

Q.P Code D 122646	Total Pages 2	Name	601733
		Register No.	
<b>SECOND SEMESTER (CUFYUGP) DEGREE EXAMINATION, APRIL 2025</b>			
<b>MATHEMATICS</b>			
<b>MAT2CJ101-INTEGRAL CALCULUS</b>			
<b>2024 Admission Onwards</b>			
<b>Maximum Time :2 Hours</b>		<b>Maximum Marks :70</b>	

### 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 <ol style="list-style-type: none"> <li>1. find the area of the region between the graph and the x-axis.</li> <li>2. average value of <math>f(x)</math> over that interval</li> </ol>
20	Find the length of the curve $x = \frac{y^3}{3} + \frac{1}{4y}$ from $y = 1$ to $y = 3$