

1059  
B.E. (Electrical and Electronics Engineering)  
Sixth Semester  
EE-601: Computer Aided Power System Analysis

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

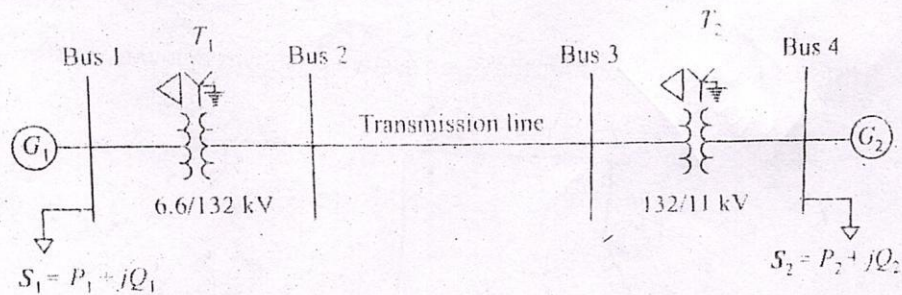
x-x-x

1. (a) What is the need of symmetrical components?
- (b) Draw positive, negative and zero sequence networks of Y-delta transformer and vice versa.
- (c) Why transient stability limit is less than steady state stability?
- (d) What information is contained in jacobian matrix of  $n$  PV buses and  $p$  number of PQ buses in NR method of load flow analysis?
- (e) What is the role of supplementary control in LFC? How it is implemented?

(5\*2=10)

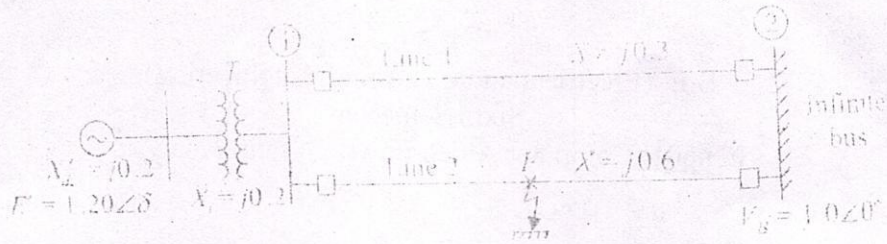
**PART - A**

2. (a) Draw block diagram of an automatic generation control in an interconnected power systems with primary speed control only.
- (b) Draw per unit single line diagram of the system given below.  
 $G_1$ : 20 MVA, 6.6 kV,  $X_{G1}=0.10$  p.u  
 $G_2$ : 25 MVA, 11 kV,  $X_{G2}=0.20$  p.u  
 $Z$  of transmission line- $(30+j120)$  ohm  
 $S_1=10$  MVA at 0.85 lagging  
 $S_2=25$  MVA at 0.95 leading  
 $XT_1=0.6$  pu;  $XT_2=0.8$  pu



(5,5)

3. (a) A three phase, 50 Hz synchronous generator is delivering 0.9 pu real power to an infinite bus via the transmission circuit as shown in Fig below. All the values are in per unit on a common base. A temporary three phase fault occurs in the middle of line. 2. Determine the rotor angle position before the fault occurs. Also compute the critical clearing angle if the fault is cleared by opening the faulted line. Assume  $H=4.5$  MJ/MVA.



(b) What is the importance of swing equation in stability analysis? State the assumptions made in stability studies. Derive an expression for swing equation.

(5,5)

4. The series impedance and shunt admittance of each line are  $0.026+j0.11$  per unit and  $j0.04$  pu respectively. The bus specifications and power inputs are as given below:

