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:CIV	Pattern:2024
Name of Course: Numerical Methods	Course Code:2404501
Max. Marks:30	Duration:1 Hr. 15 Min.

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 1 page.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. The last columns indicates the Course Outcome of the Question/sub-question.

		Marks	CO
Question No. 1			
1 a)	Use the Newton–Raphson method to find the root of the equation f(x) = cos(x) − x starting from x0 = 0.5 determine the root up to 3 decimal places. Proceed to write the python code for finding the root of the equation.	(7)	1, 2
Question No. 2			
2 a)	Solve the following system by Gauss elimination method. x + 2y + 3z + 4w = 15 2x + y + z − w = 1 0x + y − z + 2w = 4 3x − y + 2z + w = 12	(8)	1, 2
	OR		
2 b)	Solve the system of equations using Gauss–Seidel method. 10x + 2y − z = 7 −x + 8y + 2z = −5 2x − y + 9z = 10	(8)	1, 2
Question No. 3			
3 a)	Use Euler's method to approximate y(1.0) for the initial value problem $\frac{dy}{dx} = x^2 - y$, y(0)=1 with step size h = 0.25.	(7)	1, 2
Question No. 4			
4 a)	Using Taylor series determine the value of y(0.2) for $\frac{dy}{dx} = x^2 + y^2$, y(0) = 1.	(8)	1, 2
	OR		
4 b)	Determine the value of y(0.4) using Runge-Kutta method for $\frac{dy}{dx} = xy, \quad given \quad y\left(0\right) = 1.$ Use step size h = 0.2.	(8)	1, 2

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