Exam. Code: 0936
Sub. Code: 6674

2023

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. I which is compulsory and selecting two questions from each Part.

x-x-x

1. (a) Draw sequence networks for $Y_{\overline{=}} | Y_{\overline{=}}$, $Y | \Delta$, $\Delta | Y_{\overline{=}}$, $\Delta | \Delta$.

   (b) How per unit system helps in solving three phase network major issues.

   (c) What will be the size of Zbus matrix for a n-bus system?

   (d) How is regulating transformer considered in Ybus matrix?

   (e) Which is the most severe fault when neutral is not grounded?

(5 *2=10)

PART-A

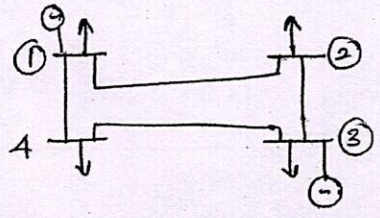
2. (a) The line-line voltages are as tabulated below.

Line voltage (V)	Magnitude(V)	Angle in degree
Vab	500	37
Vbc	800	125
Vca	1000	90

A star connected load with a resistance of 35 ohm per phase is connected to supply. Determine symmetrical components of voltage, phase voltages and line currents.

(b) For the given network, apply Newton Raphson Method to find voltages at all buses and line flows for given lines.

Base values are 100 MVA and 66 KV.



Line	Length (km)	R(n)	X(N)	Charging MUAR
1-2	50	6	10	4
2-3	46	5	24	3
1-4	50	4	40	4
3-4	100	7	30	5

Bus	P_G	Q_G	P_L	Q_L	V(P.U.)
1	-	-	60	40	$1.02 \angle 0^0$
2	0	0	110	30	$1.00 \angle 0^0$
3	180	-	70	40	$1.01 \angle 0^0$
4	0	0	85	30	$1.0 \angle 0^0$

All PG, QG, PL, QL are in MW and MUAR respectively. (5,5)

P.T.O.

3. (a) Derive an expression for swing equation. Apply equal area criterion method to a machine connected to infinite bus when there is sudden change in mechanical input.

(b) A 50 Hz synchronous generator capable of supplying 400 MW of power is connected to a large power system and its delivering 80 MW when a three phase fault occurs at its terminals, determine (a) the time in which fault must be cleared if maximum power angle is to be 85^{0}, assume H=7MJ/MVA on abase 100 MVA base and critical clearing angle.

(4,6)

4. (a) What is AGC? How load frequency control is done in two area-system?

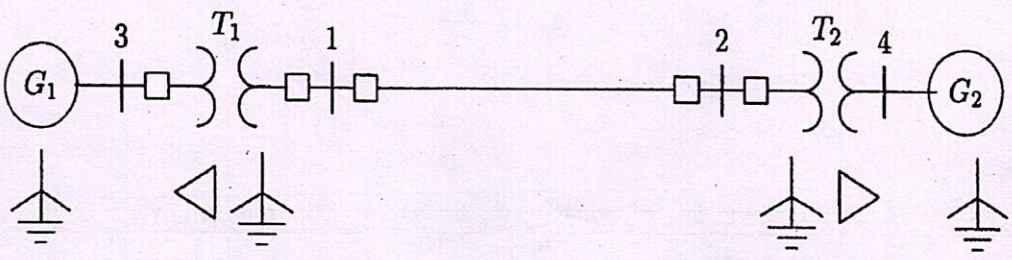
(b) Two generating units rated at 300 MW and 400 MW have governor speed regulation of 8 and 7% respectively from no load to full load respectively. They are working in parallel and share load of 550 MW. Assuming free governor action, determine the load shared by each unit.

(4,6)

PART-B

5 Compute per unit fault current using Thevenin Theorem when a three phase bolted fault occurs at bus 1.

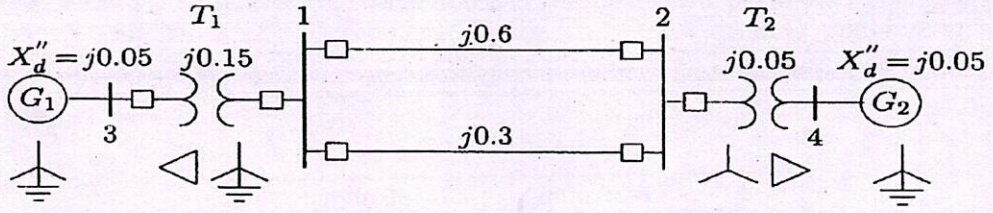
	X+	X-	X0
G1	0.10	0.10	0.05
G2	0.10	0.10	0.05
T1	0.25	0.25	0.25
T2	0.25	0.25	0.25
Line 1-2	0.30	0.30	0.50



