CBCS SCHEME

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17EE81

Eighth Semester B.E. Degree Examination, Feb./Mar. 2022
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. Explain the operating states of power system with a neat diagram, showing the transition between the states. **(10 Marks)**

b. With a neat diagram, describe the major components of SCADA system. **(10 Marks)**

OR

2 a. Discuss about the commonly used preventive and emergency control measures in a power system. **(10 Marks)**

b. Explain the various constraints to be considered in unit commitment. **(10 Marks)**

Module-2

3 a. Explain the short term hydrothermal scheduling using γ-λ iteration method. **(10 Marks)**

b. Two machines operate in parallel to supply a load of 400 MW. The capacities of the machines are 200 MW and 500 MW. Each has a droop characteristic of 4%. Their Governors are adjusted so that the frequency is 100% on full load. Calculate the load supplied by each unit and the frequency at this load. The system is a 50 Hz system. **(10 Marks)**

OR

4 a. With a neat block diagram, explain the basic generator control loops. **(10 Marks)**

b. Explain the following terms used in AGC:
(i) Control area (ii) Tie line (iii) Net interchange
(iv) Station control error (v) Unit control error **(10 Marks)**

Module-3

5 a. Derive an expression for generator model of ALFC system. **(10 Marks)**

b. A 1000 MVA generator operates on full load at the rated frequency of 50 HZ. The load is reduced to 800 MW. The steam valve has an operating time lag of 0.6 s. If H = 5 sec, determine the change in frequency. **(10 Marks)**

OR

6 a. Derive the state space model of an isolated AGC system. **(10 Marks)**

b. Two generating areas have capacities of 500 MW and 1000 MW respectively. They are interconnected by a short line. The percentage speed regulations from no-load to full-load of the two stations are 3% and 4% respectively. If the load on each station is 250 MW, find the power generation of each station and the tie-line power. **(10 Marks)**

Module-4

7 a. Discuss about the issues related to AGC implementation. **(10 Marks)**

b. Two areas of equal capacity of 2500 MW, speed regulation R = 3 Hz/per MW and H = 5 sec are connected by a tie-line of capacity 250 MW, operating at 45°. Find the frequency of the line power oscillations. **(10 Marks)**

OR

8 a. Prove that voltage at receiving end is dependent on reactive power in power system. **(10 Marks)**

b. A 440 V, 3ϕ distribution feeder has a load of 75 KW drawing a current of 130 A. A capacitor rating of 45 KVAr is connected across the load. Determine the :

(i) pf and reactive load before compensation.

(ii) pf after compensation. **(10 Marks)**

Module-5

9 a. With a neat flow chart, explain contingency analysis for line outage using line outage distribution factor. **(10 Marks)**

b. List and explain the major functions involved in system security. **(10 Marks)**

OR

10 a. Discuss the set of state variables and measurements of a conventional state estimator. **(10 Marks)**

b. List and explain the other issues in state estimation. **(10 Marks)**

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