CBCS SCHEME

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15EE81

Eighth Semester B.E. Degree Examination, Jan./Feb. 2021
Power System Operation and Control

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. With block diagram, explain the operating states of a power system. **(06 Marks)**

b. What are the preventive and emergency control measures? **(06 Marks)**

c. List the functions of remote terminal units for power system SCADA. **(04 Marks)**

OR

2 a. Classify the standard SCADA configurations. **(06 Marks)**

b. Explain the priority list method in solving unit commitment problem. **(06 Marks)**

c. List the components of SCADA system. **(04 Marks)**

Module-2

3 a. Explain the short-term hydrothermal scheduling using γ-λ iterations. **(08 Marks)**

b. Explain with diagrams: i) Steam turbine governing system ii) Electronic hydraulic governing system. **(08 Marks)**

OR

4 a. What are the assumptions and operational constraints in general algorithm for hydrothermal scheduling? **(06 Marks)**

b. What are the functions of automatic generation control? **(06 Marks)**

c. Why the cross-coupling between ALFC and AVR loops is negligible. **(04 Marks)**

Module-3

5 a. Develop the mathematical models of generator and load for frequency control. **(08 Marks)**

b. A 500MVA, 50Hz isolated generator has an inertia constant M = 8 pu MW/pu Hz and it is supplying a load of 400MVA. The load changes by 1.5% for a 1% change in frequency. Draw the block diagram for the equivalent generator-load system. For an increase of 10MVA in the load, determine the steady state frequency deviation. **(08 Marks)**

OR

6 a. Derive the state space model of an isolated power system. **(08 Marks)**

b. Two control areas are connected via tie-line with the following characteristic:
Area – 1: $R_1 = 1\%$, $D_1 = 0.8$, base MVA = 500
Area – 2: $R_2 = 2\%$, $D_2 = 1.0$, base MVA = 500
A load increase of 100MW occurs in area – 1. What is the new steady-state frequency and the change in tie-line flow? Find the same if the same load change occurs in area-2. Nominal frequency is 50Hz. **(08 Marks)**

Module-4

7 a. Derive the tie-line power oscillations equation for a two area system with valid assumptions. **(08 Marks)**

b. Briefly explain the components of power system that can generate and/or absorb reactive power. **(04 Marks)**

c. Explain the method of voltage control by shunt reactors. **(04 Marks)**

OR

8 a. Explain with relevant diagrams, the dependence of voltage on reactive power. **(08 Marks)**

b. In the power system shown in Fig.Q.8(b), the line voltage at bus-X falls by 2kV for a particular load. Calculate the reactive power injection required to bring back the voltage to the original value. All pu values are on a 500MVA base.

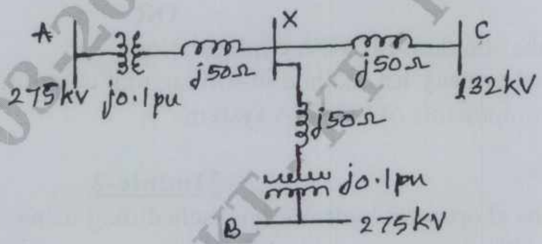

Fig.Q.8(b) **(08 Marks)**

Module-5

9 a. State the security levels of a power system. **(06 Marks)**

b. With flow chart, explain 1P1Q contingency selection procedure. **(06 Marks)**

c. Explain the reliability versus cost curves. **(04 Marks)**

OR

10 a. Explain with an example, security constrained optimal power flow function. **(08 Marks)**

b. What are the state variables in DC power flow? Derive the DC state estimator equation. **(08 Marks)**

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15EE833

Eighth Semester B.E. Degree Examination, November 2020
Integration of Distributed Generation

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions irrespective of modules.

Module-1

1 a. Compare Solar and Wind power from the point of view of space requirement. **(08 Marks)**

b. Briefly explain the factors which affect the amount of power in Solar Power systems. **(08 Marks)**

2 a. List out the main advantages of power production by combined heat and power systems. **(08 Marks)**

b. Explain the basic concepts of Tidal power production. **(08 Marks)**

Module-2

3 a. Explain the method of full power electronics coupling of DG (Distributed Generation) with the grid. **(08 Marks)**

b. Explain the impact of type of interface on the power system. **(08 Marks)**

4 a. Define Hosting Capacity. Explain how this can be increased. **(08 Marks)**

b. Briefly explain the impact of Distributed Generation on overloading and losses. **(08 Marks)**

Module-3

5 a. Briefly explain how advanced protection schemes affect the hosting capacity. **(08 Marks)**

b. Explain the impact of Distributed Generation on voltage magnitude variations. **(08 Marks)**

6 a. Explain the basic design rules in designing distribution feeders. **(08 Marks)**

b. Explain the need for probabilistic methods for the design of distribution feeders. **(08 Marks)**

Module-4

7 a. Write a note on statistical approach to hosting capacity. **(08 Marks)**

b. Explain briefly the alternate methods for voltage control. **(08 Marks)**

8 a. Explain the occurrence of fast voltage fluctuations in solar power. **(08 Marks)**

b. Explain voltage unbalance in weaker transmission systems. **(08 Marks)**

Module-5

9 a. Write a note on low frequency harmonics in Induction generation used in wind power systems. **(08 Marks)**

b. Define harmonic resonance. What are the different types of harmonic resonance? **(08 Marks)**

10 a. Explain balanced and unbalanced voltage dips in synchronous machines. **(08 Marks)**

b. Write a note on increasing the hosting capacity by strengthening of grid. **(08 Marks)**

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