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Question Paper Code : 86593

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Sixth Semester

Electrical and Electronics Engineering

EE 1351 A — POWER SYSTEM ANALYSIS

(Regulations 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the advantages of per unit calculations?
2. Define primitive network.
3. What do you mean by flat voltage start?
4. Why is generator bus called as voltage controlled bus?
5. Name any two methods of reducing short circuit current.
6. Define subtransient reactance.
7. What is the need for short circuit analysis?
8. Mention any two objectives of short circuit analysis.
9. Define stability of a power system.
10. Name two techniques for stability improvement.

PART B — (5 × 16 = 80 marks)

11. (a) Draw the reactance diagram using a base of 50 MVA and 13.78 KV on Generator G1 for the system shown in Fig.Q 11 (a).

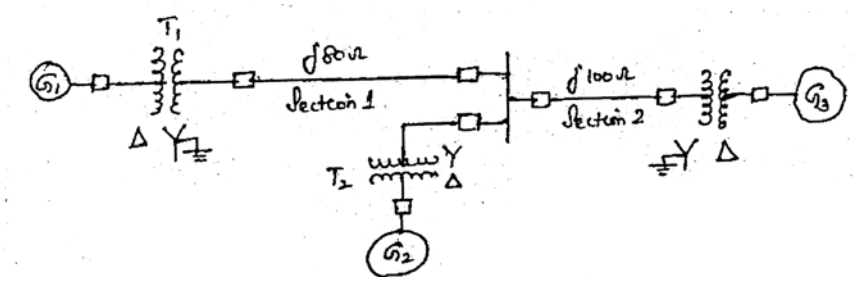

Fig. Q 11(a)

Or

(b) Form Ybus by singular transformation for the network shown in Fig. 11(b). The impedance data is given in table. Take (1) as reference. (16)

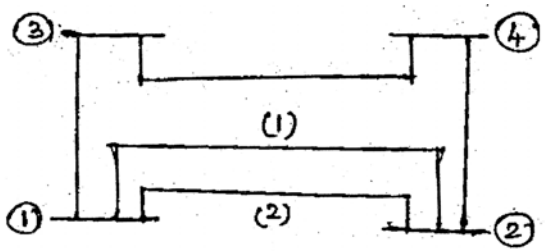

Fig. Q 11(b)

Element No.	Bus code	Self Independence
1	1-2 (1)	0.6
2	1-3	0.5
3	3-4	0.5
4	1-2(2)	0.4
5	2-4	0.2

12. (a) Explain clearly the algorithm steps for solving load equations using Newton Raphson method when the system contains all types of buses. Assume that the generators at the P-V buses have adequate Q limits.

Or

(b) Explain the step by step computational procedure for the Gauss Seidal method of load flow studies.

13. (a) The system shown in fig 13a is delivering 50 MVA at 11kv, 0.8 lagging power factor into a bus which may be regarded as infinite Particulars of various system components are: (16)

Generator	:	60 MVA, 12kV, Xd' = 0.35 pu
Transformers (each)	:	80 MVA, 12/66 kV, X = 0.08 pu
Line	:	Reactance 12 ohms, resistance negligible.

Calculate the symmetrical current that the circuit breakers A and B will be called upon to interrupt in the event of a three phase fault occurring at F near the circuit breaker B.

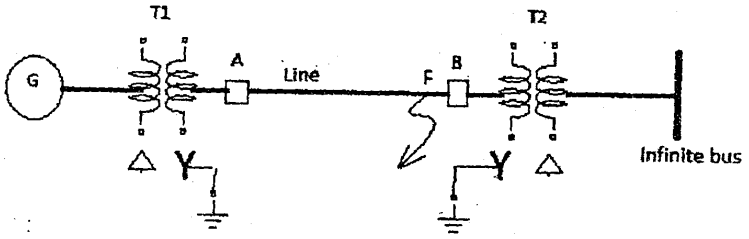

Fig. 13(a)

Or

(b) Explain the step by step procedure for systematic fault analysis for a three phase fault using bus impedance matrix. (16)

14. (a) A salient-pole generator without dampers's rated 20 MVA. 13.8 KV and has a direct axis subtransient reactance of 0.25 per unit. The negative and zero sequence reactances are 0.35 and 0.10 per unit respectively. The neutral of the generator is solidly grounded. Determine the sub-transient current in the generator and the line to line voltages for subtransient conditions when a single line to ground fault occurs at the generator terminals with generator operating unloaded at rated voltage. Neglect resistance.

Or

(b) A generator of negligible resistance having 1 p.u. voltage behind transient reactance is subjected to different types of faults.

Type of fault	Resulting fault current in p.u.
3-phase	3.33
L-L	2.23
L-G	3.01

Calculate the per unit value of 3 sequences reactances.

15. (a) (i) Derive the expression for critical clearing time for a SMIB. (10)

(ii) Explain the methods of improving transient stability. (6)

Or

(b) (i) With the help of a flow chart explain the solution of swing equation by modified Euler's method. (12)

(ii) A 50Hz 8 pole generator rated 80 MVA 11KV has an inertia constant of 7MJ/MVA. Find the moment of inertia M. (4)

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