

# CBCS SCHEME

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17EE81

## Eighth Semester B.E. Degree Examination, Dec.2023/Jan.2024 Power System Operation and Control

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. What are the objectives of power system control? Mention the levels of control to meet these objectives. (07 Marks)
- b. Classify the standard SCADA configurations. (07 Marks)
- c. What are the preventive control measures? (06 Marks)

OR

- 2 a. Explain the key concepts of reliable operation of power system. (07 Marks)
- b. Explain the components and functions of RTU. (07 Marks)
- c. Explain the priority list method in solving the unit commitment problem. (06 Marks)

### Module-2

- 3 a. Explain with the assumptions made, the discrete time interval method for hydro-thermal scheduling. (08 Marks)
- b. What are the basic generator control loops? Why cross-coupling between these loops is negligible? (07 Marks)
- c. Explain the electronic hydraulic governing system. (05 Marks)

OR

- 4 a. Explain short-term hydro-thermal scheduling using penalty factors. (08 Marks)
- b. What are the functions of automatic-generation control? (07 Marks)
- c. With diagram, explain the conventional governor. (05 Marks)

### Module-3

- 5 a. Explain with block diagram, the complete automatic load frequency control and derive its transfer function. (08 Marks)
- b. State the assumptions and derive the tie-line power deviation equation in a two-area system. (06 Marks)
- c. A control area has the following data:  
Total generation capacity = 2000 MW, Normal load = 1500 MW,  $H = 4.8$  sec  
 $D = 1.2\%$ ,  $f = 50$  Hz,  $R = 2.5$  Hz/per MW  
Determine the load damping constant and power system time constant. (06 Marks)

OR

- 6 a. With block diagram, explain the frequency bias tie-line control of a two-area system. (08 Marks)
- b. Show that in an isolated system, steady state frequency deviation is zero with integral controller. (06 Marks)
- c. Obtain the composite frequency response of a system with n-generators. (06 Marks)

**Module-4**

- 7 a. Explain with assumptions, the tie-line oscillations to study the effect of system parameters. (08 Marks)  
b. With relevant diagrams, explain the dependence voltage on reactive power. (07 Marks)  
c. What are the elements which absorb or generate reactive power? (05 Marks)

**OR**

- 8 a. Explain the effect changes in real and reactive power on sensitivity of voltage. (07 Marks)  
b. With relevant diagrams, explain the voltage control using tap-changing transformer. (08 Marks)  
c. What are the parameters to indicate voltage strength of a system? (05 Marks)

**Module-5**

- 9 a. Explain the following:  
(i) Security levels of a system  
(ii) Reliability cost curves (10 Marks)  
b. Draw the flow chart and explain contingency selection and ranking. (10 Marks)

**OR**

- 10 a. Explain the following with respect to system security:  
(i) System monitoring  
(ii) Factor affecting the system security (10 Marks)  
b. With relevant equations, explain the linear least square estimation. (10 Marks)

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