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Question Paper Code : 57320

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fifth Semester

Electrical and Electronics Engineering

EE6501 – POWER SYSTEM ANALYSIS

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Define per unit value of an electrical quantity and write the equation for base impedance for a three phase power system.

2. Write the equation for per unit impedance if change of base occurs.

3. What is the need for load flow analysis ?

4. Mention the various types of buses in power system with specified quantities for each bus.

5. State and explain symmetrical fault.

6. What is bolted fault or solid fault ?

7. What are the symmetrical components of a three phase system ?

8. Write down the equation to determine symmetrical currents from unbalanced current.

9. State Equal area criterion.

10. Define transient stability of a power system.

PART – B (5 × 16 = 80 Marks)

11. (a) The data for the system whose single line diagram shown in Fig.11(a) is as follows :

G1: 30 MVA, 10.5 kV, X" = 1.6 ohms

G2 : 15 MVA, 6.6 kV, X" = 1.2 ohms

G3 : 25 MVA, 6.6 kV, X" = 0.56 ohms

T1 : 15 MVA, 33/11 kV, X = 15.2 ohms/phase on H.T side

T2 : 15 MVA, 33/6.2 kV, X=16.0 ohms/phase on L.T side

Transmission line : X = 20.5 ohms/phase

Loads : A : 40 MW, 11 kV, 0.9 p.f lagging

B : 40 MW, 6.6 kV, 0.85 p.f lagging

Choose the base power as 30 MVA and approximate base voltages for different parts. Draw the reactance diagram. Indicate pu reactance on the diagram. **(16)**

Fig. 11(a)

OR

(b) (i) Determine the Ybus matrix by inspection method for line specification as mentioned below. **(12)**

Line p-q	Impedance in p.u.	Half Line charging admittance in p.u.
1-2	0.04+j0.02	j0.05
1-4	0.05+j0.03	j0.07
1-3	0.025+j0.06	j0.08
2-4	0.08+j0.015	j0.05
3-4	0.035+j0.045	j0.02

(ii) Draw the π-model representation of a transformer with off nominal tap ratio 'α'. **(4)**

12. (a) With a neat flow chart, explain the computational procedure for load flow solution using Gauss Seidal load flow solution. (16)

OR

(b) Draw the flow chart and explain the algorithm of Newton-Raphson iterative method when the system contains all types of buses. (16)

13. (a) A generating station feeding a 132 kV system is shown in fig. 13(a). Determine the total fault current, fault level and fault current supplied by each alternator for a 3 phase fault at the receiving end bus. The line is 200 km long. (16)

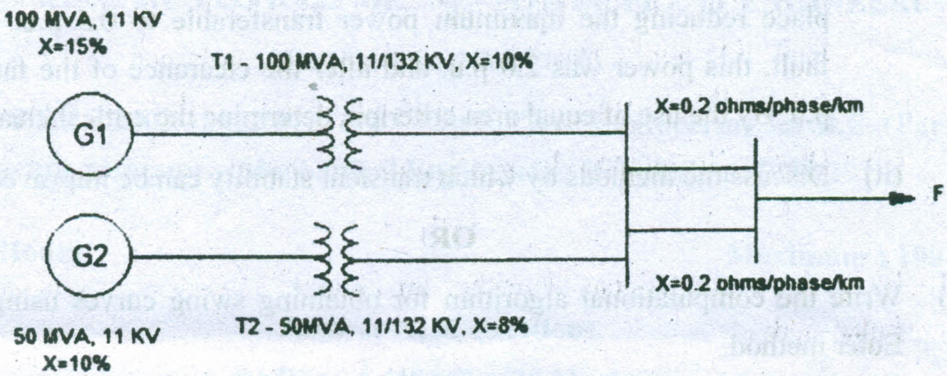

Fig.-13(a)

OR

(b) A Symmetrical fault occurs at bus 4 for the system shown in Fig 13.(b). Determine the fault current using Zbus Building algorithm. (16)

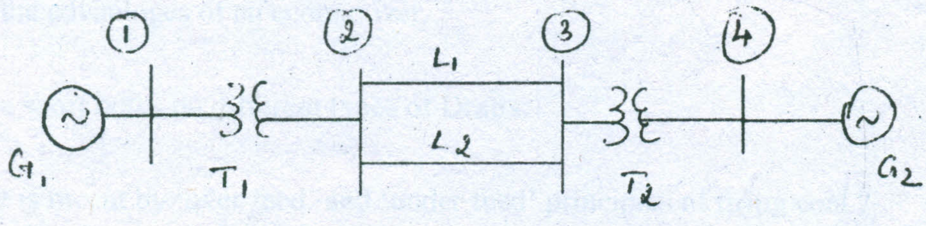

Fig.13(b)

G1, G2 : 100 MVA, 20 kV, $X^+ = 15\%$

Transformer : $X_{leakage} = 9\%$

L1, L2 : $X^+ = 10\%$

14. (a) (i) What are the assumptions to be made in short circuit studies ? (4)

(ii) Deduce and draw the sequence network for LLG fault at the terminals of unloaded generator. (12)

OR

(b) Derive the expression for fault current in line to line fault on unloaded generator. Draw an equivalent network showing the interconnection of networks to simulate line to ground fault. (16)

15. (a) (i) A generator is operating at 50 Hz, delivers 1.0 p.u. power to an infinite bus through a transmission circuit in which resistance is ignored. A fault takes place reducing the maximum power transferable to 0.5 p.u. Before the fault, this power was 2.0 p.u. and after the clearance of the fault it is 1.5 p.u. By the use of equal area criterion, determine the critical clearing angle. (10)

(ii) Discuss the methods by which transient stability can be improved. (6)

OR

(b) Write the computational algorithm for obtaining swing curves using Modified Euler method. (16)
