Reg. No. | | | | | | | | |

G. VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS), KOVILPATTI – 628 502.

UG DEGREE END SEMESTER EXAMINATIONS - APRIL 2025.
(For those admitted in June 2023 and later)

PROGRAMME AND BRANCH: B.Sc., MATHEMATICS

SEM	CATEGORY	COMPONENT	COURSE CODE	COURSE TITLE
II	PART-III	CORE-4	U23MA204	INTEGRAL CALCULUS

Date & Session:30.04.2025/FN **Time : 3 hours** **Maximum: 75 Marks**

Course Outcome	Bloom's K-level	Q. No.	**SECTION – A (10 X 1 = 10 Marks)** **Answer ALL Questions.**
CO1	K1	1.	Recall the relation between the given integral and a similar integral of lower order is called a------formula a) Integral b) Differential c) Reduction d) Algebraic
CO1	K2	2.	Recognize the value of $\int$ dx= a) x b) 2x c) x^2 d) 3x
CO2	K1	3.	Recall a -----integral is a two times repeated integral a)double b) triple c) line d) multiple
CO2	K2	4.	Recall the generalisation concept of a double integral is a-------integral a) double b) triple c) surface d) multiple
CO3	K1	5.	Recall a triple integral is a ----- times repeated integral a) 1 b) 2 c) 3 d) 4
CO3	K2	6.	Recognize the limits of the integration in a-----integral are constants a) double b) triple c) surface d) multiple
CO4	K1	7.	Identify the Gamma function a) b(n) b) x(n) c) r(n) d) β(m,n)
CO4	K2	8.	Identify the Beta function a) b(m,n) b) x(m,n) c) α(m,n) d) β(m,n)
CO5	K1	9.	Recall the formula for the bounded by the arc of the curve y=--- a) g(x) b) h(x) c) f(x) d) r(x)
CO5	K2	10.	Recall the formula for the bounded by the curve whose polar equation is r=--- a) f(θ) b) g(θ) c) h(θ) d) r(θ)

Course Outcome	Bloom's K-level	Q. No.	**SECTION – B (5 X 5 = 25 Marks)** **Answer ALL Questions choosing either (a) or (b)**
CO1	K3	11a.	Find the Reduction formula for $I_n = \int \cos^n x \, dx$. **(OR)**
CO1	K3	11b.	Prove that $I_n-(n+a) I_{n-1}+a(n-1) I_{n-2}=0$ if $I_n = \int x^n e^{-x} dx$.
CO2	K3	12a.	Write the definition of double Integral. **(OR)**
CO2	K3	12b.	Evaluate $\iint r\sqrt{a^2-r^2}\, dr\, d\theta$ over the upper half of the circle $r = a\cos\theta$.
CO3	K4	13a.	Find the volume of the paraboloid of revolution $x^2+y^2=4z$ cutoff by the plane $z=4$. **(OR)**
CO3	K4	13b.	Illustrate the Jacobian for change of two variables.
CO4	K4	14a.	Illustrate (i)Beta (ii)Gamma function. **(OR)**
CO4	K4	14b.	Illustrate the Recurrence formula of Gamma function.
CO5	K5	15a.	Find the area of ellipse $x^2+4y^2-6x+8y+9=0$. **(OR)**
CO5	K5	15b.	Find the area bounded by one arc of the cycloid $x=a(\theta - sin\theta)$,$y=a(1 - cos\theta)$.

Course Outcome	Bloom's K-level	Q. No.	**SECTION – C (5 X 8 = 40 Marks)** **Answer ALL Questions choosing either (a) or (b)**
CO1	K3	16a.	Find a reduction formula for $I_n = \int x^n (\log x)^n dx$ and hence evaluate. **(OR)**
CO1	K3	16b.	Using reduction formula evaluate $\int \sin^5 x \, dx$ and $\int \cos^6 x \, dx$.
CO2	K4	17a.	Evaluate $\iint x^2+ y^2 \, dx\, dy$ for which $x,y\geq 0$ and $x+y\leq 1$. **(OR)**
CO2	K4	17b.	Evaluate by changing the order of integration $\int_0^\infty \int_x^0 \frac{e^{-y}}{y} dx\, dy$.
CO3	K4	18a.	Find the volume bounded by the cylinder $x^2+y^2=4$,the planes $y+z = 4$ & $z=0$ required $V=\iint (4-y)\, dx\, dy$. **(OR)**
CO3	K4	18b.	Find the centroid of the area enclosed by the parabola $y^2=4ax$ the axis of x and the latus rectum of the parabola.
CO4	K5	19a.	Illustrate the properties of beta functions. **(OR)**
CO4	K5	19b.	Evaluate (i) $\int x^7 (1- x)^8 dx$ (ii) $\int_0^{\frac{\pi}{2}} sin^7 \theta \cos^5\theta$.
CO5	K5	20a.	Compute $\int_0^8 \frac{x dx}{1+x^2}$ by simpson's rule. **(OR)**
CO5	K5	20b.	Find the area of the surface obtained by the asteroid $x^{2/3} +y^{2/3} =a^{2/3}$ about x-axis.