

SEMESTER – I

Differential & Integral Calculus

(w. e. f. academic year 2019 – 20)

DSC – 1A

BS: 101

Theory: 5 credits and Tutorials: 0 credits

Theory: 5 hours/week and Tutorials: 1 hours/week

Objective: The course is aimed at exposing the students to some basic notions in differential calculus.

Outcome: By the time students complete the course they realize wide ranging applications of the subject.

Unit – I:

Partial Differentiation: Introduction – Functions of two variables – Neighbourhood of a point (a, b) – Continuity of a Function of two variables, Continuity at a point – Limit of a Function of two variables – Partial Derivatives – Geometrical representation of a function of two Variables – Homogeneous Functions.

Unit – II:

Theorem on Total Differentials – Composite Functions – Differentiation of Composite Functions – Implicit Functions – Equality of $f_{xy}(a, b)$ and $f_{yx}(a, b)$ – Taylor's theorem for a function of two variables – Maxima and Minima of functions of two variables – Lagrange's method of undetermined multipliers.

Unit – III:

Curvature and Evolutes: Introduction – Definition of Curvature – Radius of

Curvature – Length of Arc as a Function, Derivative of arc – Radius of Curvature – Cartesian Equations – Newtonian Method – Centre of Curvature – Chord of Curvature.

Evolutes: Evolutes and Involutives – Properties of the Evolutes.

Envelopes: One Parameter Family of Curves – The family of straight lines – Definition – Determination of Envelope.

Unit – IV:

Lengths of Plane Curves: Introduction – Expression for the lengths of curves $y = f(x)$ – Expressions for the length of arcs $x = f(y)$; $x = f(t)$, $y = \phi(t)$; $r = f(\theta)$

Volumes and Surfaces of Revolution: Introduction – Expression for the volume obtained by revolving about either axis – Expression for the volume obtained by revolving about any line – Area of the surface of the frustum of a cone – Expression for the surface of revolution – Pappus Theorems – Surface of revolution.

Text Books:

- Shanti Narayan, P.K. Mittal *Differential Calculus*, S.CHAND, NEW DELHI
- Shanti Narayan, *Integral Calculus*, S.CHAND, NEW DELHI.

References:

- William Anthony Granville, Percy F Smith and William Raymond Longley; *Elements of the differential and integral calculus*
- Joseph Edwards, *Differential calculus for beginners*
- Smith and Minton, *Calculus*
- Elis Pine, *How to Enjoy Calculus*
- Hari Kishan, *Differential Calculus*