A 1226

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Seventh Semester

Electrical and Electronics Engineering

EE 431 — POWER SYSTEM CONTROL

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the necessasity for frequency constancy in a power system?

2. State the purpose of system generation control.

3. List the advantages of multi area operation.

4. Define area control error.

5. What is meant by stability compensation?

6. What is SVC? When and why it is used?

7. Explain the term unit commitment.

8. Enumerate the functions of SCADA systems.

9. Draw incremental cost curve for a hydro plant.

10. Write about co-ordination generation.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is the need for voltage and frequency regulation in power system? (10)

(ii) How composite loads are modelled in power system? (6)

Or

(b) What are plant level and system level control employed in automatic generations control?

12. (a) For the single area control system consider the following data.

T_p = 10 sec T_{el} = T_T = 0 sec.

K_p = 100 Hz/pu MW R = 3 Hz/pu MW

ΔP_D = 0.1 pu K_I = 0.1. Compute the time error caused by a step disturbance of magnitude given above. Prove that the error is reduced by increasing the K_I. Express the error in seconds and cycles if the system frequency is 50 Hz.

Or

(b) Draw the block diagram of uncontrolled two area load frequency control systems and explain the salient features under static conditions.

13. (a) Explain any two modern excitations system with a neat diagram.

Or

(b) A 132 kV line is fold through an 11/132 kV transformer from a constant 11 kV supply. At the load end of the line the voltage is reduced by another transformer of nominal ratio 132/11 kV. The total impedance of the line and transformers at 132 kV is (25 + j 66) ohms. Both transformers are equipped with tap-changing facilities which are so arranged that the product of the two off-nominal settings is unity. If the load on the system is 100 MW at 0.9pf lagging. Calculate the settings of the tap-changers required to maintain the voltage of the load bus bar at 11 kV.

14. (a) What are the functions of a modern power system control centre? Explain.

Or

(b) Discuss the real time control of power system under emergency mode and restorative mode.

15. (a) With the help of a flow chart explain economic dispatch by λ iteration method.

Or

(b) A power plant has 3 units with the following characteristics.

$F_1 = 0.05\ p_1^2 + 21.5\ p_1 + 800$ Rs./hr

$F_2 = 0.10\ p_2^2 + 27\ p_2 + 500$ Rs./hr

$F_3 = 0.07\ p_3^2 + 16\ p_3 + 900$ Rs./hr

P_{max} = 120 MW and P_{min} = 39 MW.

Find the optimum scheduling and the total cost per hour for a total load of 200 MW.
