Question Paper Code: R18A32EE01

R18

ANURAG Engineering College

(An Autonomous Institution)

III B.Tech II Semester Supplementary Examinations, December-2024

POWER SYSTEM ANALYSIS

(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours **Max. Marks: 75**

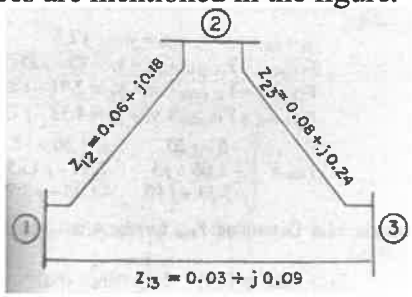
Section – A (Short Answer type questions) (25 Marks)

Answer All Questions		Course Outcome	B.T Level	Marks
1.	What is the difference between the inspection method and graph theoretic approach method for formation of Y_{bus}.	CO1	L2	2M
2.	Represent a network in impedance form and admittance form.	CO1	L2	3M
3.	Why Newton-Raphson (NR) method is superior to the Gauss-Seidel method?	CO2	L1	2M
4.	What are the three different types of buses in load flow studies?	CO2	L1	3M
5.	What are the advantages of per unit representations?	CO3	L1	2M
6.	If the resistance of the transmission line is 10Ω, find the per unit value of resistance. Given base KVA= 20 and base KV= 22.	CO3	L2	3M
7.	What is meant by an infinite bus? Draw single diagram for a synchronous machine connected to an infinite bus.	CO4	L2	2M
8.	What are three different types of stability limits in power system? How can the steady state stability limit be improved?	CO4	L2	3M
9.	Define equal area criterion.	CO5	L1	2M
10.	What is the use of swing equation? What are the different methods to solve swing equation?	CO5	L2	3M

Section B (Essay Questions)

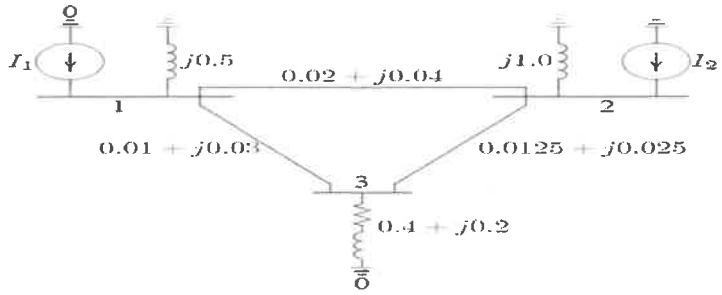
Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

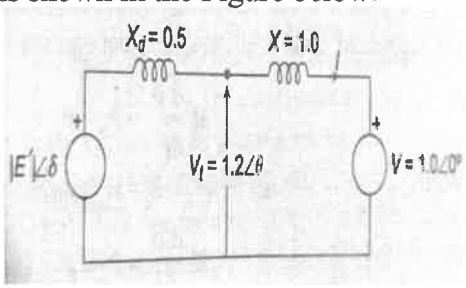
11. A) Find the bus admittance matrix for the three bus system shown below. The line impedances are mentioned in the figure. CO1 L3 10M



OR

B) Impedance diagram of a 3-bus system is given below. Find the bus admittance matrix. CO1 L3 10M



12. A)	Explain the computational procedure for load flow solution using Newton-Raphson method when the system contains all types of buses.	CO2	L3	10M
	OR			
B)	Using Gauss-Seidel method give a flow chart for a load flow study on a power system having only P-Q buses. What modification is made in the flow chart to account for PV buses?	CO2	L3	10M
13. A)	(i)Derive the relationship to determine the fault current for a line-to-line fault. (ii)The symmetrical components are $\mathbf{V_{a1} = 20 \angle 10^0\ V}$, $\mathbf{V_{a2} = 30 \angle 100^0\ V}$ **and** $\mathbf{V_{a0} = 5 \angle 180^0\ V}$. Determine the value of the phasor voltages V_a, V_b and V_c with respect to the neutral.	CO3	L3	5M+5M
	OR			
B)	An 11 kV, 25 MVA synchronous generator has positive, negative and zero sequence reactance of 0.12, 0.12 and 0.08 per unit, respectively. The generator neutral is grounded through a reactance of 0.03 per unit. A single line to ground fault occurs at the generator terminals. Determine the fault current and the line-to-line voltages. Assume that the generator was unloaded before the fault.	CO3	L3	10M
14. A)	Find the steady state power limit of a system consisting of a generator equivalent reactance 0.50 pu connected to an infinite bus through a series reactance of 1.0 pu. The terminal voltage of the generator is held at 1.20 pu and the voltage of the infinite bus is 1.0 pu. The system is shown in the Figure below:  	CO4	L3	10M
	OR			
B)	Derive the expression for active and reactive power delivered by a synchronous generator connected to an infinite bus and draw the power angle diagram. What is the condition for maximum steady state power transfer?	CO4	L3	10M
15. A)	Two large synchronous systems are interconnected by a transmission line over which there is a power transfer. State the "two-machine" simplifying assumptions and then derive the equal-area stability criterion. Show how this can be applied in case when there is a sudden change in load.	CO5	L3	10M
	OR			
B)	Define critical clearing time and critical clearing angle and how it is related to transient stability? Explain the methods to improve transient stability.	CO5	L3	10M