

Q.P Code: D141359	Total Pages : 2	Name	760279
		Register No.	
SECOND SEMESTER (CUFYUGP) DEGREE EXAMINATION, APRIL 2026			
MATHEMATICS			
MAT2CJ101 - INTEGRAL CALCULUS			
2024 Admission Onwards			
Maximum Time :2 Hours		Maximum Marks :70	

Section A

All Question can be answered. Each Question carries 3 marks (Ceiling : 24 Marks)

1	Evaluate $\int \cos^2 x dx$
2	Find $\int \frac{1}{\cos^2 \theta} d\theta$
3	Graph the integrand and use areas to evaluate the integral $\int_1^3 (x/2 + 1) dx$.
4	Evaluate $\int_0^\pi \sin^2\left(\frac{\theta}{2}\right) \cos\left(\frac{\theta}{2}\right) d\theta$
5	Explain Natural Logarithm
6	Find k if $e^{k/2} = 2$
7	Evaluate $\lim_{x \rightarrow 0^+} x \cot x$
8	Find the derivative of $\tan^{-1} x$
9	Explain the method to find volume of a Solid of Revolution with rotation about the x -axis.
10	Find the area between $y = \sec^2 x$ and $y = \sin x$ from 0 to $\pi/4$.

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Section B

All Question can be answered. Each Question carries 6 marks (Ceiling : 36 Marks))

11	Solve $\int \sqrt{x} \sin^2(x^{3/2} + 5) dx$
12	Find the area of the region between the curve $y = 4 - x^2, 0 \leq x \leq 3$, and the x -axis.
13	Find the area between the curves $y = \ln x$ and $y = \ln 2x$ from $x = 1$ to $x = 5$.
14	Solve the initial value problem $\frac{dy}{dx} = e^t \sin(e^t - 2), y(\ln 2) = 0$
15	Show that $\lim_{x \rightarrow 0^+} (1 + x)^{1/x} = e$
16	Evaluate $\int \frac{1}{(x+1)\sqrt{x^2+2x}} dx$
17	Find the area of the propeller-shaped region enclosed by the curve $x - y^3 = 0$ and the line $x - y = 0$.
18	Find the volume of the solid generated by revolving the region between the parabola $x = y^2 + 1$ and the line $x = 3$ about the line $x = 3$.

Section C

Answer any ONE. Each Question carries 10 marks (1x10=10 Marks))

19	Graph the function $f(x) = -x^2 + 5x - 4$, on the interval $[0, 2]$. Then find 1. find the area of the region between the graph and the x-axis. 2. average value of $f(x)$ over that interval
20	Find the area of the surface generated by revolving the curve $y = 2\sqrt{x}, 1 \leq x \leq 2$, about the x -axis

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