

Reg. No.:



Name:

University of Kerala

U8978

Second Semester FYUGP Degree Examination, April 2025

Discipline Specific Core Course

MATHEMATICS

UK2DSCMAT111 - Differential and Integral Calculus

Academic Level: 100-199

Time: 1 Hour 30 Minutes(90 Mins.)

Max. Marks: 42

Part A. 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark
Each.Answer all questions

Qn No.	Question	CL	CO
1	Find $\int \ln x \, dx$	RE	4
2	State the quotient rule of differentiation.	RE	1
3	Find the derivative of $f(x) = e^{2x}$.	UN	1
4	State True or false: "If a function f is differentiable at x_0 , then f is continuous at x_0 ."	UN	1
5	Evaluate $\int \frac{1}{6x-5} dx$	UN	3
6	If $f'(0) = 2$, $g(0) = 0$ and $g'(0) = 3$ then the value of $(f \circ g)'(0)$ is	UN	2

Part B.8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	Find the derivative of $y = \sin(\sin 2x)$	UN	1
8	Evaluate $\int \frac{\sec^2(\sqrt{x})}{\sqrt{x}} dx$.	UN	3
9	Find an equation for the tangent line to the curve $y = \sin(1 + x^3)$, at $x = -3$.	AP	3

Qn No.	Question	CL	CO
10	Evaluate $\int \sin 2x \cos x dx$.	AP	3

Part C. 28 Marks. Time: 60 Minutes (Cognitive Level: Apply (AP)/Analyse (AN)/Evaluate (EV)/Create (CR)) Long Answer. 7 marks each. Answer all 4 Questions choosing among options * within each question

Qn No.	Question	CL	CO
11	A) Find the coordinates of the point in the first quadrant at which the tangent line to the curve $x^3 - xy + y^3 = 0$ is parallel to the x-axis. OR B) A. (a) Let $f(x) = (x^2 - 1)/(x^4 + 1)$. Find the locations of the horizontal tangent lines of graph of $y = f(x)$. (b). Find the derivative of $f(x) = \cos(\cos x)$.	AP	2, 1
12	A) (a) Evaluate $\int x^2 e^{-x} dx$. (b) Evaluate $\int \sin^4 x \cos^5 x dx$. OR B) (a). Evaluate $\frac{d}{dx} \left[\ln \left(\frac{x^2 \sin x}{\sqrt{1+x}} \right) \right]$ (b). If $y = \left(\frac{1+x^2}{1-x^2} \right)^{17}$, find $\frac{dy}{dx}$.	AN	4, 2
13	A) (a) Evaluate $\int_2^5 (2x - 5)(x - 3)^9 dx$. (b) Evaluate $\int x^2 \sqrt{x-1} dx$ OR B)	EV	3, 1

Qn No.	Question	CL	CO
	(a). Find $\frac{d^2y}{dx^2}$ if $y = x^2 \cos x + 4 \sin x$. (b). If $f(x) = \frac{(x^2+1) \cot x}{3 - \cos x \csc x}$, find $f'(x)$.		
14	A) (a) Find $\frac{dy}{dx}$ if $x^3 + y^3 = 3xy$. Also find the tangent line to it at the point $(3/2, 3/2)$. (b) Find the derivative of $[\ln(x^2 + 1)]$ OR B) (a). Evaluate $\int e^x \cos x dx$. (b). Show that $\int_0^{\frac{\pi}{2}} \sin^n x dx = \frac{n-1}{n} \int_0^{\frac{\pi}{2}} \sin^{n-2} x dx$ for $n \geq 2$.	CR	2, 4