(10)

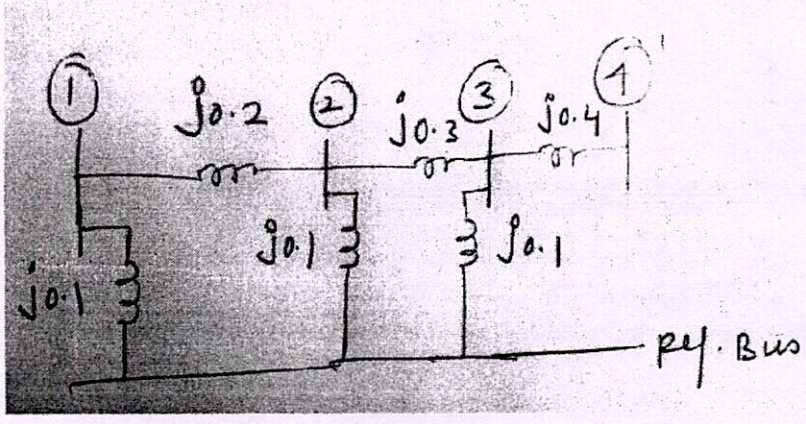
6(a) Derive an expression for L-L bolted fault and draw sequence networks for the same.

(b) The positive sequence reactance is as given below are in per unit on a common MVA base. Negative sequence impedance is same as positive. A L-L fault occurs between phase b and c through an impedance 4 ohm. Obtain positive sequence bus impedance. Find fault current, three phase voltage during fault and line currents in each phase.

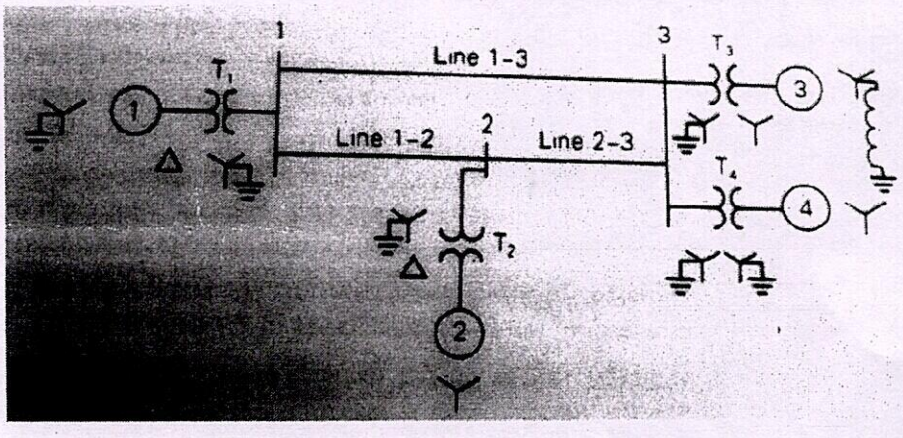


(4,6)

7 (a) Formulate Zbus matrix for given network using step-by-step algorithm



(b) The single line diagram of a three phase power system is as shown in Fig given below. The inductor to generator 3 neutral has reactance of 0.05 per unit using generator 3 ratings as a base. Draw zero, positive and negative sequence reactance diagrams using 1000 MVA, 765 kV base in the zone of line 1-2.



(4)

Item	Voltage (kV)	$X_d''=X2$	X_0
G1	15	0.18	0.07
G2	15	0.20	0.10
G3	13.8	0.15	0.05
G4	13.8	0.30	0.10

T1	1000 MVA	15/765 kV	X=0.10 p.u
T2	1000 MVA	15/765 kV	X=0.10 p.u
T3	500 MVA	15/765 kV	X=0.12 p.u
T4	750 MVA	15/765 kV	X=0.11 p.u

1-2	X1=50 ohm	X0=150 ohm
1-3	X1=40 ohm	X0=100 ohm
2-3	X1=40 ohm	X0=100 ohm

(5,5)

x-x-x