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Total No. of Questions : 08

M.Tech. (EE) (Sem.–2)

POWER SYSTEM ANALYSIS

Subject Code : MTEE-101-18

M.Code : 75215

Date of Examination : 14-01-2023

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWELVE marks.**

1. a) Develop an algorithm for G-S load flow method including PV buses in the power system. (8)

   b) Explain why N-R method is preferred to G-S method for load flow studies in power system. (4)

2. a) Derive the necessary equations to determine the fault current for a double line to ground fault. Draw a diagram showing interconnection sequence networks. (7)

   b) A 1 lkV, 20 MVA, 3- φ star connected generator have the positive, negative and zero sequence reactance are j0.09, j0.075 and j0. 10 pu. Find the fault current in each phase and voltage of the healthy phase for a double line to ground fault on terminals of generator. Assume, solid fault ($Z_f = 0$). (5)

3. a) Compare G-S method and N-R method for load flow solutions. (4)

   b) The load flow data for the sample power system are given below. The voltage magnitude at bus 2 is to be maintained at 1.04 pu. The maximum and minimum reactive power limits of the generator at bus 2 are 0.35 and 0.0 pu respectively. Determine the set of load flow equations at the end of first iteration by using N-R method. Impedance for sample system: (8)

Bus Code	Impedance	Line Charging Admittance
1-2	0.08 + j0.24	0.0
1-3	0.02 + j0.06	0.0
2-3	0.06 + j0.18	0.0

Schedule of generation and loads

Bus Code	Assumed Voltage	Generation		Load	
		MW	MVAR	MW	MVAR
1	1.06 + j0	0	0	0	0
2	1.0 + j0	0.2	0	0	0
3	1.0 + j0	0	0	0.6	0.25

4. a) What is voltage collapse? Explain its causes and prevention methods taken against it. (6)

   b) Draw PV graph for a typical line. What is the use of this graph in voltage stability studies? (6)

5. Write short notes on :

   a) Improvement in state estimates by adding measurements. (6)

   b) Algorithm formulation of 3-φ Z-bus. (6)

6. Discuss contingency analysis for power system using Brown's Method. (12)

7. a) What are symmetrical components? Explain. (6)

   b) Derive an expression for the fault current for a single line to ground fault as an unloaded generator and draw its equivalent circuit. (6)

8. a) Explain the steps of computational procedure for the N-R method of load flow studies. (8)

   b) Explain state estimation of power systems. (4)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.