Indira Gandhi National Open University
School of Computer and Information Sciences

BCS - 012
Basic Mathematics

Block

4

Vectors and Three Dimensional Geometry

BCS-012 is a 4-credit course that introduces the students to some basic mathematical concepts, tools and techniques, for solving problems, including *determinants, matrices, sequences & series, vectors, three-dimensional geometry, Principle of Mathematical Induction* and *linear programming.*

The objective of the course is to make students capable of formulating problems in terms of the concepts and applying the tools and techniques to so-obtained formulations for solving the problems.

The course is structured and developed in the form of four blocks, each block containing four units. Block 1 includes discussion of *determinants, matrices and Principle of Mathematical Induction*. In Block 2, *sequences & series, complex numbers* and methods for solving *equations* and *inequalities* are discussed. Introductory *differential calculus & integral calculus* and their applications constitute Block 3. Finally*, vectors, 3-dimensional geometry* and elements of *linear programming* are discussed in Block 4.

The course material includes a number of solved examples for each topic followed by exercises. In order to have good grasp of the topics, the students should try to solve as many exercises as possible.

BLOCK INTRODUCTION

This block includes elementary discussion of three areas of Mathematics, viz., vectors, three-dimensional geometry and linear programming. This block has four units. In Unit 1, the concept of vector and associated concepts of magnitude of a vector, direction and direction cosines of a vector, multiplication of a vector with a scalar and position vector of a point, are introduced and illustrated.

Unit 2 is about vector algebra, in which the binary/ ternary operations of scalar product, vector product, scalar triple product and vector triple product, are defined and explained with suitable examples.

Straight line in three dimensions is the subject matter of Unit3. First, the formula for finding distance between two points is given. Next, after introduction of the concept of direction cosine/ ratio of a straight line passing through two points, method for finding direction cosine/ ratio of such a straight line, is discussed. Then, methods for finding equations of a straight line in various forms are illustrated. After introduction of the concepts of coplanar lines, skew lines, angle between two lines, and distance between two lines, method for finding distance between two lines, is described.

Introductory linear programming forms the subject matter of Unit 4. First of all, the terms like constrains, objective function and optimization are introduced. Next, method for formulation of a problem as a linear programming problem (LPP) and method for graphically solving an LPP are explained. Finally,