K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2024	
Exam Seat No.:	
Academic Year:2024-2025	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:60	Duration:2.30 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			
1a)	Explain the flow chart for Gauss-Seidel method with PV buses.	(6)	CO1
Question No. 2			
2a)	An earth fault occurs on one conductor of a 3 conductor cable supplied by a 10MVA, 3 phase alternator has positive negative and zero sequence impedance of (0.5+j4.7) Ω, (0.2+j0.6) Ω and j0.43Ω per phase. The corresponding line to neutral values for the cable upto fault position are (0.36+j0.25) Ω,(0.36+j0.7) Ω and (2.5+j0.95)Ω per phase. Find fault currents and sequence components of currents. The generator is excited to give 6.6kV between lines on open circuit.	(6)	CO2
Question No. 3			
3a)	Explain the weighting factors in Weighted Least Squares (WLS) be optimized to reflect measurement uncertainty accurately.	(8)	CO3
3b)	Write the mathematical formulation for the Weighted Least Squares (WLS) method in state estimation.	(8)	CO4
	OR		
3c)	Explain the techniques can better handle non-linearities in state estimation for systems with high renewable penetration.	(8)	CO3
3d)	Write the steps involved in detecting and identifying bad data in a power system.	(8)	CO4
Question No. 4			
4a)	In a 100 MW thermal generating unit, the cost function is obtained as: $C(P_i)=300+75P_i+0.01P_i^2$ Rs/hr where P_i is the generator loading. Find (i) IFC when 100% loading is applied (ii) IFC when 50% loading is applied.	(8)	CO2

4b) Describe the condition of economic operation of thermal power plants considering transmission loss. (8) CO1

OR

4c) In a generating plant there are two turbo-generators which feed a load bus with following fuel cost characteristics: (8) CO2

$F_1(P_1) = 120 + 3P_1 + 0.075P_1^2$ Rs/hr

$F_2(P_2) = 100 + 2P_2 + 0.009P_2^2$ Rs/hr

(i) Find the economic schedule if total load is 160 MW. Assume no generator limits.

(ii) Repeat (i) with following generation limits considered:

Unit-1: Pmax = 100 MW, Pmin = 20 MW

Unit-2: Pmax = 100 MW, Pmin = 10 MW

4d) Describe the Lagrange multiplier method for solving optimal power flow problems with an example. (8) CO1

Question No. 5

5a) Describe the significance of sensitivity factors in calculating power system losses. Provide examples. (8) CO1

5b) Derive the transmission loss coefficients are used in optimal power flow (OPF) problems. Provide a practical scenario with numerical examples. (8) CO4

OR

5c) Discuss the concept of GSSD and its application in minimizing transmission losses. (8) CO1

5d) Derive the transmission loss formula in terms of generation and demand at different buses. (8) CO4

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