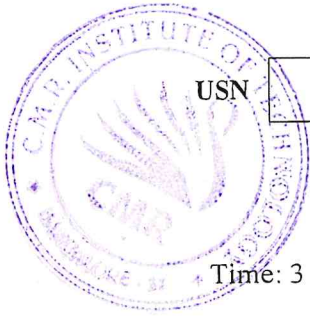


# CBGS SCHEME



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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  $\delta$ - $\lambda$  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)

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.

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- 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.

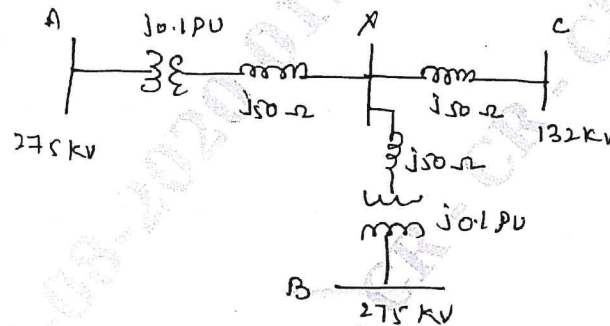


Fig Q8(b)

(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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