

SUBJECT: MATHEMATICS (MATH)

FULL MARKS: 40

CONTACT HOURS: 80 HOURS

COURSE CODE : THEORY

UNIT No.	TOPICS	CONTACT HOURS	MARKS
Unit-I	VECTORS AND THREE-DIMENSIONAL GEOMETRY	30	15
	1. Vectors Vectors and scalars, magnitude and direction of a vector. Direction cosines and direction ratios of a vector. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Definition, Geometrical Interpretation, properties and application of scalar (dot) product of vectors, vector (cross) product of vectors. 2. Three-Dimensional Geometry Introduction to 3D geometry, Coordinate axes and coordinate planes in 3D. Coordinates of a point, distance between two points, Direction cosines and direction ratios of a line joining points. Cartesian equation and vector equation of a line, skew lines, shortest distance between two lines. Angle between two lines.	10 20	5 10
Unit-II	CALCULUS	40	20
	1. Integrals Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts. Evaluation of simple integrals of the following types and problems based on them. $\int \frac{dx}{x^2 \pm a^2} \int \frac{dx}{\sqrt{x^2 \pm a^2}} \int \frac{dx}{\sqrt{a^2 - x^2}} \int \frac{dx}{ax^2 + bx + c} \int \frac{dx}{\sqrt{ax^2 + bx + c}}$ $\int \frac{px+q}{ax^2+bx+c} dx \int \frac{px+q}{\sqrt{ax^2+bx+c}} dx \int \sqrt{a^2 \pm x^2} dx \int \sqrt{x^2 - a^2} dx$ $\int \sqrt{ax^2 + bx + c} dx$ Fundamental theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.	20	9

UNIT No.	TOPICS	CONTACT HOURS	MARKS
	2. Applications of the Integrals Applications in finding the area under simple curves, especially lines, circles/parabolas/ ellipses (in standard form only)	10	6
	3. Differential Equations Definition, order and degree, general and particular solutions of a differential equation. Solution of differential equations by method of separation of variables, solutions of homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type: $\frac{dy}{dx} + py = q$ where p and q are functions of x or constants $\frac{dx}{dy} + px = q$ where p and q are functions of y or constants	10	5
Unit-III	LINEAR PROGRAMMING	10	5
	Introduction, related terminology such as constraints, objective function, optimization, graphical method of solution for problems in two variables, feasible and infeasible regions (bounded or unbounded), feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).		

[Note:20 Hours reserved for Remedial classes, Tutorials and Home Assignments.]