Register No : _____

QP Code :

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E. DEGREE END SEMESTER THEORY EXAMINATIONS, APR/MAY 2026

Fifth Semester

Electrical and Electronics Engineering

EE3501 – POWER SYSTEM ANALYSIS

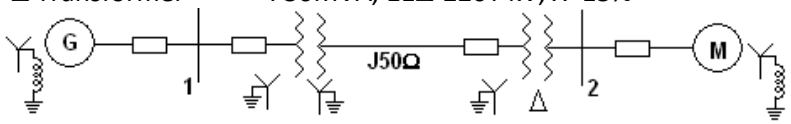
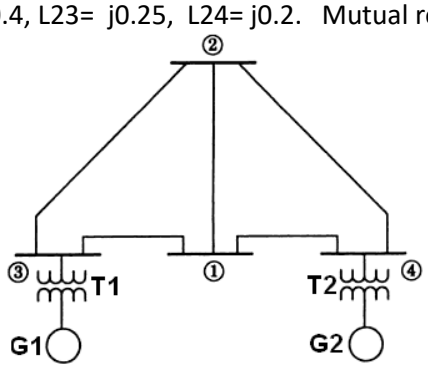
Regulations – 2021

Duration : 3 Hrs ***Maximum : 100 Marks***

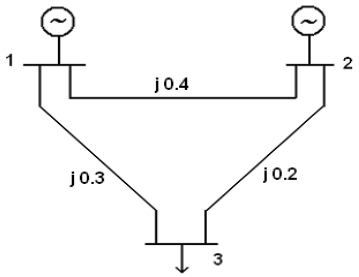
PART – A(ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	Questions	BTL	CO	Marks
1.	Define per unit value.	L1	1	2
2.	The reactance of generator is given as 20% based on its name plate rating of 20kV, 500MVA. What is the value of the reactance in ohms?	L2	1	2
3.	When the generator bus is treated as load bus in load flow studies?	L2	2	2
4.	Compare Gauss-Seidel and Newton-Raphson methods of loads flow solutions.	L2	2	2
5.	Define short circuit capacity.	L1	3	2
6.	What is meant by fault level?	L1	3	2
7.	Draw the zero sequence network of a delta-delta connected transformer.	L1	4	2
8.	Name the fault in which positive and negative sequence component currents together is equal to zero sequence current in magnitude.	L1	4	2
9.	State equal area criterion.	L1	5	2
10.	How transient stability of power system can be improved?	L2	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No			Questions	BLT	CO	Marks
11.	a	i	Draw the per unit impedance diagram for the system shown. Use a base of 100MVA, 220kV in 50 ohm line. The ratings are: Generator : 40MVA, 25kV, X"=20% Motor : 50MVA, 11kV, X"=30% Y-Y Transformer : 40MVA, 33Y-220Y kV, X=15% Y- Δ Transformer : 30MVA, 11Δ-220Y kV, X=15% 	L4	1	16
			Or			
	b	i	Obtain bus admittance matrix using singular transformation method. The reactance of the components is given in pu. G1= j1.15, G2= j1.15, T1= j0.1, T2= j0.1, L12= j0.125, L13= j0.25, L14= j0.4, L23= j0.25, L24= j0.2. Mutual reactance between L13 and L23 is j0.15. 	L4	1	16

12.	a	i	Carry out one iteration of load flow solution by Gauss-Seidel method.	L3	2	16



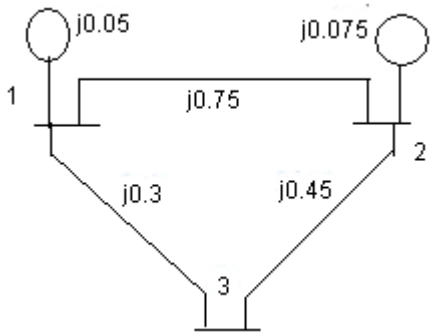
Bus 1: Slack bus, V= 1.05 $\angle 0$ 0 p.u
Bus 2: PV bus, V=1.0 p.u, PG = 3 p.u
Bus 3: PQ bus, PL=4 p.u, QL= 2 p.u
Neglect limits on reactive power generation.

Or

	b	i	With a neat flow chart and algorithm, explain the Newton Raphson method of solving load flow studies.	L3	2	16
13.	a	i	A synchronous generator and motor are rated 30MVA, 13.2kV and both have sub transient reactance of 20%. The line connecting them has reactance of 10% on the base of machine ratings. The motor is drawing 20,000KW at 0.8 pf leading and terminal voltage of 12.8 kV when a symmetrical 3 phase fault occurs at the motor terminals. Find the sub-transient current in the generator, motor and fault point.	L3	3	16

Or

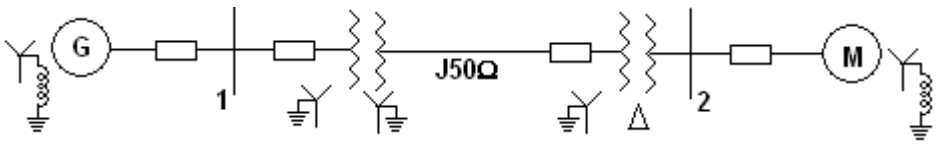
	b	i	The single line diagram of a simple three bus power system is shown. Each generator is represented by an emf behind the subtransient reactance .All the impedances are expressed in pu on a common MVA base. The generators are operating on no load at their rated voltage with their emfs in phase. A three phase fault occurs at bus 3 through a fault impedance of Zf = j0.19 pu. Obtain the fault current at the fault point.	L3	3	16



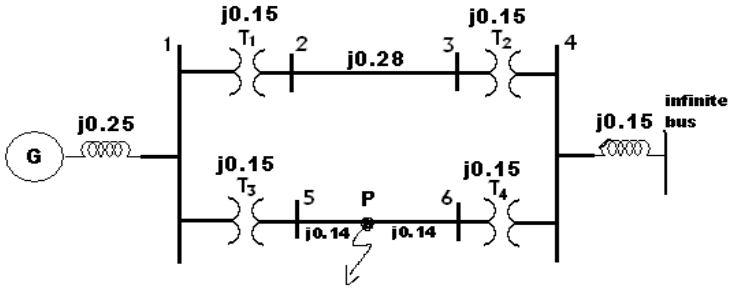
14.	a	i	Derive the expression for fault current for a line to line fault through a fault impedance in the terminals of a synchronous machine	L3	4	16

Or

	b	i	Draw the positive, negative and zero sequence networks for the system shown in the figure below. Assume zero sequence reactance for the generator and synchronous motor as 0.06pu.Current limiting reactors of 2.5 Ω are connected in the neutral of the generator and motor .The zero sequence reactance of the transmission line is j300 Ω. The ratings are as follows. Generator: 25MVA, 11kV, X"=10% Motor: 15MVA, 10kV, X"=25% Y-Y Transformer: 30MVA, 10.8Y / 121Y kV, X=10% Y- Δ Transformer: 30MVA, 10.8Δ / 121Y kV, X=10%	L3	4	16



15. a i Find the critical clearing angle for a three phase fault at the point P. The generator is delivering 1.0pu power under prefault conditions. Assume the magnitude of the internal voltage of the generator to be 1.2pu and the infinite bus voltage to be 1.0pu. L3 5 16



Or

b i With a neat flowchart, explain how the transient stability study can be done by modified Euler's method. L3 5 16