

B.E. Electrical (Electronics & Power) Engineering (Model Curriculum) Semester-VI  
**TE205 - Power Systems-II - Operations & Control**

P. Pages : 2

Time : Three Hours



**GUG/W/24/13879**

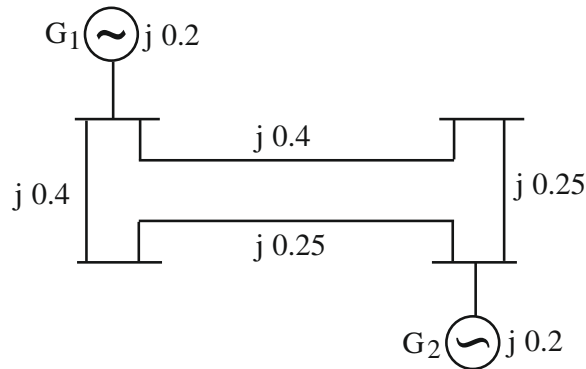
Max. Marks : 80

- Notes :
1. All questions carry equal marks.
  2. Due credit will be given to neatness and adequate dimensions.
  3. Assume suitable data wherever necessary.
  4. Illustrate your answers wherever necessary with the help of neat sketches.
  5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.
  6. Read the question paper carefully (Branch, Semester, Scheme) before attempting the questions.
  7. Use of programmable calculator is prohibited.
  8. Draw neat and proper diagram/sketches.
  9. Don't use red pen for writing the answers.
  10. Don't write any other comments except answers of questions.

1. a) Give the algorithm for load flow-solution for Gauss-Seidel method with PQ buses presents. **8**
- b) Explain the different types of buses classification for load flow studies with its specified and unspecified parameter relevance to load flow studies. **8**

**OR**

2. a) Explain the formulation of Bus admittance matrix ( $Y_{Bus}$ ) by direct inspection method with example. **8**
- b) Form the  $Y_{Bus}$  by using singular transformation for the network shown below. Including the generator buses. **8**



3. a) A 50 Hz, four pole turbo generator rated 100 MVA, 11 kV has an inertia constant of 8.0 MVA. **8**
- a) Find the stored energy in the rotor at synchronous speed.
- b) If the mechanical input is suddenly raised to 80 MW for an electrical load of 50 MW, find rotor acceleration, neglecting mechanical and electrical losses.
- c) If the acceleration calculated in part (b) is maintained for 10 cycles, find the change in torque angle and rotor speed in revolutions per minute at the end of this period.

- b) What mean by steady state stability? Derive the derivation of synchronizing coefficient stability. 8

**OR**

4. a) Derive swing equation of machine connected to an infinite bus through transmission Network. 8

- b) A single machine connected to infinite bus has  $H = 3.0$  pu, and  $X_d' = 0.25$  pu and line reactance = 0.1 pu. Initially the bus voltage (generator bus) is 1.4 pu and the generator was delivering a power of 75 MW. At  $t = 0$  s, a 3 phase short circuit occurred at the generator bus. Find the variation of rotor angle with respect to time up to  $t = 0.15$  second, taking time step of 0.05 second. 8  
Given that, base MVA is 100 and infinite bus voltage is 1.0 pu. Use Euler's method.

5. a) Explain the load frequency control of single area isolated power system with neat sketch. 8

- b) Two generators rated 200 MW and 400 MW are operating in parallel. The droop characteristics of their governor's are 4 % and 5%, respectively from no load to full load. Assuming that the generators are operating at 50 Hz at no load, how would a load of 600 MW is shared between them? What will be the system frequency at this load? Assume free governor operation. Repeat the problem if both governors have a drop of 4%. Discuss the results of both cases. 8

**OR**

6. a) Discuss generation and absorption of reactive power. 8

- b) Explain the method voltage control using tap changing transformers. 8

7. a) State and explain the importance/need of state estimation in power flow problem. 8

- b) Explain the function of supervisory control and data acquisition (SCADA) with its block diagram. 8

**OR**

8. a) Explain different function of State load dispatch center and Regional load dispatch center. 8

- b) Explain the energy control objective as per their level of decomposition of control center. 8

9. a) What is demand side management? Explain the different point which considered for improving the same. 8

- b) Explain retail competitive market model along block diagram. state advantage and disadvantage of same. 8

**OR**

10. a) What is Power Exchange? Discuss the key points of power exchange. 8

- b) Explain vertical electricity market model along block diagram. State advantage and disadvantage of same. 8

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