20HS003 CALCULUS

Hours Per Week :

L	T	P	C
4	2	-	6

COURSE DESCRIPTION AND OBJECTIVES:

The course is aimed at exposing the students to elementary notions in differential calculus. By the time students complete the course they realize wide ranging applications of the subject

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Calculate the limit and examine the continuity and understand the geometrical interpretation of differentiability.
2	Understand the consequences of various mean value theorems.
3	Understand conceptual variations while advancing from one variable to several variables in calculus.
4	Inter-relationship amongst the line integral, double and triple integral formulations.
5	Draw curves in Cartesian and polar coordinate systems.

SKILLS:

- ✓ *Realize importance of Green, Gauss and Stokes' theorems in other branches of mathematics.*
- ✓ *Master the dimension formula and theorem which are often exploited.*
- ✓ *Learn the theory of determinants and put them in practice.*

UNIT-I: Sequences, Continuity and Differentiability

Notion of convergence of sequences and series of real numbers, - definition of limit and continuity of a real valued function; Differentiability and its geometrical interpretation; Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem.

UNIT-II: Expansion of Functions

Successive differentiation and Leibnitz theorem, Maclaurin's and Taylor's theorems for expansion of a function, Expansions of exponential, logarithmic and trigonometric functions.

UNIT-III: Functions of Several Variables

Limit, continuity and first order partial derivatives, Higher order partial derivatives, Change of variables, Euler's theorem for homogeneous functions, Taylor's theorem, Total differentiation and Jacobians.

UNIT-IV: Double and Triple Integrals

Definite integral of functions of one variable, reduction formulae, Double integration over rectangular and nonrectangular regions, Double integrals in polar co-ordinates, Triple integrals, Volume by triple integral.

UNIT V : Special functions

Beta and Gamma functions, Their relation and applications to integrals

TEXT BOOKS:

1. Gorakh Prasad, A text book on Differential Calculus, Benarus Mathematical Society second edition, 2016.
2. Gorakh Prasad, A text book on Intergral Calculus, Benarus Mathematical Society second edition, 2016.

REFERENCES:

1. Howard Anton, I. Bivens & Stephan Davis (2016). Calculus (10th edition). Wiley India.
2. Gabriel Klambauer (1986). Aspects of Calculus. Springer-Verlag.
3. Wieslaw Krawcewicz & Bindhyachal Rai (2003). Calculus with Maple Labs. Narosa.
4. George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir (2018). Thomas' Calculus (14th edition). Pearson Education.
5. Jerrold Marsden, Anthony J. Tromba & Alan Weinstein (2009). Basic Multivariable Calculus, Springer India Pvt. Limited.
6. James Stewart (2012). Multivariable Calculus (7th edition). Brooks/Cole. Cengage.
7. Monty J. Strauss, Gerald L. Bradley & Karl J. Smith (2011). Calculus (3rd edition). Pearson Education. Dorling Kindersley (India) Pvt. Ltd.