Reg. No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 91454

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Seventh Semester

Electrical and Electronics Engineering

EE 2401/10133 EE 701/EE 71 – POWER SYSTEM OPERATION AND CONTROL

(Regulation 2008/2010)

(Common to PTEE 2401/10133 EE 701 – Power System Operation and Control for B.E. (Part – Time) Fifth Semester – Electrical and Electronics Engineering – Regulation 2009/2010)

Time : Three hours　　　　　　　　　　　　　　　　Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between load curve and load duration curve.

2. Define the term Diversity factor.

3. What is meant by Control area?

4. State the Control objective of Two area load frequency control.

5. State the relation between voltage, power and reactive power at a node.

6. State the advantage of Switched capacitors in voltage control.

7. Draw the incremental cost curve of thermal unit.

8. State the different constraints in unit commitment problem.

9. What is meant by Power System Security?

10. List the applications of SCADA.

PART B — (5 × 16 = 80 marks)

11. (a) A power station has to meet the following demand:

Group A: 200 kW between 8 A.M and 6 P.M

Group B: 100 kW between 6 A.M and 10 A.M

Group C: 50 kW between 6 A.M and 10 A.M

Group D: 100 kW 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 the help of block diagram.

12. (a) Explain the load frequency control of a single area system.

Or

(b) (i)   Explain the speed load characteristics of speed governor system.

(ii) Two generators rated 200MW and 400MW are operating in parallel. The droop characteristics of their governors are 4% and 5% respectively from no load to full load. Assuming that the generators are operating at 50Hz at no load, how would a load of 600MW be shared between them? What will be the system frequency at this load? Assume free governor operation. Also find the load sharing if both governors have a droop of 4%.

13. (a) With the help of a block diagram explain modelling of an excitation system. Derive the transfer function of each block.

Or

(b) Explain the different methods of voltage control.

14. (a) Derive the Coordination equations for economic dispatch with and without loss.

Or

(b) (i)   Create a unit commitment using the priority list method for the following three units.

The fuel cost equations are as follows:

Unit 1: $F_1(P_1) = 561 + 7.92 P_1 + 0.001562 P_1^2$ $150 \leq P_1 \leq 600$

Unit 2: $F_2(P_2) = 310 + 7.85 P_2 + 0.00194 P_2^2$ $100 \leq P_2 \leq 400$

Unit 3: $F_3(P_3) = 93.6 + 9.56 P_3 + 0.005784 P_3^2$ $50 \leq P_3 \leq 200$

(ii) Explain forward dynamic programming approach for solving Unit Commitment problem with a neat flow – chart.

15. (a) Explain the concept of energy control centre (or) load dispatch centre. Also discuss its function.

Or

(b) Explain the various operating states of power system. Also discuss the state transitions and control strategies.