

Roll No.

Total No. of Pages : 02

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M.Tech. (Power System) (2013 & Onwards) (Sem.-2)

POWER SYSTEM OPERATION AND CONTROL

Subject Code : MTPS-201

M.Code : 71367

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

- 1) a) Compare the following :
 - i) Economic dispatch and Unit Commitment.
 - ii) Newton method and Linear Programming.
 - iii) Load frequency control and Generation control.
- b) How is generation scheduled among various generators when transmission losses are considered in an all thermal system? Explain. (12,8)
- 2) What is an Optimal Power Flow problem? Discuss its problem formulation. What are the various methods to solve this problem? Explain the application of Linear Programming method to obtain OPF solution. (20)
- 3) a) What are coordination equations? Give their physical significance.
- b) What are Kuhn-Tucker conditions? How are these useful in optimal power flow?
- c) Describe how optimal control can be determined in case of Load frequency control problem. What are the limitations of optimal control theory? (5,5,10)
- 4) a) Discuss the dynamic programming method to solve unit commitment problem in power system. Obtain the economic schedule for the two units, the production costs of which are given as follows, to supply a load of 5MW, in steps of 0.5 MW

$$C_1 = 0.85P_1^2 + 30 P_1$$

$$C_2 = 1.35P_2^2 + 22P_2$$

Use dynamic programming method.

- b) Explain the following terms :
 - i) B-coefficients
 - ii) Base point and participation factors (10,10)

- 5) What do you understand by 'Hydro-Thermal Scheduling'? Discuss gradient method for short-range fixed-head Hydro-Thermal scheduling. (20)
- 6) a) Two generators with ratings 130MW and 290MW operate at 50Hz frequency. The system load increases by 80MW when both the generators are operating at about half of their capacity. The frequency then falls to 49.75Hz. If the generators are to share the increased load in proportion to their ratings what should be the individual regulations? What should be regulations if expressed in per unit megawatt?
- b) Determine the area frequency response characteristic and the static frequency error for a system with the following data, when 1% load change occurs?
- $$D = 0.01 \text{ pu MW/Hz} \quad R = 2.5 \text{ Hz/pu MW} \quad T_p = 16.5 \text{ sec}$$
- $$K_p = 100 \text{ Hz/pu MW}$$
- If the governor is blocked so that it does not change the generation, then what would be the steady state frequency error?
- c) What is a unit commitment problem? Discuss its problem formulation. Explain the application of priority list method to this problem. (5,5,10)
- 7) a) Discuss in detail, the characteristics of nuclear and hydro units.
- b) What is area frequency response characteristic? Explain it, in the context of two area system. (10,10)
- 8) Write short notes on the following :
- a) Composite generation production cost function.
- b) Scheduling Energy.
- c) Variation in thermal unit characteristics with multiple valves.
- d) Generation with limited energy supply. (20)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.