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7E7042

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B.Tech. VII- Semester (Main&Back) Examination, Nov. - 2019
Electrical Engg.
7EE2 A Power System Analysis
(Common for EE, EX)

Time : 3 Hours

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Maximum Marks : 80
Min. Passing Marks : 26

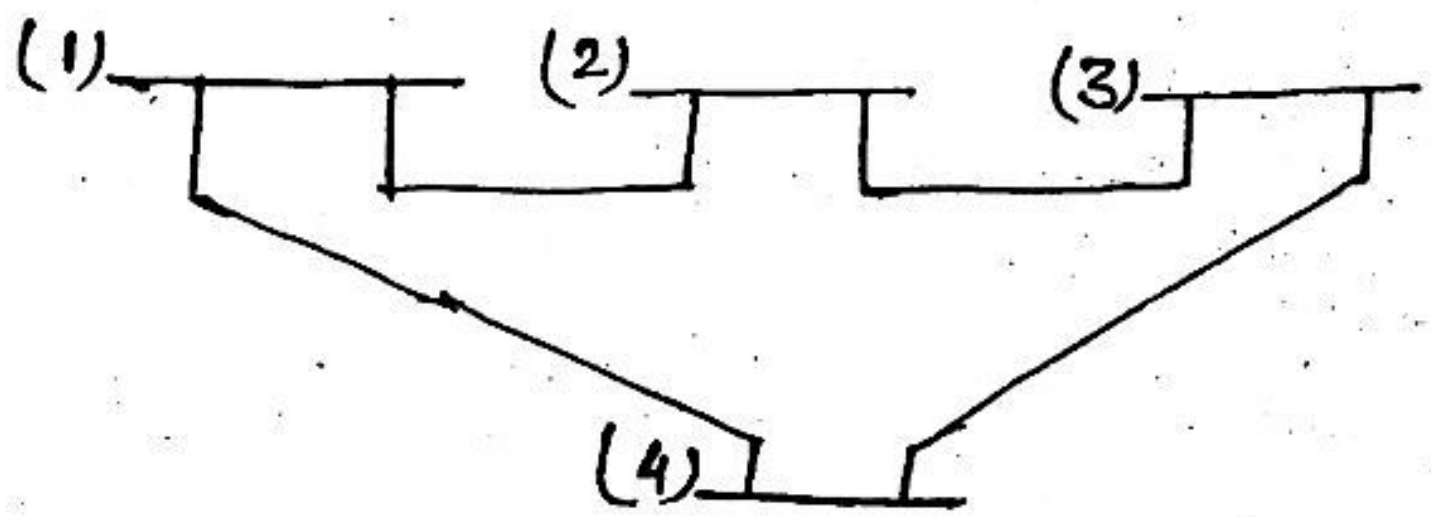
Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.

UNIT - I

1. a) What do you mean by per unit and percentage quantities? What is the need of per unit system? What are the advantages of per unit system? (8)
- b) Figure shows a 4 bus system. The shunt admittance at the buses are negligible. the line impedance are as below : Formulate Y_{BUS} matrix

Line (but to bus)	1-2	2-3	3-4	1-4	
R (P.U)	0.025	0.02	0.05	0.04	
X (P.U)	0.10	0.08	0.20	0.16	(8)

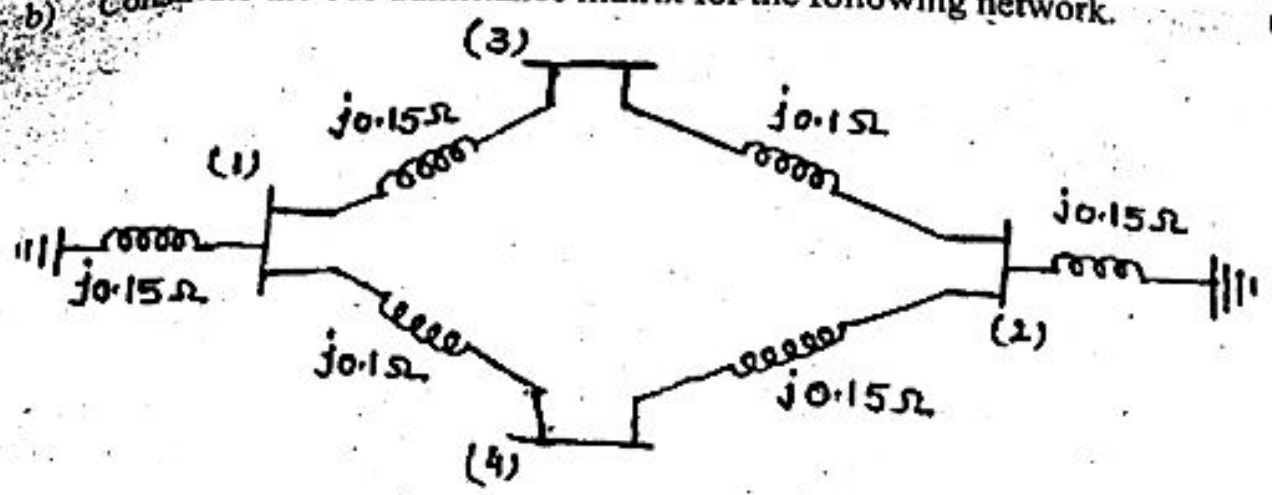


(OR)

