01/11/18 AN

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

Question Paper Code : 20464

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Sixth Semester

Electrical and Electronics Engineering

EE 6603 — POWER SYSTEM OPERATION AND CONTROL

(Regulations 2013)

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

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the need for load forecasting?
2. What is spinning reserve?
3. What is the use of Secondary loop?
4. Define control area.
5. State the advantage of switched capacitors in voltage control.
6. What are the different types of Static VAR Compensator?
7. Distinguish between Economic dispatch and Unit commitment.
8. Define crew constraints?
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) A generating station has the following daily load cycle :

Time (hours) :	0-6	6-10	10-12	12-16	16-20	20-24
Load (MW) :	40	50	60	50	70	40

Draw the load curve and find

(i) Maximum demand

(ii) Units generated per day

(iii) Average load

(iv) Load factor. (13)

Or

(b) Discuss the overview of system operation and control? (13)

12. (a) Draw the transfer function block diagram for a single - area system provided with static analysis of uncontrolled case and controlled case. (13)

Or

(b) Two generators rated 400 MW and 700 MW are operated in parallel. The droop characteristics of their governors are 3% and 4% respectively from no-load to full-load. Assuming that the governors are operating in 50 Hz at no load, how would a load of 1000 MW be shared between them? What will be the system frequency at this load? Assume linear governor operation. Determine the full load speed for each machine. (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) Determine the economic generation schedules of three generating units in a power system to meet the system load of 925 MW. The operating limit and cost function is given below :

Operating limits $250\ \text{MW} \le P_{G1} \le 450\ \text{MW}$

$200\ \text{MW} \le P_{G2} \le 350\ \text{MW}$

$125\ \text{MW} \le P_{G3} \le 225\ \text{MW}$

Cost function is $F_1(P_{G1}) = 0.0045\ P_{G1}^2 + 5.2P_{G1} + 580$

$F_2(P_{G1}) = 0.0056\ P_{G2}^2 + 4.5P_{G2} + 640$

$F_3(P_{G1}) = 0.0079\ P_{G3}^2 + 5.8P_{G3} + 820$.

Or

(b) Explain in detail, with the help of a flow chart the forward dynamic programming solution method of unit commitment problem. (13)

15. (a) What are the functions of energy control centre or load dispatch centre and explain its operation? (13)

Or

(b) Explain the hardware components and functional aspects of SCADA system using a fundamental block diagram. (13)

PART C — (1 × 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 reactances 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.