U124-311 AIADS, U124-342 CSE AI, U124-391 EXTC, U124-3111 Mech, U124-321 civil

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PRN No.		PAPER CODE	

May 2024 (ENDSEM) EXAM
F.Y. B.TECH (SEMESTER - II)

Course Name: Calculus & Ordinary Differential Equations **Branch:** Common to all **Course Code:** BS10232

(PATTERN 2023)

Time: [1 Hr. 30 Min] **[Max. Marks: 40]**

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed.**
3) **Use suitable data wherever required.**
4) **All questions are compulsory. Solve any one sub question from Question 3 and any two sub questions each from Questions 4, 5 and 6 respectively.**

Q. No	Question Description	Max. Marks	CO mapped	BT Level
1	a) If $u = e^{\frac{y}{x}}$, find the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$	[2]	CO1	U
2	a) Find extreme values of $f(x, y) = 1 - x^2 - y^2$.	[2]	CO2	U
3	**Solve any one.** a) Find Fourier series of the following data up to first harmonic. x (in degrees): 0, 60, 120, 180, 240, 300, 360 y: 0.8, 0.6, 0.4, 0.7, 0.9, 1.1, 0.8	[6]	CO3	U
	b) Find Fourier series of the function $f(x) = \pi^2 - x^2$ where $0 \le x \le 2\pi$.	[6]	CO3	U
4	**Solve any two.** a) Evaluate $\int_0^1 \frac{1}{\sqrt{x \log\left(\frac{1}{x}\right)}}\, dx$.	[5]	CO4	U
	b) Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\cot\theta}\, d\theta \times \int_0^{\frac{\pi}{2}} \sqrt{\tan\theta}\, d\theta$.	[5]	CO4	U
	c) Trace the curve $y^2(x^2 - 1) = x$.	[5]	CO4	U

5	**Solve any two.**			
	a) Evaluate $\int_0^1 \int_y^{1+y^2} x^2 y \, dx \, dy.$	[5]	CO5	U
	b) Find area bounded by the parabola $y^2 = x$ and line $x = 4.$	[5]	CO5	U
	c) Evaluate $\int_0^1 \int_0^{1-x} \int_0^{x+y} e^x \, dx \, dy \, dz.$	[5]	CO5	U
6	**Solve any two.**			
	a) Solve: $\frac{dy}{dx} = \frac{1 + y^2 + 3x^2 y}{1 - 2xy - x^3}$	[5]	CO6	U
	b) Solve: $\frac{dy}{dx} - xy = y^2 e^{-\frac{x^2}{2}} \log x$	[5]	CO6	U
	c) Find an orthogonal trajectory of the family of curves given by $xy = c.$	[5]	CO6	U

Bloom's Taxonomy level abbreviations:

R- Remembering, U - Understanding, A - Applying