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10EE82

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

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting at least TWO questions from each part.**

**PART – A**

- 1 a. With a block diagram, explain the function and configuration of Digital Computer used on Energy control center. (06 Marks)
- b. With a block diagram, explain the following: (i) Automatic generation control. (ii) Control area and area control error. (06 Marks)
- c. Two areas are inter connected. The generating capacity of area 1 is 36000 MW and its regulating characteristic is 1.5% of capacity per 0.1 Hz. Area 2 has capacity of 4000 MW and its regulating characteristic is 1% of capacity per 0.1 Hz. Find each areas share of a increased load of 400 MW in the Area 2 and resulting Tie Line flow. Also find new operating frequency if base frequency is 50 Hz. (08 Marks)
  
- 2 a. With a block diagram, explain basic loops of generators and meaning of cross coupling. (06 Marks)
- b. Explain brushless excitation system with a block diagram. (06 Marks)
- c. Two generators are supplying a certain load in power system their ratings are 50 MW and 500 MW respectively. The frequency is 50 Hz and each generator is half loaded. The system load is increased by 110 MW and as a result the frequency drops to 49.5 Hz. What must be the individual regulations if these two generators should increase their turbine powers in proportion to their ratings? (08 Marks)
  
- 3 a. Explain pool operation and its merits and demerits. (06 Marks)
- b. Explain the tieline bias control of Two area system. (06 Marks)
- c. A single area consists of two generators having following characteristics:  
 Unit 1 : 600 MVA, 6 % Regulation on 600 MVA base.  
 Unit 2 : 500 MVA, 4 % Regulation on 500 MVA base.  
 These units are operating in parallel and sharing 900 MW. Unit 1 supplies 500 MW and Unit 2 supplies 400 mw at 50 Hz. A sudden increase in load by 80 MW is noticed in the area. Find the new generation on each unit and new operating frequency. Take common base of 1000 for the calculations. (08 Marks)
  
- 4 a. Explain generation and absorption of reactive power in power system. (06 Marks)
- b. List the effects of sub synchronous resonance and also derive an equation relating normal frequency and sub synchronous frequency. (06 Marks)
- c. In the radial transmission system shown in Fig. Q4 (c) all the values are in pu and referred to the base of 100 MVA. Determine the power factor at which the generator must operate. (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.

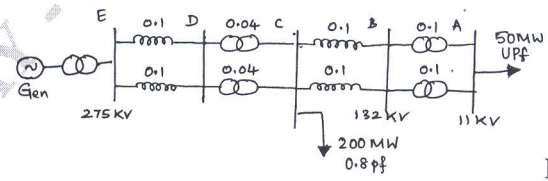


Fig. Q4 (c)

**PART – B**

- 5 a. Define Unit commitment and explain constraints related to unit commitment. (10 Marks)  
b. Explain Dynamic programming method of solution of unit commitment problem. (10 Marks)
- 6 a. What is power system security? Explain Security Constrained Optimal Power Flow (SCOPF) with simple example. (10 Marks)  
b. Define contingency and with the help of flow chart, explain sensitivity factors based contingency analysis. (10 Marks)
- 7 a. With the help of block diagram, explain power system state estimator. (10 Marks)  
b. With a block diagram, explain system security and emergency control. (10 Marks)
- 8 a. Explain different modes of failures in a system. (10 Marks)  
b. Derive the steady state reliability expression and general reliability expression. (10 Marks)

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