

# CBCS SCHEME

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17EE81

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

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. What are the states of power system, explain in brief with a suitable diagram. (06 Marks)  
b. With usual notations, explain following with reference to SCADA systems. SCADA/AGC, EMS, DMS, LMS, AMR. (06 Marks)  
c. Explain the constraints in UC. (08 Marks)
- 2 a. Explain the major components of Energy Management Center. (06 Marks)  
b. Explain in brief the components of Remote Terminal Unit for power system SCADA. (07 Marks)  
c. Explain with Flow Chart the Dynamic Programming Method of unit commitment. (07 Marks)
- 3 a. Write a note on Scheduling of Hydrosystems with necessary formulae involved into it. (05 Marks)  
b. Explain the Mathematical formulation, Discretization, Algorithmic steps involved in Discrete Time Interval Method of Hydro Thermal Scheduling. (10 Marks)  
c. Explain the need for Automatic Generation Control (AGC) in power system operation and control. (05 Marks)
- 4 a. Write a brief note features of hydropower plants that participate in Hydrothermal Scheduling. (05 Marks)  
b. Explain with a suitable Flow chart the short Term Hydrothermal Scheduling using  $\gamma - \lambda$  Iterations. (10 Marks)  
c. Explain the Basic Generator Control loops with reference to AGC in PSOC. (05 Marks)
- 5 a. Obtain the Mathematical Model ALFC components Speed Governor, Turbine. (10 Marks)  
b. Obtain the Transfer function of a AGC with Integral controller from its relevant block diagram representation of ALFC. (10 Marks)
- 6 a. Analyse the effects of changes in loads of two area ALFC system with primary loop. (10 Marks)  
b. Obtain the state space Model of an Isolated system. (10 Marks)
- 7 a. Explain the state space Model for Two-Area ALFC system. (12 Marks)  
b. Explain in brief the issues related in AGC implementation. (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.

- 8 a. With a suitable assumptions made in Two-Area ALFC system, obtain the Tie-line oscillations formula and analyse different damping conditions. (10 Marks)
- b. Two Area ALFC control system has follows data Area :
- i) Area① :  $R_1 = 0.1\text{pu}$ ,  $D_1 = 0.8\text{pu}$ ,  $MVA_{1\text{rated}} = 1500$
- ii) Area② :  $R_2 = 0.098\text{pu}$ ,  $D_2 = 0.9\text{pu}$   $MVA_{2\text{rated}} = 500$
- In Area – 1 Load increase = 100mW. Find steady state frequency and Tie- line power flow change. (06 Marks)
- c. Write an explanatory note on production absorption of reactive power and listout the methods of voltage control in power system operation and controls. (04 Marks)
- 9 a. Explain the power system reliability and system security levels. (10 Marks)
- b. Write a note on Reliability cost, LOLE, LOEE, LOLF, and LOLD. (10 Marks)
- 10 a. With a suitable flow chart explain the contingency analysis procedure. (10 Marks)
- b. What are the state variables, measurements involved in state estimator, explain in brief state estimation problem formulation. (10 Marks)

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