

ANURAG Engineering College
(An Autonomous Institution)

III B.Tech II Semester Supplementary Examinations, Dec-2023/Jan-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. Define: Oriented graph of a network.	CO1	L1	2M
2. The partial network has 'm' buses and a reference. A branch is added between a new bus and an existing bus, then what will be the size of modified Z_{Bus} .	CO1	L2	3M
3. Classify buses with known and unknown parameters.	CO2	L1	2M
4. Why the load flow studies are important for planning the existing system as well as the future expansion?	CO2	L2	3M
5. Distinguish between symmetrical and unsymmetrical short circuits.	CO3	L2	2M
6. How does the short circuit occur in power system and mention two objectives of short circuit analysis.	CO3	L2	3M
7. What is meant by Steady state stability power limit?	CO4	L1	2M
8. What is the systems design strategies aimed at lowering system reactance?	CO4	L2	3M
9. What are the assumptions made in solving swing equation?	CO5	L1	2M
10. List the types of disturbances that may occur in a single machine infinite bus bar system of the equal area criterion stability	CO5	L1	3M

Section B (Essay Questions)

Answer all questions, each question carries equal marks.

(5 x 10M = 50M)

11. The parameters of a 3-bus system are as under, Find the bus admittance matrix using direct inspection method.

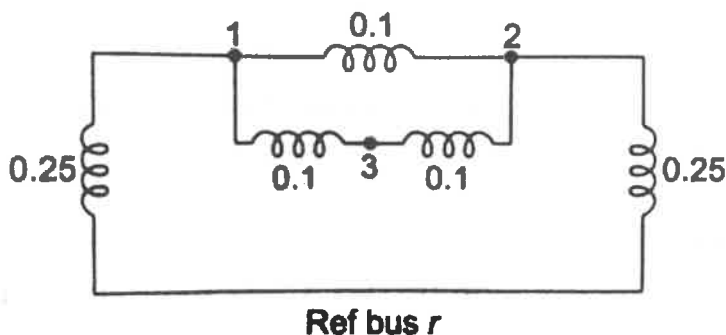
CO1 L3 10M

Bus Code	Impedance (pu)	Half-line Charging admittance (pu)
1-2	$0.06+j0.18$	$j0.005$
1-3	$0.02+j0.06$	$j0.006$
2-3	$0.04+j0.12$	$j0.005$

OR

- B) Obtain the Bus Impedance Matrix for the network shown in Figure (all impedances are in p.u.) using Z-bus building algorithm.

CO1 L3 10M



12. The load flow data for the sample power system is given below (all values are in per unit). The voltage magnitude at bus 2 is to be maintained at 1.04 p.u. The maximum and minimum reactive power limits of the generator at bus 2 are 0.35 and 0.0 p.u. respectively. Determine the voltage solution of the power system at the end of first iteration using Gauss-Seidel method.

CO2 L3 10M

Bus code	Impedance	Line charging admittance
1-2	$0.08 + j0.24$	0.0
1-3	$0.02 + j0.06$	0.0
2-3	$0.06 + j0.18$	0.0

Bus code	Assumed voltages	Generation		Load	
		P	Q	P	Q
1	$1.06 + j0.0$	0.0	0.0	0	0
2	$1.0 + j0.0$	0.2	0.0	0	0
3	$1.0 + j0.0$	0.0	0.0	0.6	0.25

OR

- B) Clearly explain the computational procedure for load flow solution using Newton-Raphson method, considering the generator reactive power limit.

CO2 L3 10M

13. Write short notes on short circuit current and MVA calculation for symmetrical fault analysis.

CO3 L3 10M

OR

- B) A 25 MVA, 13.2 kV alternator with solidly grounded neutral has a sub-transient reactance of 0.25 p.u. The negative and zero sequence reactances are 0.35 and 0.1 p.u. respectively. Determine the fault current and the line-to-line voltages at the fault when a double line-to-ground fault occurs at the terminals of an unloaded alternator. Neglect resistance.

CO3 L3 10M

14. Discuss the methods of improving steady state stability of the power system network.

CO4 L3 10M

OR

- B) With the help of Power-angle curve, explain how system stability can be studied?

CO4 L3 10M

15. Explain about determination of transient stability using equal area criterion.

CO5 L3 10M

OR

- B) Briefly describe the classical step by step solution of swing equation.

CO5 L3 10M