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

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

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:V
Class:TY	Program:B.Tech
Branch Code:MEC	Pattern:2023
Name of Course:Numerical and Statistical Methods	Course Code:2305303
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 03 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 of the Question/sub-question.

Marks CO

Question No. 1

1a) Apply Bi-Section Method to find root of equation.Do 3 iterations (6) CO1

$-0.9x^2 + 1.7x + 2.5 = 0$, Take initial guess x1 = 2.8 & x2 = 3.

Question No. 2

2a) Apply Rung- Kutta 2nd order method to solve $\frac{dy}{dx} = x + y$, (6) CO2

For the given boundary condition that at x= 0, y= 1.

Find y at x = 0.2. Take step size h= 0.1

Question No. 3

3a) Apply Simpson's 3/8th Rule to find integration of $x^3 - 3x^2 + 6x + 8$ (8) CO3

using three strips in the limit 0 to 1.5

OR

3b) Apply Simpson's 1/3rd Rule to find integration of (8) CO3

$(e^x - x^3 - 2x + 1)$ in the limits 1 to 4 by using six strips

3c) Apply Simpson's 3/8th Rule to find integration of $\frac{\sin x}{2 + 3 \sin x}$ (8) CO3

using six strips in the limit 0 to 1

OR

3d) Apply Simpson's $1/3^{rd}$ rule to find the integration of (e^x) in the limits 0 to 4 using four strips (8) CO3

Question No. 4

4a) Apply Karl Person's Method Compute karl Person's coefficient of correlation between X and Y for the following data (8) CO4

X	2	4	5	6	8	11
Y	18	12	10	8	7	5

OR

4b) Apply least square regression to fit a straight line y = ax +b to the data given below. Find values of constant a and b (8) CO4

x	0	2	4	6	8	12	20
y	10	12	18	22	20	30	30

4c) Apply Lagrange's Interpolation Using following values of x and y. Find the interpolating polynomial for the data. Find the value of y at x = 1.5 (8) CO4

x	1	3	4
y = f(x)	1	27	64

OR

4d) Apply Newton's Forward Difference formula Prepare Newton's Forward Difference table. Calculate f(1.5) (8) CO4

x	0	2	4	6	8
y	5	29	125	341	725

Question No. 5

5a) Apply Newton's Method to calculate the maximum value of the equation $(2 \sin x - 0.1 x^2)$ Take initial guess as 2.5 and do 3 iterations (8) CO5

OR

5b) Apply Simplex Method to calculate x_1 , x_2 and to Maximize profit (8) CO5

$Z = 6x_1 + 4x_2$ subjected to condition, $2x_1 + 3x_2 \leq 100$ and $4x_1 + 2x_2 \leq 120$ $x_1, x_2 \geq 0$

5c) Apply Graphical Method to Minimize Z = 2x + 3y subjected to condition, $2x + 4y \geq 80$ and $4x + 2y \geq 100$ $x,y \geq 0$ (8) CO5

OR

5d) Apply Simplex Method to calculate x_1 , x_2 and to Maximize profit (8) CO5

$Z = 1600x + 1500y$ subjected to condition, $5x + 4y \leq 500$ and $15x + 16y \leq 1800$, $x,y \geq 0$

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