K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

InSem Examination-I Winter2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:I
Class:PG-I	Program:M.Tech
Branch Code:ELE	Pattern:2024
Name of Course:Computer-Aided Power System Analysis	Course Code:2406501
Max. Marks:30	Duration:1.15 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains ____02_page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Marks CO

Question No. 1

1 a) The load flow data of a four-bus system is given in Tables I and II. Taking bus 1 as slack bus determine the voltages of all buses at the end of first iteration starting with a flat voltage profile using Gauss-Seidel method. (7) CO2

Table I: Impedance and line charging admittances

Bus Code	Impedance	Line charging $y_{pq/2}$
1-2	0.02 + j0.08	0.0 + j0.040
1-3	0.06 + j0.24	0.0 + j0.030
2-3	0.04 + j0.16	0.0 + j0.025
2-4	0.04 + j0.16	0.0 + j0.025
3-4	0.01 + j0.04	0.0 + j0.015

Table II: Assumed bus voltages, generation and loads

Bus Code	Assumed voltages	Generation		Load	
		MW	MVAr	MW	MVAr

1	1.06 + j0.0	0.0	0.0	0.0	0.0
2	1.0 + j0.0	0.0	0.0	0.2	0.1
3	1.0 + j0.0	0.0	0.0	0.5	0.2
4	1.0 + j0.0	0.0	0.0	0.4	0.05

Question No. 2

2 a) Explain NR method for load flow study and write its algorithm. (8) CO4

OR

2 b) Explain the Gauss-Seidel method for power flow analysis. Derive the iterative equations and write the algorithm steps. (8) CO4

Question No. 3

3 a) A 3-phase, 11 kV, 20 MVA alternator has a positive sequence reactance of j0.8 p.u. and negative/zero sequence reactances of j0.3 p.u. and j0.1 p.u. respectively. The neutral of the alternator is solidly grounded. Calculate the fault current for a single Line-to-Ground (L-G) fault at its terminals. Assume pre-fault voltage is 1.0 p.u. (7) CO2

Question No. 4

4 a) Define positive, negative and zero sequence components in 3-phase systems. What is its significance in power short-circuit studies? (8) CO1

OR

4 b) Explain how sequence components are used in unbalanced fault analysis. Discuss the advantages of symmetrical component analysis. (8) CO1

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