

## MIN-MTH-3.2: Calculus

Total Marks: 100 (Theory -60, Internal Assessment -40)

**Course Objectives:** The main objective of the course is to

- Give idea about Successive differentiation, Leibnitz theorem.
- Explain various reduction formulas for integration of trigonometric and exponential functions.
- Give idea about product of vectors and their applications in real world.

**Course Outcomes:**

After completion of this paper, students will be able to:

**CO-1** Apply calculus for solving real life problem.

**CO-2** Understand different vector operations and their applications.

**Unit 1:** Successive differentiation, standard order on nth order derivatives and Leibnitz theorem, partial differentiation, partial derivatives of first and higher orders for functions of two and three variables, Euler's theorem on homogeneous functions. **15 Marks**

**Unit 2:** Integrals of the form:  $\int \frac{px+q}{\sqrt{ax^2+bx+c}} dx$ ,  $\int (px+q)\sqrt{ax^2+bx+c}$ ,  $\int \frac{dx}{(px+q)\sqrt{ax^2+bx+c}}$ .

Integration of rational functions of  $\sin x$  and  $\cos x$ . Properties definite integrals.

Reduction formulae for integration of the following functions:

$x^n e^{ax}$ ,  $x^m \sin nx$ ,  $x^m \cos nx$ ,  $x^n (\log x)^m$ ,  $\frac{1}{(x^2+k^2)^n}$ ,  $\sin^n x$ ,  $\cos^n x$ ,  $\tan^n x$ ,  $\operatorname{cosec}^n x$ .

**20 Marks**

**Unit 3:** Scalar and vector products of two vectors, Scalar triple product, vector triple product, Product of four vectors, Vector point function, limit, continuity and differentiation of vector function, Partial derivatives of vectors. Gradient of a scalar point function, Divergence and curl of a vector. **25 Marks**

**Text Books:**

1. B.C. Das, B.N. Mukherjee, Differential Calculus, U.N. Dhur & Sons Private Ltd.
2. B.C. Das, B.N. Mukherjee, Integral Calculus, U.N. Dhur & Sons Private Ltd.
3. J.G. Chakravorty, P.R. Ghosh, Vector Analysis, U.N. Dhur & Sons Private Ltd.

**Reference Book:**

1. K.C. Maity, R. K. Ghose, Integral calculus, New central Book Agency, Calcutta.
2. M. Spigel, Vector Analysis, Schaum Outline Series.