

CRM08

Rev 1.11

BS

11/05/24

**CONTINUOUS INTERNAL EVALUATION - 1**

Dept: BS(MAT)	Sem / Div: II SEM/ CSA,CSB,AIML,CD	Sub: Mathematics II for CSE stream	S Code: BMATS201
Date: 15/05/24	Time: 9:30-11:00	Max Marks: 50	Elective: N

Note: Answer any 2 full questions, choosing one full question from each part.

QN		Questions	Marks	RBT	CO's										
PART A															
1	a	Using Newton-Raphson method, find the real root of $x \log_e x - \cos x$ near $x=1$ . Perform three iterations.	8	L2	CO4										
	b	Evaluate $\int_0^2 \frac{dx}{16+x^2}$ using Trapezoidal rule with six sub- intervals.	8	L2	CO4										
	c	<table border="1"><tr><td>x</td><td>0</td><td>1</td><td>3</td><td>4</td></tr><tr><td>y</td><td>-12</td><td>0</td><td>6</td><td>12</td></tr></table> Find the interpolating polynomial and hence estimate y at $x=2$ using Lagranges interpolation formula.	x	0	1	3	4	y	-12	0	6	12	9	L1	CO4
x	0	1	3	4											
y	-12	0	6	12											
OR															
2	a	Using Regular Falsi Method, Find the root of equation $x e^x = \cos x$ that lies in (0,1). Carry out 4 iterations	8	L2	CO4										
	b	A survey conducted in a slum reveals the following information as shown in the table. Estimate the number of persons in the income group of 20 to 25 using forward interpolation formula. <table border="1"><tr><td>Income /day(Rs)</td><td>Under 10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td></tr></table>	Income /day(Rs)	Under 10	10-20	20-30	30-40	40-50	8	L2	CO4				
Income /day(Rs)	Under 10	10-20	20-30	30-40	40-50										

	No: of persons.	20	45	115	210	115				1	de: BPV
c	Using Simpson's $1/3^{\text{rd}}$ rule, Evaluate $\int_0^1 e^{-x^2} dx$ on dividing the interval (0,1) into 10 equal sub-intervals						9	L2	CO4		

### PART B

3	a	Show that $\vec{F}$ is both Solenoidal and irrotational, given $\vec{F} = \frac{xi + yj}{x^2 + y^2}$	8	L2	CO2
	b	Find the directional derivative of $4xz^3 - 3x^2y^2z$ at (2,-1,2) along $2i-3j+6k$	8	L2	CO2
	c	Using Runge kutta method of fourth order, solve the equation $\frac{dy}{dx} = \frac{y-x}{y+x}$ , $y(0)=1$ at $x=0.1$ , $h=0.1$	9	L2	CO5

### OR

4	a	If $\vec{F} = \text{grad}(x^3 + y^3 + z^3 - 3xyz)$ then find $\text{div } \vec{F}$ and $\text{curl } \vec{F}$	8	L2	CO2
	b	Find the angle between the two surfaces $x^2 + y^2 - z^2 = 4$ and $x^2 + y^2 - z = 13$ at (2,1,2)	8	L2	CO2
	c	Using Modified Euler's Method, Solve $\frac{dy}{dx} = \sin x + \cos y$ , $y(2.5)=0$ at $x=3$ and $x=3.5$ in two steps. Perform two iterations in each step.	9	L2	CO5

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