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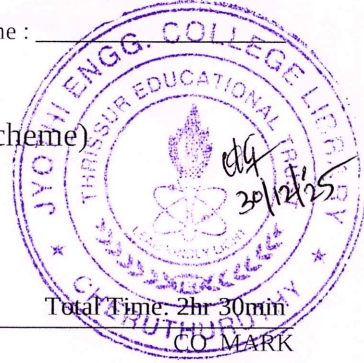
Name : _____



Jyothi Engineering College(Autonomous)

M.Tech Degree S1 (R) Examination, December 2025 (2025 Scheme)

25PIAT101- COMPUTATIONAL METHODS FOR ENGINEERS



Total Mark: 60

Total Time: 2hr 30min
CO-MARK**PART A**

Answer All Questions

- Find an approximation to the real root of $f(x) = x^3 - 2x - 5$ in the interval $[2, 3]$ using 5 bisection iterations. Show the interval after each iteration and the midpoint approximation. CO1 (5)
- Explain simple linear regression. Derive the expressions for the regression coefficients using the method of least squares. CO2 (5)
- Evaluate by Trapezoidal rule $\int_0^5 \frac{1}{4x+5} dx$ dividing the range into 10 equal parts. CO3 (5)
- Explain Taylor's series method for solving first-order ODEs. Mention its merits and demerits. CO4 (5)
- A curve passes through the points (0,18), (1,10), (3,-18) and (6,90). Find the slope of the curve at $x = 2$ using Lagrange's formula. CO5 (5)

PART B

Answer Any Five Question(s)

- Apply Gauss Jordan method to find the solution of the following systems.
 $x+y+z = 9$
 $2x-3y+4z = 13$
 $3x+4y+5z = 40$ CO1 (7)
- Fit a second degree polynomial of the form $y = a + bx + cx^2$ to the following data.

x	0	1	2	3	4	5
y	2.1	7.7	13.6	27.2	40.9	61.1

CO2 (7)

- Compute the value of $\int_{0.2}^{1.4} (\sin x - \log x + e^x) dx$ using Simpson's one third rule into 6 equal subintervals. CO3 (7)
- Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$ using forward interpolation from the following data.

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

CO3 (7)

- Given $\frac{dy}{dx} = x^3 + y$, $y(0) = 2$. Also $y(0.2) = 2.073$, $y(0.4) = 2.452$ and $y(0.6) = 3.023$. Find $y(0.8)$ by Milne's predictor -corrector method taking $h = 0.2$. CO4 (7)

11. Apply the Runge-Kutta method to find the approximate value of y for $x = 0.2$ in steps of 0.1, if $\frac{dy}{dx} = x + y^2$, $y = 1$ where $x = 0$. CO4 (7)
12. Solve $\nabla^2 u = 8x^2y^2$ for a square mesh given $u = 0$ in the 4 boundaries dividing the square into 16 sub-squares of length 1 unit. CO5 (7)
