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2002 SCHEME EE61

Sixth Semester B.E. Degree Examination, June-July 2009
Power System Analysis & Stability

Time: 3 hrs. Max. Marks:100

Note: *1.Answer any FIVE full questions.*
2.Assume missing data suitably.

1 a. What is per unit system? Mention the advantages of per unit system. (05 Marks)

b. What is one line diagram of a power system? What is its significance? (05 Marks)

c. A three winding transformer has rating as follows:

Primary	Y connected	6.6 kV,	15 MVA
Secondary	Y connected	33 kV,	15 MVA
Tertiary	Δ connected	2.2 kV,	7.5 MVA.

Leakage impedances measured from primary side as $Z_{ps} = j\ 0.232\Omega$, $Z_{pt} = j\ 0.29\ \Omega$ and on the secondary side $Z_{st} = j\ 8.7\Omega$. Find the star connected equivalent on a base of 15 MVA, 6.6 kV in the primary circuit. Neglect resistances. (10 Marks)

2 a. Explain the concept of short circuit capacity. (05 Marks)

b. Determine the fault MVA, if a fault takes place at 'F' in the diagram, shown in Fig.2(b). The per unit values of reactances are given with 100 MVA as base. (15 Marks)

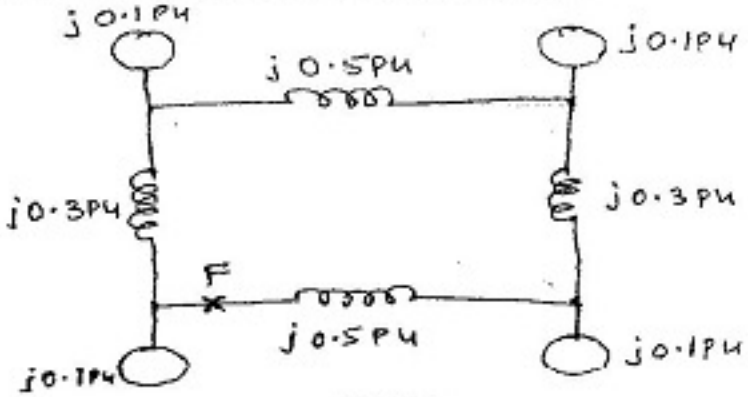

Fig.2(b)

3 a. Explain what are symmetrical components. How they are useful in solving the power system problems? (05 Marks)

b. Explain the effect of Neutral in the power system. (05 Marks)

c. A single phase resistive load of 100 kVA is connected across lines BC of a balanced supply of 3kV. Compute the symmetrical components of line currents. (10 Marks)

4 a. Explain sequences impedances and networks of synchronous generator. (05 Marks)

b. Draw the positive, negative and zero sequence networks for the power system.
[Refer Fig.4(b) on Page 2]
Choose a base of 50 MVA, 220 kV in the 50 Ω transmission lines and mark all reactances in per unit. The ratings of the generators and transformers are

Gen 1 :	25 MVA,	11 kV,	X" = 20%
Gen 2 :	25 MVA,	11 kV,	X" = 20%

Three phase transformer (each) : 20 MVA, 11Y/220Y kV, X = 15%
The negative sequence reactances of each synchronous machine is equal to the sub transient reactances. The zero sequences reactances of lines are 250% of their positive sequences.
(15 Marks)

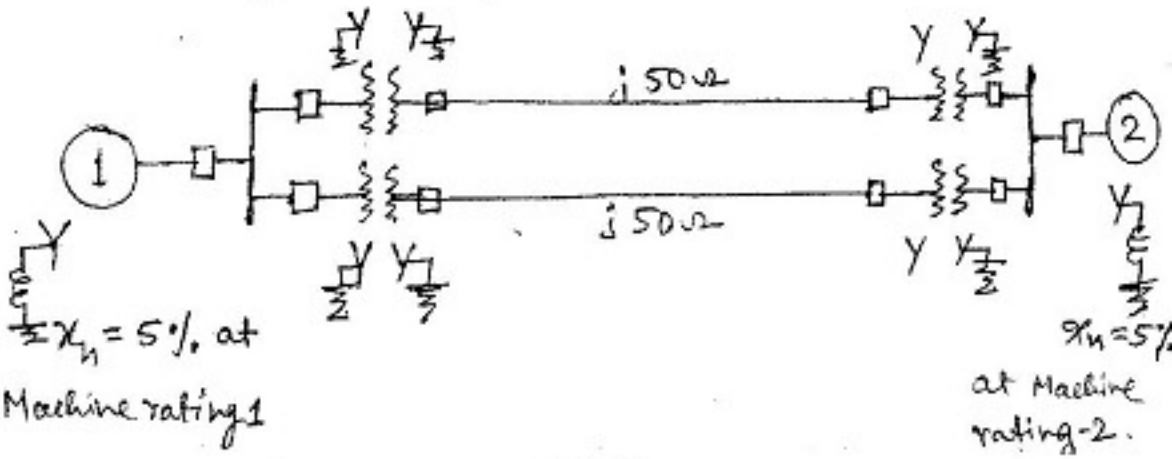

Fig.4(b)

5 a. For a double line to ground fault on unbalanced generator, derive the equation for the fa current and draw the connections and sequences networks. **(10 Mar**

b. A 3-phase alternator rated 40MVA, 11 kV, 50 Hz is running at rated speed and developi rated voltage. The generator neutral is isolated and a LLG fault takes place on phase b and Determine the fault current in p.u. Given $X_1 = 0.3$pu, $X_2 = 0.2$pu & $X_0 = 0.1$pu. Also find t fault current in amperes. **(10 Mar**

6 a. Distinguish between steady state stability and transient stability in power system. **(05 Mar**

b. A two pole, 50 Hz, 11 kV turbo alternator has a rating of 100 MW, power factor 0. lagging. The rotor has a moment of inertia of 10,000 kg.m^2. Calculate H and M. **(05 Mar**

c. Explain the construction procedure of Clarke's diagram for a two machine system connect via impedances. **(10 Mar**

7 a. Derive swing equation for a synchronous machine. **(10 Mar**

b. A 50 Hz generator is delivering 50% of the power that it is capable of delivering thoroug transmission line to an infinite bus. A fault occurs that increase the reactance between t generators and the infinite bus to 500% of the value before the fault. When the fault isolated the maximum power that can be delivered is 75% of the original maximum val Determine the critical clearing angle for the condition described. **(10 Mar**

8 Write short notes on the following:

a. Factors affecting the transient stability of a power system.

b. Equal area criterion (EAC)

c. Steady state stability analysis

d. Selection of C.B's **(20 Mar**