Course Code	Course Title	L	T	P	U
MAT122T	**Integral Calculus**	**4**	**0**	**0**	**4**

Objectives of the Course:

The objectives of this course are as follows:
Objective 1: Students will be able to learn the basics of integral calculus.
Objective 2: Students will have an idea about area calculation behind the need to study integral calculus.
Objective 3: Students will be able to tackle the cases when integrands are complicated in nature and depend on certain parameters.

Course learning outcome: Upon completion of this course, the student will be able to:

1. Understand basic terms and properties of integral calculus.
2. Classify and explain the integration of the product of two functions.
3. Analyse and understand the definite integrals and various methods of solution.
4. Get acquainted with multiple integrals.

Mapping of Course Outcome(s):

PO/ CO		Program Outcomes					
		PO1	PO2	PO3	PO4	PO5	PO6
Course Outcomes	CO 1	S	L			L	S
	CO 2	S	S			L	S
	CO 3	S	M			M	M
	CO 4	S	M			M	S

L-Low, M-Medium, S-Strong

Textbook(s):

T1: Integral Calculus, B. C. Das and B. N. Mukherjee, U. N. Dhur & Sons Private Limited.
T2: Teach Yourself Integral Calculus, S. N. Thakur and S. B. Prasad, Bharati Bhawan (Publishers and Distributors).

Reference book(s):

R1: An Introduction to Analysis: Integral Calculus, R. K. Ghosh and K. C. Maity, New Central Book Agency.
R2: Integral Calculus, Shanti Narayan, S. Chand & Company Ltd

Course Contents:

Unit-1

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Introduction to integral calculus: Concept of integral calculus and real-life events and situations explained by calculus, Definition and fundamental properties, Method of substitution, Integration by parts. (12 hours)

Unit-2

Indefinite integral: Special Trigonometric Functions, Rational Fractions, Irrational Fractions, Integration by Successive Reduction where certain integral is connected to some integrals of lower order. (12 hours)

Unit-3

Definite Integrals: Definite Integrals and various methods of solution, Infinite or Improper Integrals and Integration of Infinite Sum. (12 hours)

Unit-4

Application of integral calculus: Areas of Plane Curves [Quadrature], Lengths of Plane Curves (Rectification), Volumes and Surfaces of Solids of Revolution, Centroid and Moment of Inertia, Multiple Integrals. (09 hours)

Lecture-wise plan:

Lecture No.	Learning objective	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1.	The objective is to provide the idea of area calculation behind the need to study integral calculus	Concept of integral calculus and real-life events and situations explained by calculus	T1Pvii-T1Pxvii
2.	The objective is to have an idea of integration as an inverse process of differentiation	Definition and fundamental properties	T1P-T1P16
3.			
4.	This is to provide the idea that sometimes it is convenient to substitute a function with another for ease of integration	Method of substitution	T1P17-T1P54
5.			
6.			
7.			
8.			
9.	This is to provide the idea of the integration of the product of two functions	Integration by parts	T1P56-T1P94
10.			
11.			
12.			
13.			
14.	To specially concentrate on the integration of trigonometric functions	Special Trigonometric Functions	T1P95-T1P130
15.			
16.			

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17. 18. 19.			
20. 21.	This is to understand the method of breaking into partial fractions	Rational Fractions Irrational Fractions	T1P132-T1P163
22. 23. 24.	The objective is to tackle the cases when integrands are complicated in nature and depend on certain parameters	Integration by Successive Reduction where certain integral is connected to some integrals of lower order.	T1P165-T1P196
25. 26.	To define integration as a process of summation	Definite Integrals and various methods of solution	T1P198-T1P259
27. 28. 29. 30.	To get an idea about the integral if either the range is infinite or the integrand has an infinite discontinuity in the range.	Infinite or Improper Integrals and Integration of Infinite Sum	T1P260-T1P317
31.	To find area bounded by any defined contour line and to learn the process of finding the length of an arc of a curve	Areas of Plane Curves [Quadrature]	T1P319-T1P352
32. 33.		Lengths of Plane Curves (Rectification)	T1P353-T1P373
34. 35. 36. 37. 38.	To find out volumes and surface-areas through integration	Volumes and Surfaces of Solids of Revolution	T1P374-T1P390
39. 40. 41.	To have the concept of physical applications of integral calculus	Centroid and Moment of Inertia	T1P391-T1P411
42. 43. 44. 45.	To have the concept of double integration, change of order of integration and transformation of multiple integrals	Multiple Integrals	T1P544-T1P587

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Evaluation Scheme:

Component	Duration	Weightage (%)	Remarks
Internal I	To be decided	25	Open Book
Mid term	2 hrs.	20	Closed Book
Internal II	To be decided	25	Open Book
Comprehensive Exam	3 hrs.	30	Closed Book

1. **Attendance Policy:** A Student must normally maintain a minimum of **75% attendance** in the course without which he/she shall be disqualified from appearing in the respective examination.

2. **Make-up Policy:** A student, who misses any component of evaluation for genuine reasons, must immediately approach the instructor with a request for make-up examination stating reasons. **The decision of the instructor in all matters of make-up shall be final.**

3. **Chamber Consultation Hours:** During the Chamber Consultation Hours, the students can consult the respective faculty in his/her chamber without prior appointment.

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