

(ii) Explain briefly about plant level and system level control of a power system. (5)

12. (a) (i) Derive the block diagram of state variable model for ALFC. (7)

(ii) A power system has a total load of 1250 MW at 50 Hz. The load varies 1.5% for every 1% change in frequency. Find the steady-state frequency deviation when a 50MW load is suddenly tripped, if (6)

(1) There is no speed control;

(2) The system has 250 MW of spinning reserve evenly spread among 500 MW of generating capacity with 5% regulation based on this capacity. Assume that the effect of governor dead bands is such that only 80% of the governor respond to the reduction in system Load.

Or

(b) Derive the transfer function model and draw the block diagram for a single control area provided with governor system. From the transfer function derive the expression for steady state frequency error for a step change. (13)

13. (a) Draw the circuit diagram for a typical excitation system and derive the transfer function model. (13)

Or

(b) Explain the operation of tap changing transformer and discuss its application. (13)

14. (a) Write the algorithm for iterative solution of economic dispatch without and with losses co-ordinated. (13)

Or

(b) (i) Discuss the various constraints in unit commitment. (7)

(ii) Explain dynamic programming solution for unit commitment with flowchart. (6)

15. (a) Describe SCADA system for power system, its hardware components and applications. (13)

Or

(b) Draw the state transition diagram of a power system and explain the different control strategies. (13)

PART C — ($1 \times 15 = 15$ marks)

16. (a) Write short notes on state estimation? Explain the help of flow chart the weighted least square estimate.

Or

(b) Find the rating of synchronous compensator connected to the tertiary winding of 60 kV Star connected, 33 kV star connected, 11 kV delta connected three winding transformer to supply a load 60MW at 0.8 p.f lagging at 33 kV across the secondary. Equivalent primary and tertiary winding reactance is are 18Ω and 0.12Ω respectively. While the secondary winding reactance is negligible. Assume that V_1 is 66 kV and maximum off nominal setting between transformer primary and secondary is 1:1.1.

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