



# CLUSTER UNIVERSITY SRINAGAR

## SYLLABUS (FYUP UNDER NEP 2020)

### Offered By Department Of MATHEMATICS

#### Semester 1<sup>st</sup> (Minor Course)

#### ***Course Title: Calculus-I***

Course Code: UGMTH22N101

Credits: 4 (Theory: 3, Tutorial: 1)

Contact Hrs: 60

Max. Marks 100

External: 75; Min Marks: 30

Internal (Continuous Assessment): 25 Marks, Min Marks: 10

#### **Course objectives/Outcome:**

After the completion of this course, the students shall be able to:

1. Understand continuity and differentiability of a function.
2. Find tangent/normal of a curve, curvature and radius of curvature of a function.
3. Find the expansion of various functions.
4. Understand indeterminate forms, homogeneous functions and partial differentiation.

#### **Unit I**

Functions of one variable, limit and continuity of a function ( $\epsilon$ - $\delta$  Definition), properties of continuous functions on closed and bounded intervals, classification of discontinuities. Successive differentiation,  $n$ th derivatives of  $(ax + b)^n$ ,  $\sin(ax + b)$ ,  $\cos(ax + b)$ ,  $\log(ax + b)$ ,  $e^{ax} \sin(bx + c)$ ,  $e^{ax} \cos(bx + c)$ . Successive differentiation using method of partial fractions, Leibnitz's theorem.

#### **Unit II**

Tangents and normals (polar coordinates only), angle between radius vector and tangent, perpendicular from pole to tangent, angle of intersection of two curves, polar tangent, polar normal, polar sub-tangent, polar sub-normal. Curvature and radius of curvature of a function at a point, asymptotes, asymptotes parallel to the axes, oblique asymptotes of  $n$ th degree curve, singular points, classification of double points.

#### **Unit III**

Roll's theorem, Mean value theorems and their geometrical interpretations, Taylor's theorem with Lagrange's and Cauchy's forms of remainders, Taylor's series, Maclaurin's series of  $\sin x$ ,  $\cos x$ ,  $e^x$ ,  $\log(1 + x)$ ,  $(1 + x)^n$ .

#### **Unit –IV**

Indeterminate forms, Partial differentiation, total differentiation, Homogenous functions, Euler's theorem on homogenous functions. Some problems on Euler's theorem.

#### **Text Books Recommended:**

- (1) Differential Calculus by S.D. Chopra, M.L.Kochar & A. Aziz-ul-Auzeem, Kapoor Publications.
- (2) Calculus and Analytic Geometry by G.B. Thomas, R. L. Finny Pearson Education.
- (3) T. M. Apostol: Calculus, John Wiley and Sons, New York.
- (4) S. Lang: A First Course in Calculus, Addison Wesley Publishing Co., Philippines.