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Question Paper Code : 71782

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Sixth Semester

Electrical and Electronics Engineering

EE 6603 — POWER SYSTEM OPERATION AND CONTROL

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the need for load forecasting in power systems?
2. What are brownouts?
3. What is the need for integral controller in ALFC?
4. What do you understand by control area?
5. Comment on the use of series capacitors in transmission lines.
6. What is exciter ceiling voltage?
7. What are the constraints in unit commitment?
8. Define incremental cost in power dispatch.
9. List out the conditions for normal operation of a power system.
10. Define energy control centre.

PART B — (5 × 16 = 80 marks)

11. (a) A power system has a maximum demand of 25000 kW, Load factor of 60%, plant capacity factor of 50% and a plant use factor of 72%. Find

(i) daily energy produced

(ii) reserve capacity of the plant

(iii) maximum energy that could be produced daily if the plant, operating in accordance with operating schedule, is fully loaded when in operation. (16)

Or

(b) Explain plant level and system level controls in a power system. (16)

12. (a) Develop linear model for single area ALFC and explain the static and dynamic analysis for controlled input. (16)

Or

(b) A two area system connected by a tie line has the following parameters with base MVA for each area with the frequency of 50 Hz and synchronizing power co-efficient T_{12} = 2 pu. A load change of 400 MW occurs in area 1. Determine the steady state frequency deviation and the change in tie line flow. (16)

Area	1	2
Turbine output power	2000 MVA	1000 MVA
Inertia constant	3%	4%
Generator gain constant	50 Hz/pu MW	40
Governor time constant	0.3	0.2
Turbine time constant	0.6	0.4

13. (a) Develop the block diagram of AVR and obtain its transfer function and explain its static and dynamic response. (16)

Or

(b) Describe in detail various reactive power compensation techniques used in system level voltage control. (16)

14. (a) (i) The fuel cost functions for the three thermal plants in Rs/h are given by

$F_1 = 0.004\ P_1^2 + 5.3\ P_1 + 500$ Rs/Hr

$F_2 = 0.006\ P_2^2 + 5.5\ P_2 + 400$ Rs/Hr

$F_3 = 0.009\ P_3^2 + 5.8\ P_3 + 200$ Rs/Hr

where P_1, P_2 and P_3 are in MW. The total load is 800 MW. Find the optimal dispatch and the total cost in Rs/h (8)

(ii) Write the algorithm for iterative solution of economic dispatch with losses co-ordinated. (8)

Or

(b) (i) Explain with the neat flowchart the procedure for finding solution for unit commitment problem using forward dynamic programming method. (8)

(ii) Explain priority list method using full load average production cost. (8)

15. (a) Describe SCADA system for power system, its hardware components and applications. (16)

Or

(b) Draw the state transition diagram of a power system and explain the different control strategies. (16)
