CBCS SCHEME

15EE81

Eighth Semester B.E. Degree Examination, July/August 2021
Power System Operation and Control

Time: 3 hrs.

Max. Marks: 80

Note: *Answer any FIVE full questions.*

1 a. What are the different operating states of power system? Explain the transition that can take place from one state to another state, with a block diagram. **(08 Marks)**
   b. What is SCADA? Explain the components of SCADA with a general SCADA configuration. **(08 Marks)**

2 a. List the seven key concepts proposed by NERC. Explain any two. **(08 Marks)**
   b. What is a unit commitment problem? Draw and explain the flow chart for forward dynamic programming method. **(08 Marks)**

3 a. Explain the algorithm for hydrothermal scheduling using discrete time interval method. **(10 Marks)**
   b. Explain the basic control loop of a generator with a schematic diagram. **(06 Marks)**

4 a. Draw the block diagram of steam turbine governing system and explain the functions of various components. **(08 Marks)**
   b. Explain the following terms :
      i)   Control Area
      ii) Tie – line
      iii) Area Control Error (ACE). **(08 Marks)**

5 a. Obtain the transfer function for the complete ALFC system. **(08 Marks)**
   b. A control area has the following data :
      Total generation capacity = 2000MW, Normal load = 1500MW, H = 4.8s, D = 1.2%, f = 50Hz, R = 2.5Hz/pu MW.
      i) Determine the primary ALFC parameters
      ii) For an increase of 0.02pu in the load, find the frequency drop without and with governor control. **(08 Marks)**

6 a. Obtain the block diagram representation of a two area system, with primary control. **(08 Marks)**
   b. Obtain the state space model of a single area system. **(08 Marks)**

7 a. Explain tie line oscillations in a 2-area system. **(10 Marks)**
   b. Explain briefly the components of a power system that can generate and /or absorb reactive power. **(06 Marks)**

8   a.   Show that the real power flow between nodes is proportional to the transmission angle 'δ' and reactive power flow is proportional to the scalar voltage difference between the two nodes.
         (08 Marks)
    b.   Explain the method of voltage control by reactive power injection.   **(08 Marks)**

9   a.   Explain the Security Constrained Optimal Power Flow (SCOPF) function of power system security with an example.
         (08 Marks)
    b.   Explain contingency analysis using a flow chart.   **(08 Marks)**

10 a.   What is state estimation in power system? Discuss need and importance of state estimation.
         (06 Marks)
    b.   Explain the Weighted Least Square Estimation (WLSE) method of power system state estimation.
         (10 Marks)

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