

QP CODE: D2BMT2401	(Pages: 2)	Reg. No :
		Name :
SECOND SEMESTER FYUGP EXAMINATION, APRIL 2025		
MAJOR COURSE		
MAT2CJ101 : Integral Calculus		
(Credits: 4)		
Time: 2 Hours	Maximum Marks: 70	
Section A		
Answer the following questions. Each carries 3 marks (Ceiling: 24 marks)		
1. Define Riemann sum for a function f on the interval $[a, b]$.	BL1	CO1
2. Show that the value of $\int_0^1 \sqrt{1 + \cos x} \, dx$ cannot possibly be 2.	BL1	CO1
3. Evaluate the integral $\int (\sqrt{x} + \sqrt[3]{x}) \, dx$.	BL2	CO1
4. Find $\frac{d}{dx} \ln(x^2 + 3)$.	BL1	CO2
5. Find $\frac{dy}{dx}$ if $y = \frac{1}{2} \ln \frac{1+x}{1-x}$.	BL2	CO2
6. Evaluate the integral $\int_0^1 \frac{dx}{1+x^2}$.	BL2	CO2
7. Find $\int x \cos x \, dx$.	BL2	CO1
8. Evaluate the integral $\int 3\sqrt{\sin v} \cos v \, dv$.	BL2	CO1
9. Determine the area of the region between the two curves $x = y^2$ and $x = 1$.	BL3	CO3
10. Find the volume of the solid generated by revolving the region bounded by the curve $x = y^{3/2}$ and the lines $x = 0, y = 2$ about the Y-axis.	BL2	CO3
Section B		
Answer the following questions. Each carries 6 marks (Ceiling: 36 Marks)		
11. Find the average value of $f(x) = 4 - x^2$ on $[0, 3]$. Does f actually take on this value at some point in the given domain?	BL2	CO1
(PTO)		

12. Evaluate $\int \csc^2 2\theta \cot 2\theta d\theta$ by substitution.	BL2	CO1
1. Using $u = \cot 2\theta$ 2. Using $u = \csc 2\theta$		
13. State the Fundamental theorem of Calculus Part 1 and find $\frac{dy}{dx}$ if $y = \int_1^{x^2} \cos t dt$.	BL1	CO1
14. Evaluate $\int_{-1}^1 3x^2 \sqrt{x^3 + 1} dx$.	BL2	CO1
15. Compute $\lim_{x \rightarrow 0} \frac{x - \sin x}{x^3}$.	BL2	CO2
16. Evaluate A, B and C in the equation $\frac{x-1}{(x+1)^3} = \frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{C}{(x+1)^3}$.	BL2	CO1
17. Determine the area of the region between the curve $y = x^2 - 3$ and the line $y = 1$.	BL3	CO3
18. Find the length of the curve $y = \frac{4\sqrt{2}}{3}x^{3/2} - 1, 0 \leq x \leq 1$.	BL2	CO3
Section C		
Answer any one question. Each carries 10 marks (1 x 10 = 10 Marks)		
19. a) Solve for y if $\ln(y^2 - 1) - \ln(y + 1) = \ln(\sin x)$. b) Find t if $e^{-0.01t} = 1000$.	BL2	CO2
20. Let $f(x) = \sqrt[3]{3x}$ Consider the portion of the curve where $0 \leq y \leq 2$. Find the surface area of the surface generated by revolving the graph of $f(x)$ around the Y -axis.	BL2	CO3
CO : Course Outcome		
BL : Bloom's Taxonomy Levels (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)		