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Eighth Semester B.E. Degree Examination, June/July 2019
Power System Operation and Control

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Derive expression for frequency deviation and change in tie-line power flow in a two area inter connected power system. (08 Marks)
- b. Explain the objectives and function of AGC in a power system. (05 Marks)
- c. Two synchronous generators are initially supplying a common load at 1PU frequency (50 Hz). The rating of unit 1 is 337 MW and has 0.03 P.U droop built into its governor. Unit 2 is rated at 420 MW and has 0.05PU droop. Find each unit share of a 0.1 PU increase in the total demand. Also find the new line frequency. (07 Marks)
- 2 a. Describe the function of AVR with a neat block diagram. (06 Marks)
- b. Write notes on basic generator control loops and cross coupling between control loops. (08 Marks)
- c. Determine the primary ALFC loop parameters for control area having the following data:
Total rates area capacity, $P_r = 2000$ MW
Inertia constant 5.05, Frequency $f_0 = 60$ Hz
Normal operating load $P_D = 1000$ MW. (06 Marks)
- 3 a. Obtain the complete block diagram representation of Load Frequency Control (LFC) of an isolated power system, with necessary equations (transfer functions). (10 Marks)
- b. Obtain an expression for steady state change in system frequency Δf_{ss} for step change in the load demand, assume free governor operations. (10 Marks)
- 4 a. Define: i) Voltage stability ii) Voltage collapse iii) Sub synchronous resonance (06 Marks)
- b. Explain briefly the components/equipments of power system that can generate and/or absorb reactive power. (08 Marks)
- c. Derive the equations to get the relation between voltage, power and reactive power at a node. (06 Marks)

PART – B

- 5 a. With the help of a flow chart, explain the dynamic programming method in unit commitment solution. (10 Marks)
- b. Explain priority list method for unit commitment problem with an example. (10 Marks)
- 6 a. Explain the factors affecting power system security. (08 Marks)
- b. With the block diagram, explain AC power flow security analysis. (06 Marks)
- c. With the help of flow chart, explain the contingency selection procedure. (06 Marks)
- 7 a. Explain Energy Management System. (08 Marks)
- b. Explain the least square estimation method used in power system state estimation. (12 Marks)
- 8 a. With the help of flow chart, explain loss and load probability for planning of generating capacity. (10 Marks)
- b. Obtain the expression for steady-state reliability and general reliability function. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.