

**Department** : Mathematics

**Semester** : B.Sc. I

**Subject Name & Code** : Algebra-I and Calculus-I

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Students are able to understand and implement the following concepts

**CO1.** Matrices, Rank of a Matrices and elementary transformations.

**CO2.** Elementary transformations, Reduction to Normal forms and Solution of system of Linear equations

**CO3.** Determinants, Properties of Determinants, examples on fourth order Determinants.

**CO4.** Symmetric and Skew-Symmetric determinants & Reciprocal determinants

**CO5.** Real number, Field Axioms and Order Axioms and Completeness of **R**.

**CO1.** Absolute values and Archimedean property.

**CO2.** Continuous and Discontinuous functions and Algebra of limits.

**CO3.** Boundedness of continuous functions, Intermediate value theorem and Uniform continuity and Borel Covering theorem.

**CO4.** L'Hospital rule and Indeterminate forms of  $\frac{0}{0}$ ,  $\frac{\infty}{\infty}$ ,  $(\infty - \infty)$ ,  $0 \times \infty$ ,  $0^0$ ,  $1^\infty$  &  $\infty^0$ .

**CO5.**  $n^{\text{th}}$  derivative of  $(ax + b)^n$ ,  $\frac{1}{(ax+b)}$ ,  $e^{ax}$ ,  $\sin(ax + b)$ ,  $\cos(ax + b)$ ,  $e^{ax} \sin(bx + c)$ ,  $e^{ax} \cos(bx + c)$

**CO6.** Leibnitz's rule of  $n^{\text{th}}$  derivative of a product.

**CO7.** Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem.

**CO8.** Taylor's Theorem (with Scломilch and Rouché's form of reminder), Maclaurin's Series

**Department** : Mathematics

**Semester** : B.Sc. II

**Subject Name & Code** : Calculus II and 3D Geometry

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Students are able to comprehend the following concepts

- CO1.** Polar coordinate system, Angle between radius vector and tangent at a point on the curve.
- CO2.** Angle of intersection of two curves, Polar sub tangent, polar sub-normal & Polar and pedal equation of the curves.
- CO3.** Derivative of arc length, Curvature and radius of curvature.
- CO4.** Radius of curvature of intrinsic form, Cartesian form, parametric form, polar form, pedal forms, Evolutes and Involutives.
- CO5.** Limits, continuity of functions of two variables & Partial derivatives.
- CO6.** Total derivatives, total differentials & Homogeneous functions, Euler's theorem on homogeneous functions.
- CO7.** Reduction formulae for integration of  $\sin^n x$ ,  $\cos^n x$ ,  $\tan^n x$ ,  $\cot^n x$ ,  $\sec^n x$ ,  $\operatorname{cosec}^n x$ ,  $(\sin^m x \cos^n x)$ ,  $x^n e^{ax}$ ,  $x^m (\log x)^n$ .
- CO8.** Sphere, Equation of sphere, Standard form, Central form and General form.
- CO9.** Sphere through a given circle, equation of circles, two spheres touch each other internally and externally. Angle of intersection of two spheres & orthogonal properties.
- CO10.** Equation of cone with vertex at the origin is a homogeneous second degree equation, General equation of the cone of second degree which passes through the co-ordinate axis.
- CO11.** Equation of the right circular cone with different vertices and different parameters.