Question Paper Code: R18A32EE02

R18

ANURAG Engineering College

(An Autonomous Institution)

III B.Tech II Semester Regular/Supplementary Examinations, June/July-2024

POWER SYSTEM ANALYSIS

(ELECTRICAL AND ELECTRONICS ENGINEERING)

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

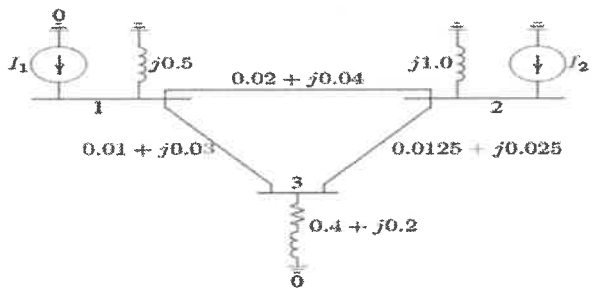
Section – A (Short Answer type questions) (25 Marks)

Answer All Questions	Course Outcome	B.T Level	Marks
1. What are the advantages of Y_{bus} over Z_{bus} ?	CO1	L1	2M
2. What is the difference between a linear graph, connected graph and oriented graph?	CO1	L2	3M
3. What is the significance of load flow analysis in a power system?	CO2	L1	2M
4. What is the difference between fast decouple method and Newton-Raphson method for load flow studies? When is fast decouple method used for load flow studies?	CO2	L2	3M
5. If the resistance of the transmission line is 5Ω, find the per unit value of resistance. Given base KVA= 10 and base KV= 11.	CO3	L2	2M
6. What are the different types of unsymmetrical faults in power system?	CO3	L1	3M
7. Define steady state stability limit for a power system.	CO4	L1	2M
8. Draw the power angle curve and write the expression for active power transferred from a synchronous machine to infinite bus and hence state the condition for maximum steady state power transfer.	CO4	L2	3M
9. What is meant by transient stability limit in a power system?	CO5	L1	2M
10. Define critical clearing angle and critical clearing time and how it is limited to transient stability?	CO5	L2	3M

Section B (Essay Questions)

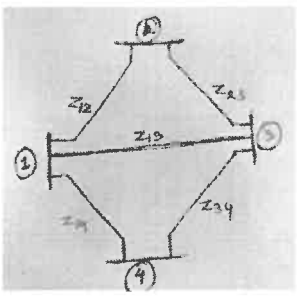
Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

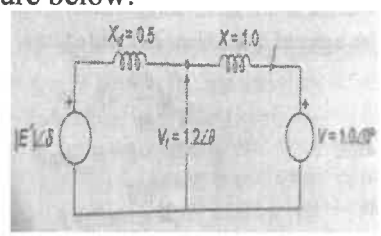
11. A)	Impedance diagram of a 3-bus system is given below. Find the bus admittance matrix.	CO1	L3	10M



OR

B)	Determine the bus admittance matrix for the 4-bus system in the figure shown below. The line series impedances are as follows: Z_{12}=(0.25+j1.0), Z_{13}=(0.20+j0.8), Z_{14}=(0.3+j1.2), Z_{23}=(0.2+j0.8), Z_{34}=(0.15+j0.6)	CO1	L3	10M



12. A)	Explain the computational procedure for load flow solution using Gauss-Seidel method when the system contains all types of buses.	CO2	L3	10M
	OR			
B)	Give a flow chart for load flow study using Newton-Raphson method. How does the method get modified to account for PV buses?	CO2	L3	10M
13. A)	A 20 MVA, 11 KV generator has $Z_1=Z_2=j0.25pu$, $Z_{og}=j0.05pu$ .A L-G fault occurred on the unloaded generator terminals. Find the fault current & line to line voltages during fault condition. Assume generator is grounded through a reactance of j0.1pu.	CO3	L3	10M
	OR			
B)	i) Derive the relationship to determine the fault current for a line-to-line fault.	CO3	L3	5M
	ii) The symmetrical components are $\mathbf{V_{a1} = 30 \angle 10^0\ V}$, $\mathbf{V_{a2} = 20 \angle 100^0\ V}$ **and** $\mathbf{V_{a0} = 10 \angle 190^0\ V}$. Determine the value of the phasor voltages V_a, V_b and V_c with respect to the neutral.			5M
14. A)	i) Derive the steady state stability limit of a synchronous machine connected to infinite bus.	CO4	L3	7M
	ii) How the steady state stability limit be improved?			3M
	OR			
B)	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
15. A)	What is the use of swing equation? Derive swing equation for synchronous machine connected to infinite bus.	CO5	L3	10M
	OR			
B)	Explain the equal area criterion and how it may be used to study the stability of a two machine system. List the factors determining the stability limit and indicate how it may be improved.	CO5	L3	10M