Course Code: 23EE6T12

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE

(AUTONOMOUS)

III - B.TechII-Semester Regular Examinations (BR23), MAY - 2026

POWER SYSTEM ANALYSIS

(EEE)

Time: 3 hours Max. Marks: 70

Question Paper consists of Part-A and Part-B

*Answer **ALL** the question in **Part-A and Part-B***

PART–A (10X2 = 20M)

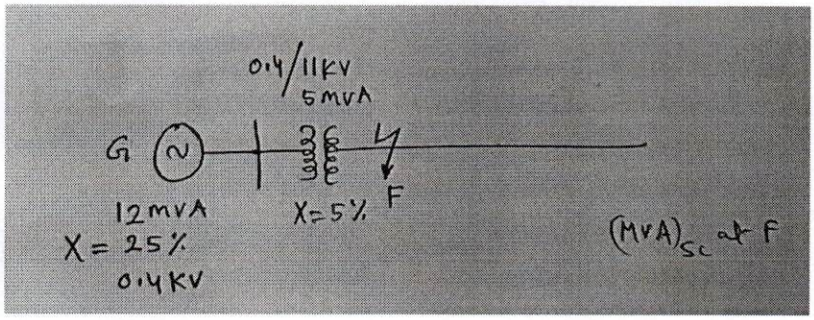
		Marks	CO	BL
1. a)	Define the terms basic cut set	(2M)	CO1	L1
b)	What are the two methods for forming the Ybus matrix?	(2M)	CO1	L1
c)	Define power flow studies and their necessity.	(2M)	CO2	L1
d)	List the different types of buses used in load flow analysis.	(2M)	CO2	L1
e)	What is a three-phase short circuit?.	(2M)	CO3	L1
f)	State the difference between Ybus and Zbus matrices.	(2M)	CO3	L2
g)	Mention the significance of Zero sequence components.	(2M)	CO4	L1
h)	Justify the need for symmetrical component analysis in unbalanced fault conditions.	(2M)	CO4	L5
i)	Define steady state stability.	(2M)	CO5	L1
j)	What is critical clearing time?	(2M)	CO5	L1

PART–B (5X10 = 50M)

2a.	Explain the Bus Incidence matrix with examples.	5(M)	CO1	L2
b.	Explain the concept of per unit representation in power systems.	5(M)	CO1	L2
	(OR)			
3.	A 3-bus system has line impedances: Bus 1 to Bus 2: Z_{12}=j0.2pu Bus 2 to Bus 3: Z_{23}=j0.25 pu Bus 1 to Bus 3: Z_{13}=j0.1pu Y bus Formation Using Singular Transformation Method and Using the Direct Method.	10(M)	CO1	L3
4a.	Explain Gauss-Seidel method of load flow solution with flow chart.	5(M)	CO2	L2
b.	Explain the Algorithm for N-R method in rectangular coordinates.	5(M)	CO2	L2
	(OR)			
5.	Perform one iteration of the Gauss-Seidel method for a 3-bus system with the following data: • Bus 1 (Slack Bus): V1=1.05∠0∘pu • Bus 2 (PQ Bus): P2=−1.0 pu, Q2=−0.5 pu, • Bus 3 (PQ Bus): P3=−0.8pu, Q3=−0.4 pu, • Ybus Matrix:	10(M)	CO2	L3

$$Y_{\text{bus}} = \begin{bmatrix} j10 & -j5 & -j5 \\ -j5 & j8 & -j3 \\ -j5 & -j3 & j8 \end{bmatrix}$$

6a.	What are the advantages and disadvantages of Z_{Bus} building algorithm?	5(M)	CO3	L2
b.	Calculate short circuit MVA for a given power system network.	5(M)	CO3	L2



(OR)

7.	A power system consists of three buses with the initial Zbus matrix:	10(M)	CO3	L3

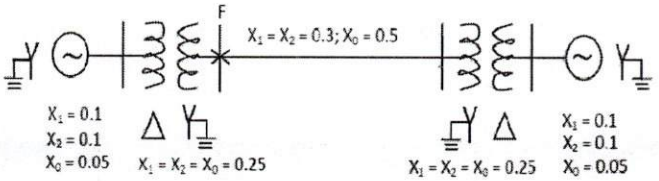
$$Z_{\text{bus}} = \begin{bmatrix} j0.3 & j0.1 & j0.05 \\ j0.1 & j0.25 & j0.08 \\ j0.05 & j0.08 & j0.2 \end{bmatrix}$$

A new branch is added between Bus 2 and Bus 3 with impedance j0.1 pu.Using the Zbus modification algorithm, determine the updated Zbus matrix.

8.	Derive an expression for the fault current for 3-phase fault with X_n and X_f.	10(M)	CO4	L4

(OR)

9.	A LG fault occurs at point F on the system shown in figure below. Find fault current.	10(M)	CO4	L3



10.	Derive the swing equation for a machine connected to an infinite bus in a power system network.	10(M)	CO5	L4

(OR)

11.	What is equal area criterion? Discuss its application and limitation in the study of power stability.	10(M)	CO5	L2

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