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10EE82

**Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020**  
**Power System Operation and Control**

Time: 3 hrs.

Max. Marks:100

**Note:** Answer any FIVE full questions, selecting atleast TWO questions from each part.

**PART - A**

- 1 a. What is Energy Control Center? Explain. (08 Marks)
- b. Explain with a block diagram, the digital computer configuration of the SCADA system. (06 Marks)
- c. Explain the parallel operation of generators with an infinite bus. (06 Marks)
- 2 a. What is an Automatic Voltage Regulator? Obtain mathematical modeling of exciter. (06 Marks)
- b. With neat diagram, explain the speed governing system of Automatic load frequency control loop. (08 Marks)
- c. Explain the brush less AVR Loop. (06 Marks)
- 3 a. What is Tie Line? Obtain modeling of the tie line. (07 Marks)
- b. What are the advantages of multi – area systems? Draw the block diagram of two area systems. (07 Marks)
- c. Explain the static response of two area systems. (06 Marks)
- 4 a. Obtain the relationship between voltage, power and reactive power at a node. (06 Marks)
- b. Explain the synchronous compensators method of reactive power injection. (04 Marks)
- c. A 13kv line is fed through an 11/132 kv transformer from a constant 11kv supply. At the load end of the line the voltage is reduced by another transformer of nominal ratio 132/11kv. The total impedance of the line and transformers at 132 kv is  $(25 + i66) \Omega$ . Both transformers are equipped with tap – changing facilities which are arranged so that the product of the two off – nominal settings in unity. If the load on the system is 111 MW at 0.9 pf. lagging, calculate the settings of the tap changers required to maintain the voltage of the load bus bar at 11kv. Use a base of 100 MVA. (04 Marks)
- d. Explain the voltage collapse with relevant P – V diagram. (06 Marks)

**PART - B**

- 5 a. What is Unit Commitment? What are the constraints in solving the unit commitment problem? (10 Marks)
- b. With the help of flow chart, explain the Dynamic programming method of unit commitment. (10 Marks)
- 6 a. What is System security? Explain the major functions involved in the system security. (10 Marks)
- b. With the help of flow chart, explain the contingency analysis. (10 Marks)
- 7 a. What is State Estimation? Explain the basis of power system state estimation. (10 Marks)
- b. Explain Least Square solution technique for power system state estimation. (10 Marks)
- 8 a. Explain modes of failures of a system. (06 Marks)
- b. With a flow chart, explain loss of load probability. (10 Marks)
- c. Explain i) Mean Time between the failure ii) Mean Down Time. (04 Marks)

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24 JAN 2020

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.

