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Question Paper Code : 71515

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

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. What is the need for load forecasting in a power system?

2. What are the advantages of computer control in power system? What are the types of computer control?

3. Find the open loop gain of an Automatic voltage regulator loop if the static error does not exceed 2%.

4. Brief the application of secondary ALFC loop in power system networks.

5. Show that the shunt compensation improves critical voltage as well as the power factor.

6. Distinguish between rotor angle stability and short-term voltage stability.

7. Find the incremental transmission losses for a two area power system, where the bus voltages are kept fixed and the line power flow is a function of line angle. Power loss is a function of generation of area B only.

8. What is spinning reserve?

9. What role SCADA plays in electrical power systems?

10. What are responsibilities of regional load dispatch centres?

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PART B — ($5 \times 16 = 80$ marks)

11. (a) Compare various stochastical methods of load fore casting.

Or

(b) Give a detailed account of online techniques for non-stationary load prediction.

12. (a) With the block diagram of speed governing system, explain the Automatic Load Frequency Control. Also derive necessary equations.

Or

(b) A sub-grid has total rated capacity 2500 MW. It encounters a load increase of 50 MW if the normal operating load is 1000 MW. Assume inertia constant (H) to be 5 sec and regulation of the generators in the system as 2 Hz/p.u MW. Find (i) ALFC loop parameters (ii) Static frequency drop, (iii) Transient response of the ALFC loop. Assume load frequency dependency to be linear.

13. (a) Derive the relation between voltage and real & reactive powers in a transmission line. Explain the voltage profile variation along the line as the reactive power varies.

Or

(b) Discuss at length, the effect of transformer on load tap changing on voltage stability.

14. (a) Determine the economic operation point for the three thermal units delivering a total load of 600 MW without considering generator limit as well as with considering generator limit.

Given;

Unit 1 : maximum output = 600 MW, minimum output = 150 MW

The fuel cost function is $F_1(P_1) = 550 + 7.7\,P_1 + 0.00165\,P_1^2$ Rs/hr

Unit 2 : coal fired : maximum output = 500 MW, minimum output = 125 MW.

The fuel cost function is $F_2(P_2) = 300 + 7.88\,P_2 + 0.002\,P_2^2$ Rs/hr

Unit 3 : coal fired : maximum output = 600 MW, minimum output =150 MW

The fuel cost function is $F_3(P_3) = 80 + 7.99\,P_3 + 0.005\,P_3^2$ Rs/hr

Or

(b) What is priority list method of unit commitment? Explain it with an example.

15. (a) What is state estimation with respect to power system? Explain briefly the method of maximum likelihood weighted least squares estimation.

Or

(b) What is normal operating state of a power system? Describe in detail the various states that a power system takes, with their operating conditions.

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