10EE82

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)**

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