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B.E / B.Tech/ B. Arch (Full Time) END SEMESTER EXAMINATIONS – Nov / Dec 2024

ELECTRICAL AND ELECTRONICS ENGINEERING

V Semester

EE8504 Power System Analysis

(Regulation 2012)

Time: 3 Hours — Answer ALL Questions — Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What are the advantages of per unit system?
2. Define primitive network. Write the performance equation in impedance and admittance form.
3. What is the importance of power flow analysis in planning and operation of power system?
4. Differentiate Newton Raphson method and Gauss Seidal method.
5. Draw the circuit models of a short circuited synchronous machine on No load.
6. What is short circuit MVA? Why short circuit MVA calculation is needed?
7. What do you meant by symmetrical components?
8. Name the fault in which zero sequence current is zero?
9. Compare the inertia constants M and H.
10. Does reactive power has any effect on stability?

Part – B (5 x 16 = 80 marks)
(Question No.11 is Compulsory)

11. Fig. 11 shows a two-machine system. The ratings are as follows:
Synchronous Generator: 20 MVA, 11 kV, X" = 0.15 pu, Synchronous motor: 15 MVA, 11 kV, X" = 0.15 pu, Transformer T1: 25 MVA, 11/132 kV, X = 0.1 pu, Transformer T2: 20 MVA, 132/11 kV, X = 0.1 pu. Line Impedance: 200 + j500 Ω. Static load: 5MVA, 0.8 power factor lagging. Draw the reactance diagram for the system. Choose a base voltage of 11 KV and a base volt-ampere of 20 MVA.

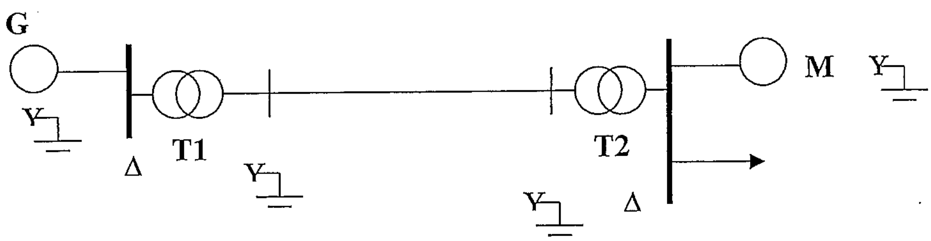


Fig. 11

12. a) Write the algorithm with necessary equations and flowchart for Newton Raphson method.

(OR)

b) Carryout one iteration of load flow analysis of the system given below using Gauss Seidal method.

Line data:

Buses	Reactance pu.
1-2	j0.13
2-3	j0.14
3-1	j0.12

Bus data:

Bus no.	Type	V (pu)	Generation (pu)		Load (pu)	
			P	Q	P	Q
1	Slack bus	1.01	-	-	-	-
2	PQ bus	-			1.0	0.8
3	PV bus	1.03	0.8	-	-	-

13. a) Formulate the Z- bus using the Z Bus building algorithm.

S.No.	From Bus	To Bus	Reactance pu.
1.	ref	1	j0.25
2.	ref	3	j0.15
3.	1	2	j0.25
4.	2	3	j0.15
5.	1	3	j0.2

(OR)

b) Fig. 13(b) shows a generating station feeding a 132 KV system. Determine the total fault current and fault current supplied by each alternator for a 3 phase fault at the receiving end bus. The line is 200 km long.

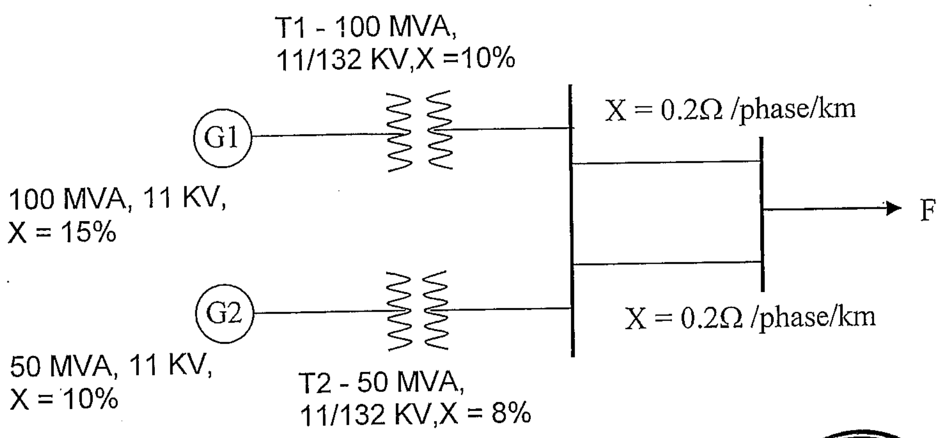
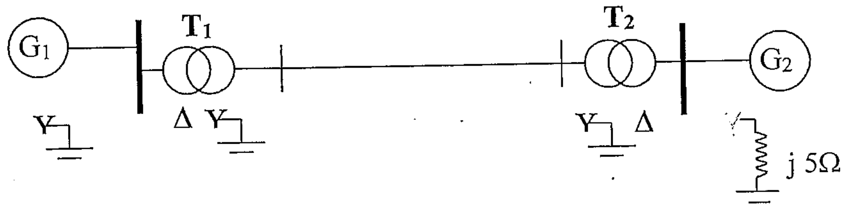


Fig. 13(b)

14. a) Derive the relationship for fault currents in phase b and c in terms of symmetrical components when there is L-L-G fault on phase b and c.

(OR)

b) Draw the positive, negative and zero sequence network for the system. Generator G_1 = 50 MVA, 11KV, X = 0.08 pu, Transformer T_1 = 50 MVA 11/220 KV, X = 0.1 pu, Generator G_2 = 30 MVA, 11KV, X = 0.07 pu, Transformer T_2 = 50 MVA 11/220 KV, X = 0.09 pu, reactance of the Transmission Line = 555.6 ohms. Consider base MVA = 50 MVA and Base Voltage = 11 KV.



15. a) Derive swing equation for a single machine connected to infinite bus system and discuss its application in the study of power system stability.

(OR)

b) Two alternators given below are interconnected using a short line. Machine 1: 4 pole, 50 Hz, 75 MVA, 0.8 lag, 20000 kg-m^2. Machine M2: 2 pole, 50 Hz, 100 MVA, 0.85 lag, 10000 kg-m^2. Determine the inertia constant of the single equivalent machine on a base of 400 MVA.