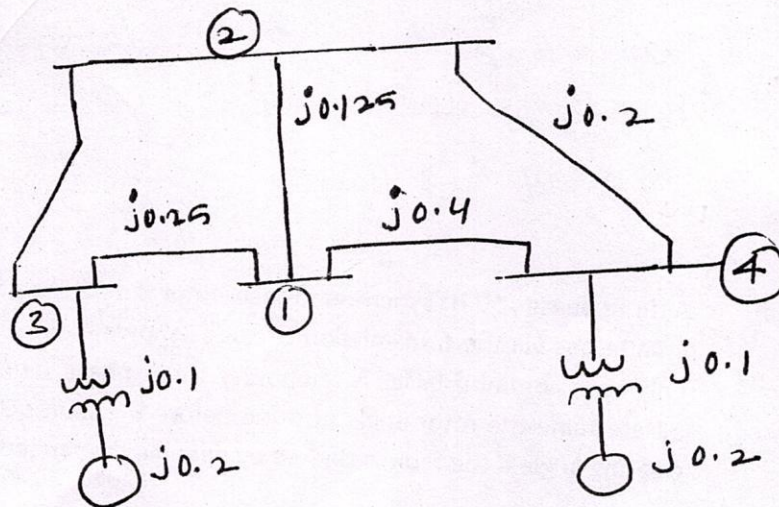
Bus	PG	QG	PD	QD	Bus Voltage
1	Unspecified	Unspecified	1.0	0.5	$1.03+j0$
2	1.5	Unspecified	0	0	1.03
3	0	0	1.2	0.5	Unspecified

For bus 2, the minimum and maximum reactive power limits are 0 and 0.8 pu. Find  $P_2, Q_2, P_3, Q_3$  for second iteration using NR method.

(10)

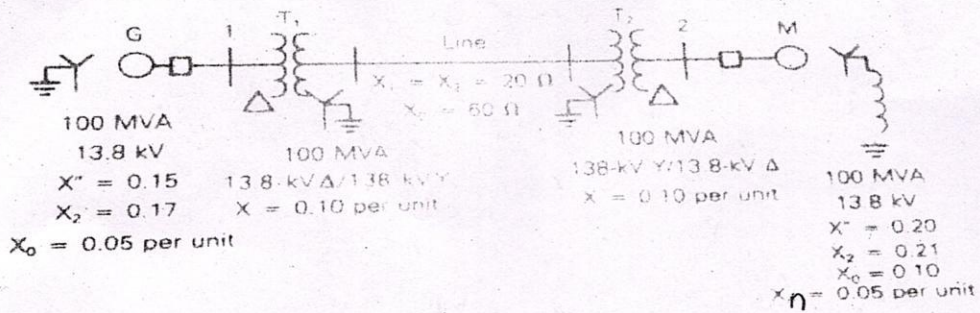
PART-B

5. (a) Derive an expression for fault current in L-L-G and draw the sequence networks for the same.  
 (b) Formulate  $Z_{bus}$  for the given system as shown below using step-step algorithm.



(5,5)

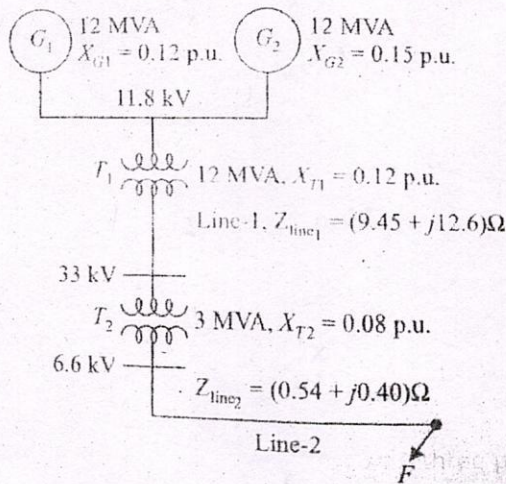
6. A single line diagram of a power system as below given below.



Draw the per unit zero, negative and positive sequence networks on a 100 MVA, 13.8 kV base in the zone of generator. The prefault voltage is 1.05 per unit. There is fault at buses 1 and 2 respectively. Determine the subtransient fault current in per unit for a bolted single line to ground from phase a to ground at bus 1 and single line to ground from phase a to ground at bus 2 with fault impedance of 0.3 ohms. Find the per unit line-ground voltages at bus 1 and 2 during these faults.

(10)

7. A radial power system network is shown in Fig below. A three phase balanced fault occurs at F. Determine the fault current and the line voltage at 11.8 Kv bus under the fault condition.



(10)

X-X-X

