CBCS SCHEME

USN | | | | | | | | | | |

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)**

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.

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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