

Q.P Code: D141359	Total Pages : 2	Name	760485
		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 $\pi/4$.

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

Q.P Code D 122646	Total Pages 2	Name 601717
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MATHEMATICS		
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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 $\int \sin^2 x dx$
2	Find $\int \cos(7\theta + 5) d\theta$
3	Graph the integrand and use areas to evaluate the integral $\int_2^5 (2x + 1) dx$.
4	State Fundamental Theorem of Calculus
5	Find $\int \tan x dx$
6	Find y if $\ln y = t/2 + 7$
7	Find $\lim_{x \rightarrow 0} \frac{x^2}{\sin x}$
8	Express $\frac{5x - 3}{x^2 - 2x - 3}$ as a sum of partial fractions.
9	Explain the method to find the area between two curves
10	Set up an integral for the length of the curve $y = x^2$; $-1 \leq x \leq 2$

Section B

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

11	Solve $\int \sqrt{4t-1} dt$
12	Suppose that f is continuous and that $\int_1^2 f(x)dx = 4$. Show that $f(x) = 4$ at least once on $[1, 2]$.
13	Evaluate the integral $\int_0^{\pi} \frac{\sec x \tan x}{2 + \sec x} dx$
14	Solve the initial value problem $e^y \frac{dy}{dx} = 2x, x > \sqrt{3}, y(2) = 0$
15	Evaluate $\lim_{x \rightarrow 0} \left(\frac{1}{\sin x} - \frac{1}{x} \right)$
16	Evaluate $\int \frac{1}{\sqrt{4x-x^2}} dx$
17	Find the areas of the regions enclosed by the curves $x + y^2 = 3$ and $4x + y^2 = 0$
18	Find the volume of the solid generated by revolving the region bounded by $y = \sqrt{x}$ and the lines $y = 1, x = 4$ about the line $y = 1$.

Section C

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

19	Graph the function $f(x) = x^2 - 6x + 8$ on the interval $[0, 3]$. 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 length of the curve $x = \frac{y^3}{3} + \frac{1}{4y}$ from $y = 1$ to $y = 3$