Code: R7410204

R07

B.Tech IV Year I Semester (R07) Supplementary Examinations, May 2013

POWER SYSTEM OPERATION AND CONTROL

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions

All questions carry equal marks

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1 A simple two-plant system have the incremental cost curves are:

$$dC_1/dPG_1 = 0.01\ PG_1 + 2.0 \text{ and } dC_2/dPG_2 = 0.01\ PG_2 + 1.5.$$

Determine PG_1 and PG_2 when the load on the system is 1000 MW.

2 Write algorithm for economic allocation of generation among generators of a thermal system taking into account transmission losses with derive necessary equations.

3 Derive mathematical formulation for hydro thermal scheduling.

4 Two generating stations A and B have full load capacities of 500 MW and 210 MW respectively. The inter connector connecting the two stations has an induction motor/synchronous generator (plant C) of full load capacity 50 MW near station. A percentage changes of speeds of A, B and C are 5, 4 and 2.5 respectively. The loads on bus bars A and B are 250 MW and 100 MW respectively. Determine the load taken by the set C and indicate the direction of power flow.

5 A power system has load of 1250 MW at 50 Hz. If 50 MW load is tripped, find the steady state frequency deviation when:

(a) There is no speed control.

(b) The system has a reserve of 200 MW spread over 500 MW of generation capacity with 5% regulation on this capacity. All the generators are operating with valves wide open. Due to dead band only 80% of governors respond to load change. Assume load damping constant $B = 1.5$.

6 Two control areas of 1000 MW and 2000 MW capacities are interconnected by a tie line. The speed regulations of the two areas respectively are 4 Hz/Pu MW and 2.5 Hz/Pu MW. Consider 2% change in load occurs for 2% change in frequency in each area. Find steady state change in frequency and tie-line power of 10 MW change in load occurs in both areas.

7 Explain how modern control theory can be applied to load frequency control problem.

8 Explain the operations of synchronous condenser and mention its applications in power systems and derive the expression for capacity of synchronous condenser.

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