Reg. No.												

Question Paper Code	11867

13 JUN 2023

B.E. DEGREE EXAMINATIONS, APRIL / MAY 2023

Fifth Semester

Electrical and Electronics Engineering

20EEPC501 – POWER SYSTEM ANALYSIS

(Regulations 2020)

Duration: 3 Hours Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	What is one line diagram?	*2,K1,CO1*
2.	Define per unit value.	*2,K1,CO1*
3.	What is the need for slack bus?	*2,K1,CO2*
4.	Compare the Gauss Seidel and Newton Raphson methods of load flow study.	*2,K2,CO2*
5.	List the classification of faults.	*2,K1,CO3*
6.	What is meant by doubling effect?	*2,K1,CO3*
7.	What are symmetrical components?	*2,K1,CO4*
8.	Illustrate zero sequence networks for a Δ-Δ transformer.	*2,K2,CO4*
9.	What is small signal stability and how it is analyzed?	*2,K1,CO5*
10.	List the causes of voltage instability.	*2,K1,CO5*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Form the Y BUS by using singular transformation for the network shown in Figure 1 including the generator buses. *13,K3,CO1*

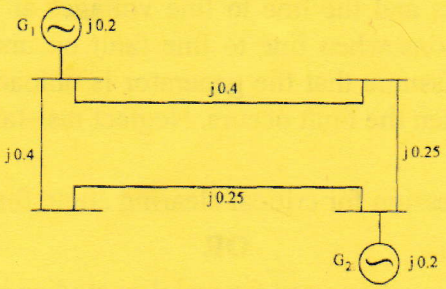

Figure 1

OR

b) Draw the reactance diagram using a base of 50 MVA and 13.8 kV on generator G_1 for the diagram given below Figure 2. *13,K3,CO1*

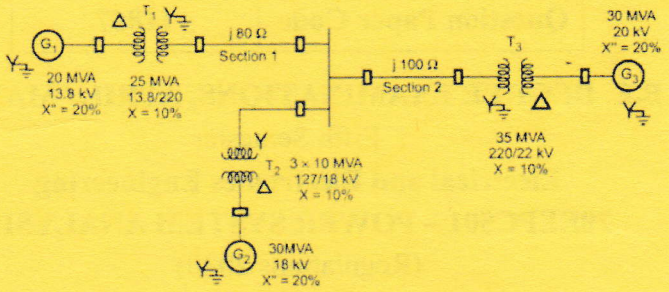

Figure 2

12. a) Explain the types of buses and derive the power flow equations in load flow analysis. *13,K2,CO21*

OR

b) With a neat flow chart explain the computational procedure for load flow solution using gauss seidal method when the system contains all types of buses. *13,K2,CO2*

13. a) Explain the steps involved in bus impedance matrix building algorithm to build bus Impedance matrix. *13,K2,CO3*

OR

b) Explain short circuit computation using Thevenin's theorem. *13,K2,CO3*

14. a) Develop the expression for fault current in single line to ground fault on unloaded generator. Draw an equivalent network showing the inter connection of networks to simulate single line to ground fault. *13,K3,CO4*

OR

b) A salient pole generator without dampers is rated 20 MVA, 13.8 kV and has direct axis sub – transient reactance of 0.25 per unit. The negative and zero sequence reactances are, respectively, 0.35 and 0.1 per unit. The neutral of the generator is solidly grounded. Find the sub-transient currents and the line to line voltages at the fault under sub-transient conditions when line to line fault occurs at the terminals of the generator. Assume that the generator is unloaded and operation at rated voltage when the fault occurs. Neglect resistance. *13,K3,CO4*

15. a) Derive the Expression for critical clearing angle for SMIB line. *13,K3,CO5*

OR

b) Examine swing equation used for stability studies in power system. *13,K3,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) For the network shown in Figure 3 form the bus admittance matrix. Determine the reduced admittance by eliminating node 4. The values are marked in p.u. *15,K3,CO1*

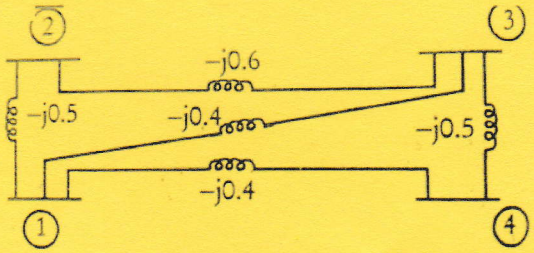

Figure 3

OR

b) The following is the system data for a load flow solution. Determine the voltages at the end of first iteration using Gauss-Seidel method. Take α=1.6. *15,K3,CO2*

The line admittances:

Bus code	*Admittance*
1-2	2-j8.0
1-3	1-j4.0
2-3	0.666-j2.664
2-4	1-j4.0
3-4	2-j8.0

The schedule of active and reactive powers:

Bus code	*P in p.u*	*Q in p.u*	*V in p.u*	*Bus Type*
1	-	-	1.06	Slack
2	0.5	0.2	1+j0.0	PQ
3	0.4	0.3	1+j0.0	PQ
4	0.3	0.1	1+j0.0	PQ