B.E. Electrical (Electronics & Power) Engineering (Model Curriculum) Semester - VI

TE205(PCC) - Power Systems II (Operations & Control)

P. Pages : 2 **GUG/S/23/13879**

Time : Three Hours * 2 6 1 6 * Max. Marks : 80

Notes :
1. All questions carry equal marks.
2. Read the question paper carefully (Branch, Semester, Scheme) before attempting the questions.
3. Every question has equal weightage.
4. Use of programmable calculator is prohibited.
5. Assume suitable data wherever necessary.
6. Draw neat and proper diagram/sketches.
7. Don't' use red pen for writing the answers.
8. Don't' write any other comments except answers of questions.

1. a) Explain the formulation of Bus admittance matrix (Y_{Bus}) by singular transformation method with example. **8**

b) Explain the flow chart for Gauss-Seidel method with PV buses. **8**

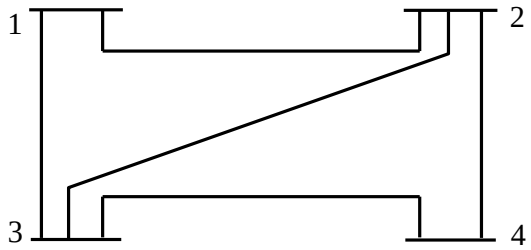
OR

2. a) Derive and explain about static load flow equations. **8**

b) Fig : 1 shows the one-line diagram of a simple four-bus system. Table: 1 gives the line impedances identified by the buses on which these terminate. The shunt admittance all the buses is assumed negligible **8**

a) Find Y_{Bus} assuming that the line shown dotted is not connected.

b) What modifications need to be carried out in Y_{Bus}, if the line shown dotted is connected



Line, bus to bus	R. pu	X pu
1-2	0.05	0.15
1-3	0.10	0.30
2-3	0.15	0.45
2-4	0.10	0.30
3-4	0.05	0.15

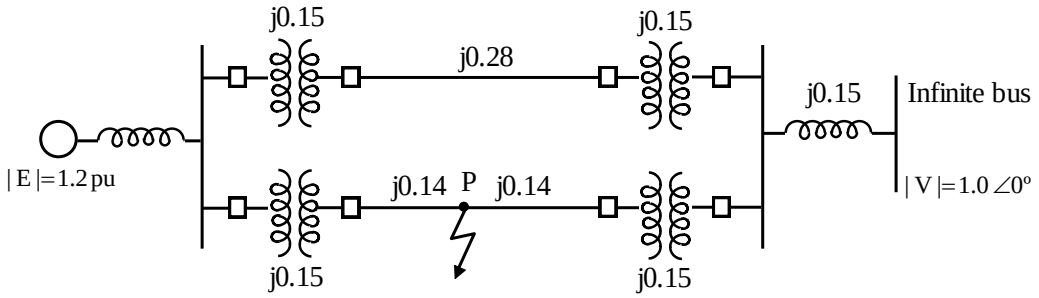
3. a) Define the following terms: **6**

i) Steady state stability.

ii) Dynamic stability

iii) Transient stability.

b) Find the critical clearing angle for the system shown in Fig. 1 for a three phase fault at the point P. The generator is delivering 1.0 pu power under prefault conditions. **10**



OR

4. a) A synchronous generator of reactance 1. 20 p u is connected to an infinite bus bar l Vl = 1.0 pu) through transformers and a line of total reactance of 0.60 pu. The generator no load voltage is l .20 pu and its inertia constant is H = 4 MW-s/MVA. The resistance and machine damping may be assumed negligible. The system frequency is 50 Hz. **8**
Calculate the frequency of natural oscillations if the generator is loaded to (1) 50% and (ii) 80% of its maximum power limit.

b) Explain equal area criterion of stability applied to a finite machine connected to infinite bus. **8**

5. a) Derive the relationship between Δf (Change in frequency) and ΔPc (change in speed changer). **8**

b) With necessary diagrams, briefly describe DC excitation systems, AC excitation systems and Brushless AC excitation systems. **8**

OR

6. a) From the necessary equations, obtain the block diagram of exciter in an AVR. **8**

b) A 100 MVA synchronous generator operates on full load at frequency of 50 Hz. The load is suddenly reduced to 50 MW. Due to time lag in governor system, the steam value begins to close after 0.4 seconds. Determine the change in frequency that occurs in this time. **8**

7. a) Explain different function of Local Control centre and area load dispatch center. **8**

b) What is meant by corrective rescheduling? Describe the same as per levels of power system security. **8**

OR

8. a) Explain the concept of phasors measurement units and wide-area measurement systems. **8**

b) Explain the contingency Analysis. Preventive control and emergency control of power system. **8**

9. a) What is mean by Electric utility? Explain the major goals of electric Utility applied to the potential functions of a twenty-first century electric utility. **8**

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

OR

10. a) Define the spot pricing. Explain the advantages and disadvantages of spot pricing. **8**

b) Explain Retail competitive market model along block diagram. State advantage and disadvantage of same. **8**

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