

QP CODE: D2BMT2501	(Pages: 2)	Reg. No :
		Name :
SECOND SEMESTER FYUGP EXAMINATION, APRIL 2026 (Regular/Improvement/Supplementary) Discipline Specific Core (DSC) Courses - Major 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 indefinite integral of a function and give an example.	BL1	CO1, CO3
2. Evaluate $\sum_{k=1}^4 (k^2 - 3k)$.	BL1	CO2
3. Find the average value of $f(t) = (t - 1)^2$ over the interval $[0, 3]$.	BL2	CO1
4. Find $\frac{d}{dx} \ln ax$, for any number a .	BL1	CO2
5. Express the solution of the following initial value problem as an integral $\frac{dy}{dx} = \tan x, y(1) = 5$.	BL2	CO1
6. Find $\frac{d}{dx} \sin^{-1}(x^2)$.	BL2	CO2
7. Evaluate the integral $\int \frac{1}{x - \sqrt{x}} dx$.	BL2	CO1
8. Find $\int x \sin x dx$.	BL2	CO1
9. Find the volume of the solid generated by revolving the region bounded by the curve $y = x^2$ and the lines $y = 0, x = 2$ about the X -axis.	BL2	CO3
10. Set up a formula to find the length of the curve $x = \sin y, 0 \leq y \leq \pi$.	BL2	CO3
(PTO)		

Section B

Answer the following questions. Each carries 6 marks (Ceiling: 36 Marks)

11.	Find the area of the region between the curve $y = x^2 - 6x + 8$, $0 \leq x \leq 3$ and the x axis.	BL2	CO1
12.	Evaluate the integrals: $\int \frac{4y \, dy}{\sqrt{2y^2+1}}$ $\int \frac{(1+\sqrt{x})^3}{\sqrt{x}} \, dx$	BL2	CO1
13.	Simplify the expression $\ln(e^{2 \ln x})$.	BL1	CO2
14.	Evaluate $\int_1^2 \frac{2 \ln x}{x} dx$.	BL2	CO2
15.	Compute $\lim_{t \rightarrow 0} \frac{t \sin t}{1 - \cos t}$	BL2	CO2
16.	Using Method of partial fractions evaluate $\int \frac{5x - 3}{(x + 1)(x - 3)} dx$.	BL2	CO1
17.	Find the area of the region enclosed by the lines $x = 0$ and $x = 3$ and the curve $x = 2y^2$.	BL3	CO3
18.	Consider the graph of $y = x^3$ on the interval $0 \leq x \leq 2$. Compute the area of the surface of revolution formed by revolving this graph about the X -axis.	BL2	CO3

Section C

Answer any one question. Each carries 10 marks (1 x 10 = 10 Marks)

19.	a) Evaluate $\int_0^{\sqrt[3]{\pi^2}} \sqrt{\theta} \cos^2(\theta^{3/2}) d\theta$. b) Show that if f is continuous, then $\int_0^1 f(x) dx = \int_0^1 f(1-x) dx$.	BL3	CO1
20.	If $\mathbb{R}$ is the region bounded above by $f(x) = 9 - (\frac{x}{2})^2$ and below by $g(x) = 6 - x$, find the area of the region $\mathbb{R}$.	BL3	CO3

CO : Course Outcome

BL : Bloom's Taxonomy Levels (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)