CBCS SCHEME

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15EE81

Eighth Semester B.E. Degree Examination, Aug./Sept.2020
Power System Operation and Control

Time: 3 hrs. Max. Marks: 80

Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Briefly describe the major components of a SCADA system. **(08 Marks)**
b. What are the various transducers used in power system SCADA? **(04 Marks)**
c. Discuss the various options available for communication in SCADA. **(04 Marks)**

2 a. Draw the flowchart for the priority list method of unit commitment and explain. **(08 Marks)**
b. Draw and explain the flowchart for the forward dynamic programming algorithm. **(08 Marks)**

Module-2

3 a. Explain algorithm for hydro thermal scheduling using Discrete Time Interval method. **(10 Marks)**
b. Draw flow chart for 8-λ interactions. **(06 Marks)**

4 a. What are the functions of AGC? **(04 Marks)**
b. Draw the block diagram of steam turbine governing system and explain the functions of the various components. **(08 Marks)**
c. What are the two modes of governor operation and explain. **(04 Marks)**

Module-3

5 a. Derive the transfer function for the complete ALFC block. **(08 Marks)**
b. Two generators rated 1000 MW and 500 MW are operating on parallel with a droop of 5% and 4% respectively. The frequency in 1 PU, 50 HZ at no-load. How is a load of 800 MW shared between them? At what frequency? **(08 Marks)**

6 a. Draw the block diagram of a two area system with primary control loop. **(08 Marks)**
b. The data of a two area system are as follows,
Area 1: $PG_1 = 1000$ MW, $R_1 = 0.015$, $D_1 = 0$
Area 2: $PG_2 = 10000$ MW, $R_2 = 0.0015$, $D_2 = 0$
An increase of 10 MW takes place in area1. Determine the change in frequency, ACE and the appropriate control action. **(08 Marks)**

Module-4

7 a. Two control areas of capacity 1500 MW and 10000 MW are interconnected through the tie-line. The parameters of each area on its own capacity are R = 1 Hz/PUMW and D = 0.02 PUMW/Hz. There is an increase of 200 MW. In load of area 2. Determine the steady state frequency deviation and change in tie-line power. **(08 Marks)**
b. What are the tie-line oscillations? What determines the frequency of these oscillations? **(08 Marks)**

8 a. Explain generation and absorption of reactive power in electrical power system. **(06 Marks)**

b. 3 – generating stations are connected to a common bus-bar X, as shown on Fig.Q8(b) for a particular system load, the line voltage at the bus bar falls by 2 KV. Calculate the reactive power injection required to bring back the voltage to the original value. All PU values are on a 500 MVA base.

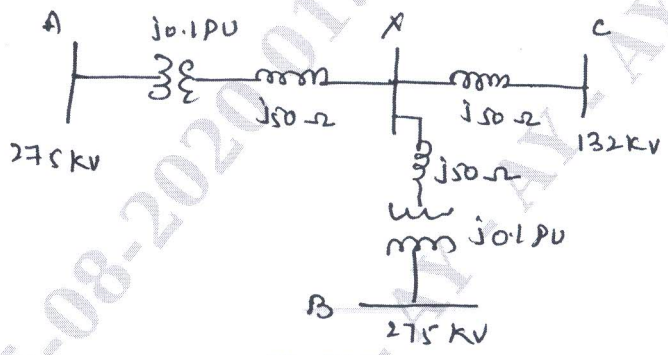

Fig.Q8(b) **(10 Marks)**

Module-5

9 a. Explain the factors affecting power system security. **(06 Marks)**

b. With the help of flow chart, explain the contingency analysis. **(10 Marks)**

10 a. Explain calculation of linear sensitivity factor and contingency ranking. **(08 Marks)**

b. What are state variables? **(02 Marks)**

c. Describe the D.C. State estimator. **(06 Marks)**

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