- a) Explain the procedure for formulations of admittance matrix also explain the modification fo admittance matrix. (8)

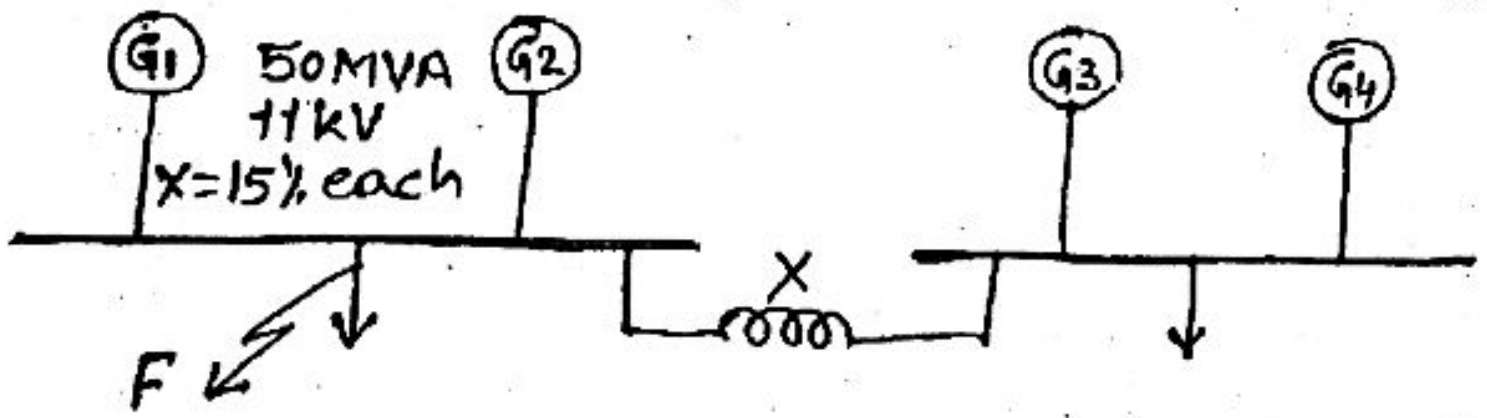
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b) Construct the bus admittance matrix for the following network. (8)



UNIT - II

2. a) Discuss the analysis of short circuit on a loaded synchronous machine and draw models for computing subtransient and subtransient current. (8)
- b) Fig shows a system having 4 alternator each rated at 11 kV, 50 MVA and each having a subtransient reactance of 15%. Find.
 - i) Fault level for a fault on one of the feeders (near the bus) with zero value of reactance X.
 - ii) The reactance of the current limiting reactor X to limit the fault level to 800 MVA for a fault on.



(OR)

2. a) In step by step formulation of Z_{bus} , it is not necessary to include the case of an element connected between two new buses, Why? (8)
- b) A 3 - phase 15 MVA, 10 kV alternator has internal reactance of 6% and negligible resistance. Find the external reactance per phase to be connected in series with the alternator so that steady current on short circuit does not exceed 6 times the full load current. (8)

UNIT - III

3. a) Write short note on sequence impedance of transformer and draw the transformer connection and their equivalent sequence network. (8)
- b) Determine the symmetrical components of current in a three phase system, the original phasors of which are $I_a = 12 + j6$, $I_b = 12 - j12$, $I_c = -15 + j10$. (8)

(OR)

3. a) What do you understand by symmetrical components? Explain positive, Negative and zero sequence components. (8)
- b) Derive expression for fault current by symmetrical component method for single line to ground fault. (8)

UNIT - IV

4. a) Derive the expression for fault current by symmetrical component method for line to line fault. (8)
- b) For a fault at alternator terminals, a single line to ground fault is more severe than a 3 - phase fault. Why? (8)

(OR)

4. a) Distinguish between
- Symmetrical and Unsymmetrical faults.
 - Short circuit and open circuit fault. (8)
- b) A 50 MVA, 11 kV, 3- ϕ alternator was subjected to different types of faults, The fault current were : 3- ϕ fault 1870 Amp., line to line fault 2590 Amp, single line to ground fault 4130 Amp. The alternator neutral is solidly grounded. Find per unit values of three sequence reactances of the alternator. (8)

UNIT - V

5. a) Explain different type of buses and variables in power system. Derive steady state load flow equation. (8)
- b) What do you mean by load flow problems? (8)

(OR)

5. a) Give the comparison of Gauss - Seidal, Newton Raphson and fast decoupled load flow studies. (8)
- b) Give reason
- Majority of buses in power system are load buses
 - Bus admittance matrix is preferred for load flow study. (8)