Course Code: **23EE6T12**

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE

(AUTONOMOUS)

III-B.Tech II-Semester Regular Examinations (BR23), April/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-AandPart-B***

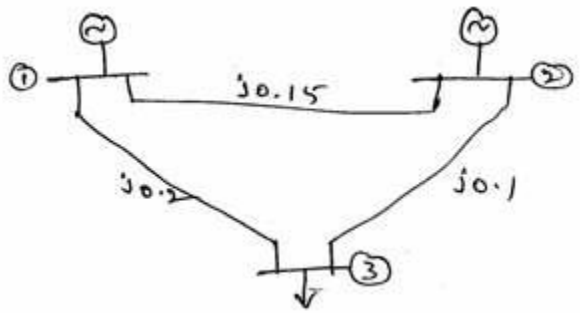
PART–A (10X2 = 20M)

		Marks	CO	BL
1. a)	Define the node incidence matrix	(2M)	CO1	BL1
b)	What is meant by primitive network representation?	(2M)	CO1	BL1
c)	What are the necessities of power flow studies?	(2M)	CO2	BL1
d)	What are the merits of Newton Raphson method?	(2M)	CO2	BL1
e)	What are the methods used for forming the Zbus matrix?	(2M)	CO3	BL1
f)	What are the four ways of adding impedance to an existing system so as to modify Zbus matrix?	(2M)	CO3	BL1
g)	Write the definition of symmetrical components.	(2M)	CO4	BL1
h)	Give examples of symmetrical and unsymmetrical faults.	(2M)	CO4	BL2
i)	What are the causes for large disturbances in the power system?	(2M)	CO5	BL1
j)	What are the methods considered for improving steady state stability?	(2M)	CO5	BL1

PART–B (5X10 = 50M)

2a.	What are the advantages of the per unit system for analysis of power system.	5(M)	CO1	BL2
b.	Derive the bus admittance matrix by singular transformation.	5(M)	CO1	BL3
	(OR)			
3.	A 100 MVA, 13 kV, three phase generator has a subtransient reactance of 12%. The generator supplies two synchronous motors through a 75 km transmission line having transformers at both ends. In this, first transformer is a three phase, 100 MVA, 13/220 kV, 10% reactance and second one is made of three single phase transformers of rating 100 MVA, 127/10.5 kV, 10% reactance. Synchronous motors ratings are 75 MVA and 25 MVA and both operating at 10.5 kV with 18% subtransient reactance. Series reactance of transmission line is 0.25 ohm/km. Develop the single line diagram with all the are marked in p.u.	10(M)	CO1	BL3

4a.	How the buses are classified in power system? Discuss the significance of slack bus in power systems.	5(M)	CO2	BL1
b.	Derive the expressions of static power flow equations.	5(M)	CO2	BL3
	(OR)			

5.	Determine the load flows at the end of first iteration by using fast decoupled load flow method for the following data. Bus 1 : Slack bus, $V_{spec} = 1.04 \angle 0^0$ p.u Bus 2 : P V bus, V_{spec} = 1.0 p.u, P_{G2} = 2.5 p.u Bus 3 : PQ bus, P_{D3} = 3.2 p.u, Q_{D3} = 2.1 p u 	10(M)	CO2	BL4

6a.	What do you understand by a short circuit? Discuss the possible causes of short circuit in the power system.	5(M)	CO3	BL1
b.	Explain the selection of reactors for reducing the fault current in the power system.	5(M)	CO3	BL5
	(OR)			
7.	Determine the Z_{Bus} using building algorithm for a power system whose element data is given in the following table:	10(M)	CO3	BL4

Element No.	Connected between bus Nos.	Self reactance (p.u)
1	1-2	0.3
2	1-3	0.15
3	2-3	0.2
4	1-3	0.25

8a.	What are symmetrical components? Why are they used in power system fault analysis? Explain in details	5(M)	CO4	BL1
b.	Describe the positive, negative and zero sequence impedance diagrams of unloaded alternator.	5(M)	CO4	BL2
	(OR)			
9a.	Analyze the double line to ground fault and derive the expression for the abnormal current.	5(M)	CO4	BL4
b.	The phase currents in a three phase supply to an un balanced load are I_a=(12+j19) A, I_b=(10-j2) A, I_c=(-7-j8) A. The phase sequence is 'abc'. Find the sequence components of currents.	5(M)	CO4	BL1

10.	Illustrate the determination of transient stability by equal area criterion with three different conditions.	10(M)	CO5	BL4
	(OR)			
11a.	Explain the elementary concepts of steady state, dynamic and transient stabilities	5(M)	CO5	BL5

b.	A double circuit, 3-phase feeder connects a single generator to a large network. The power corresponding to the limit of steady state stability for each circuit is 120 MW. The line is transmitting 90 MW, where one of the circuits is suddenly switched out. Find with reference to appropriate diagram whether the generator is likely to remain in stable.	5(M)	CO5	BL1

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