

Q.P Code D141640	Total Pages 2	Name 760395
		Register No.
SECOND SEMESTER (CUFYUGP) DEGREE EXAMINATION, APRIL 2026		
MATHEMATICS		
MAT2MN100 -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	Find $\int (1 + \tan^2 \theta) d\theta$
2	Evaluate $\int \sin 3x dx$
3	Show that the value of $\int_0^1 \sqrt{1 + \sin x} dx$ doesnot exceed $\sqrt{2}$
4	Evaluate $\int_{2\pi/3}^{\pi} \tan^3 \frac{x}{4} \sec^2 \frac{x}{4} dx$
5	Use logarithmic differentiation to find the derivative of $y = \sqrt{x(x+1)}$ with respect to the independent variable x .
6	Find $\int e^{\cos x} \sin x dx$
7	True or False: $\lim_{x \rightarrow 3} \frac{x-3}{x^2-3} = \lim_{x \rightarrow 3} \frac{1}{2x} = \frac{1}{6}$. Give reasons for your answer.
8	Find $\int x \sin x dx$
9	Explain the surface area formula for the revolution of a curve about the x -axis
10	Find the area between $y = 2 \sin x$ and $y = \sin 2x$ from 0 to π .

Section B

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

11	Solve $\int \csc^2 7x \cot 7x \, dx$
12	Graph the integrand $\int_{-1}^1 (1 - x) \, dx$ and use areas to evaluate the integral.
13	Solve the initial value problem $\frac{dy}{dx} = 1 + \frac{1}{x}, y(0) = 1$
14	Find the average value of $\ln x$ over $[1, e]$.
15	Find $\lim_{x \rightarrow \infty} x^{1/x}$
16	Evaluate $\int \csc x \, dx$
17	A curved wedge is cut from a cylinder of radius 3 by two planes. One plane is perpendicular to the axis of the cylinder. The second plane crosses the first plane at a 45° angle at the center of the cylinder. Find the volume of the wedge.
18	Find the length of the curve $y = x^{3/2}$ from $x = 0$ to $x = 4$

Section C

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

19	Express the integrand as a sum of partial fractions and evaluate the integral $\int \frac{x^3}{x^2 + 2x + 1} \, dx$.
20	The line segment $x = 1 - y, 0 \leq y \leq 1$, is revolved about the y - axis to generate a cone. Find its lateral surface area.