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Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Power System Operation and Control

Time: 3 hrs.
Max. Marks:100

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

PART – A

1 a. What is energy control center? Explain the functions of energy control center. **(06 Marks)**
   b. With block diagram, explain the digital computer configuration of the SCADA system. **(07 Marks)**
   c. Explain the parallel operation of generator with infinite bus. **(07 Marks)**

2 a. What is automatic voltage regulator? Obtain the mathematical modeling of exciter. **(07 Marks)**
   b. Two areas are interconnected. The generating capacity of A is 36,000 MW and its regulating characteristic is 1.5% of capacity/0.1 Hz. Area-D has a generating capacity of 40,000MW and its regulating characteristic is 1.0% of capacity/0.1Hz. Find each areas share of a +400 MW disturbance occurring in D and the resulting tie line flow. **(05 Marks)**
   c. Explain the static performance of the Automatic Voltage Regulator (AVR) loop. **(08 Marks)**

3 a. What is Automatic Load Frequency Control (ALFC)? Obtain the mathematical modeling to close the ALFC loop. **(06 Marks)**
   b. With block diagram, explain the static response of two area system. **(10 Marks)**
   c. Determine the primary ALFC loop parameters for a control area having the following data:
   Total rated area capacity P_r = 2000MW
   Normal operating load P_D^O = 1000MW
   Inertia constant H = 5.0sec
   Regulation R = 2.4Hz/pu MW
   Frequency f = 60 Hz
   Take ∂P_D^O = 10MW and ∂ f = 0.6 Hz. **(04 Marks)**

4 a. Derive an expression to relate voltage, power and reactive power at a node. **(06 Marks)**
   b. Explain the method of voltage control by
   i)   Shunt capacitor and reactor
   ii) Synchronous compensator. **(07 Marks)**
   c. With PV diagram, explain the phenomina of voltage collapse. **(07 Marks)**

PART – B

5 a. What is unit commitment? Explain the constraints in solving the unit commitment problem. **(10 Marks)**
   b. With the help of flow chart, explain the dynamic programming technique. **(10 Marks)**

6 a. What is system security? Explain the security constrained optimal power flow. **(06 Marks)**
   b. With the help of flow chart, explain the contingency analysis. **(08 Marks)**
   c. Explain the DC load flow technique for contingency analysis. **(06 Marks)**

7 a. What is state estimation? Explain the power system state estimation. (10 Marks)
   b. Explain the least square technique. (10 Marks)

8 a. Define reliability. Explain the mode of failures in a system. (05 Marks)
   b. Derive the following reliability expression:
      i)   Reliability index.
      ii) Steady state reliability expression.
      iii) General reliability expression. (08 Marks)
   c. With flow chart, explain the loss of load probability. (07 Marks)

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