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10EE82

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.***

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.

1 a. What is an AGC? Mention its functions. **(04 Marks)**

b. With the help of a block diagram, explain the functions of a typical dual digital computer control and monitoring of a power system. **(08 Marks)**

c. Two areas A and B are interconnected. The generating capacity of area A is 36,000 MW and its regulating characteristics is 1.5% of capacity per 0.1 Hz. Area B has a generating capacity of 4000 MW and its regulating characteristics is 1% of capacity per 0.1Hz. Find each areas share of a 400 MW disturbance [load increase] occurring in area B and the resulting tie – line flow. Assume 60Hz frequency. **(08 Marks)**

2 a. Explain Parallel Operation of two generators with different capacity and different regulation and hence derive an expression for equivalent system regulation. **(12 Marks)**

b. A 100 MVA synchronous generator is operating on rated load, unity power factor at 50Hz frequency. The load is suddenly reduced to 50MW. Due to time lag in the governor system, the steam valve begins to close after 0.4 seconds. Determine the change in frequency that occurs in this time. Take H = 5 kw – sec/KVA of generator capacity. **(08 Marks)**

3 a. Explain with block diagram, the modeling of i) Speed governing system ii) Turbine iii) Generator and load. **(10 Marks)**

b. With block diagram representation, explain Tie – line bias control of a two area load frequency control. **(10 Marks)**

4 a. Show that the real power flow between two nodes is determined by the transmission angle 'δ' and the reactive power flow is determined by the scalar voltage difference between two nodes. **(08 Marks)**

b. Define Voltage Stability and Voltage Collapse. **(04 Marks)**

c. In a radial transmission system, shown in Fig. Q4(c), all per unit values are referred to the voltage bases shown and 100 MVA. Determine i) The total active power ii) Total reactive power iii) The power factor at which the generator must operate. **(08 Marks)**

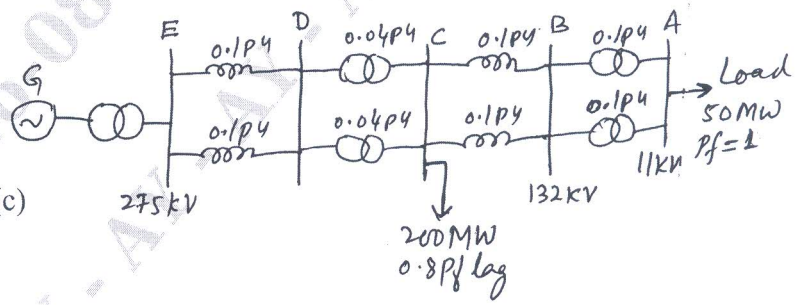

Fig. Q4(c)

5 a. What is Unit Commitment? List the constraints in Unit Commitment. **(08 Marks)**

b. Explain the Dynamic Programming method in Unit Commitment Solution. **(08 Marks)**

c. With an example, explain Priority List method for Unit Commitment problem. **(04 Marks)**

6 a. Explain 'Secured Power System' and 'Power System Blackout'. (06 Marks)
b. Explain the factors affecting Power System Security. (06 Marks)
c. With the help of flow chart, explain Contingency Analysis. (08 Marks)

7 a. Explain the Weighted LSE [Least Squares Estimation] method of power system state estimation. (10 Marks)
b. Explain : i) Suppression of bad data ii) Identification of bad data in state estimation. (10 Marks)

8 a. With reference to reliability, define : i) MTBF ii) Mean failure rate iii) Mean down time iv) Mean repair rate. (08 Marks)
b. A system has three generating units, each of 50MW capacity. The Forced Outage Rate (FOR) of each unit is 0.03. Find the total number of states and their probability of occurrence. (06 Marks)
c. Discuss the three modes of failure of a system. (06 Marks)

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