Printed Pages : 4

EEE601

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 121602

Roll No.

B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15

POWER SYSTEM ANALYSIS

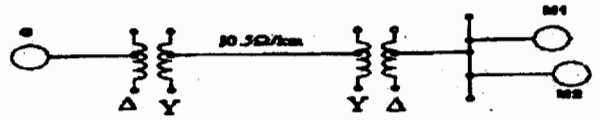
Time : 3 Hours] [Total Marks : 100

All Questions are Compulsory

1 Attempt any four parts of the following: (4×5=20)

(A) What do you understand by Single line diagram and reactance diagram of a power system? Explain per unit system and its advantage.

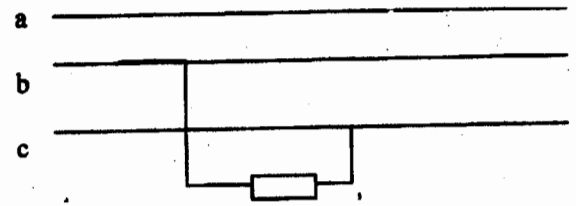
(B) A 500 MVA, 20 kV, 3Φ generator has sub transient reactance of 10%. The generator supplies 2 synchronous motors through a transmission line having transformers at both ends as shown in fig. In this, T1 is a 3Φ transformer 250 MVA, 20/230 kV, 15% reactance & T2 is made of 3 single phase transformer of rating 500 MVA, 13.2/127 kV, 20% reactance. Series reactance of the transmission line is 100Ω. The ratings of 2 motors are: M1=150 MVA, 13.2 kV, 15% & M2=200 MVA, 13.2 kV, 20%. Draw the reactance diagram with all the reactance's marked in p.u. Select the generator rating as base values (fig. on next page.)



(C) What are current limiting reactors? Discuss their locational aspects and advantages.

(D) The line to ground voltage on the high voltage side of a transformer are Va 100kv, Vb = 30 kv and Vc = 38kv on phase a,b,c .voltage of phase a leads phase b by 100° and lags that of phase c by 176.5° ,determine the symmetrical components of V_a

(E) A single phase load of 100 KVA connected across line b-c of three phase 3.3 kv .Determine the symmetrical component of current.



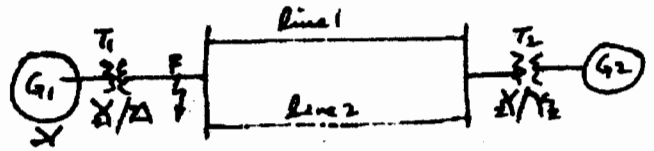
(F) Explain the symmetrical component and why it is used in power system.

2 Attempt any two parts of the following: **10×2=20**

(A) Show that zero sequence impedance of a generator with neutral grounded a impedance Zn is (Zs + 3Zn) , where Zs is the impedance of synchronous generator. An 11 kv, 25 MVA generator have positive ,negative and zero sequence impedance of 0.12, 0.12 and 0.08 per unit resp. The generator is grounded through a impedance of 0.03 per unit.. Determine the fault current of a single line to ground fault occurs at generator terminal. Also calculate line to line fault voltage. Assume generator was unloaded before fault.

(B) Derive and explain the algorithm of Z_{bus} formation by singular transform method .

(C) Determine the fault current in case of L-L-G fault when fault occurs at point shown in figure. Both the generator are generating power at 1.0 p.u. voltage. reactance on same base are given in the table.



	x_0	x_1	x_2
G_1	0.05	0.30	0.20
G_2	0.03	0.25	0.15
$Line1$	0.70	0.30	0.30
$Line2$	0.70	0.30	0.30
T_1	0.12	0.12	0.12
T_2	0.10	0.10	0.10

3 Attempt any two parts of the following: (10*2=20)

(A) Explain the computational procedure for load flow solution using Newton Raphson iterative method when the system contains all types of buses.

(B) Discuss the load flow equations and also formulate the equations using Gauss seidal method.

(C) What is the purpose of Load flow study? Also classify the buses for the same and compare the different load flow techniques.

4 Attempt any two parts of the following: **10×2=20**

(A) Discuss point by point method for solving swing equation for transient stability analysis of power system. Also explain the method of improving transient stability.

(B) A 150 MVA generator –transformer unit having an overall reactance of 0.3 p.u. is delivering 150 MW to infinite bus bar over a double circuit 220 kV line having reactance per phase per circuit of 100 ohms. A 3 phase fault occurs midway along one of the transmission lines. Calculate the maximum angle of swing that the generator may achieve the fault is cleared without loss of stability.

(C) For the system shown in figure the numerical values of different components are X'd= 0.2 p.u. and X1=X2= 0:4 p.u. Initially the generator was delivering the power of 1.5 p.u. If one of the double circuit lines is tripped off, determine whether the system will remain stable or not. If stability is maintained, determine the maximum angle of swing attained by generator.

5 Attempt any two parts of the following: **10×2=20**

(A) Starting from the first principles show that the surge behaves as travelling wave.

(B) Discuss the behaviour of travelling waves when it reaches (i) Open circuited (ii) Short circuited transmission line and (iii) when line is terminating with a impedance equal to surge impedance (Z_0).

(C) Discuss the reflection and refraction of travelling wave drawing the Bewely's lattice diagram. Take a suitable example of explanation.

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