

## BCA – 123 Mathematical Foundations - II

**Maximum Marks: 100**  
**Minimum Pass Marks: 35**  
**Time: 3 hours**

**External: 80**  
**Internal: 20**

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

### UNIT- I

Propositions and logical operators, Truth tables and propositions generated by a set. Equivalence and implications, Laws of logic, Mathematical system, Proposition over a universe, Mathematical induction, Quantifiers

### UNIT- II

Binary operations on a non empty set, Groups, Subgroups, Normal Subgroups, Cosets, Factor groups, Rings, Sub rings, Ideals, Factor rings, Prime ideals, Minimal ideal, Fields, direct product of groups, Isomorphism of groups and rings (definitions and examples only)

### UNIT- III

Addition and multiplication of matrices, Laws of matrix algebra, Singular and non singular matrices, Inverse of a matrix, Rank of a matrix, Rank of the product of two matrices, Systems of linear equations i.e.  $AX=0$  and  $AX=B$

### UNIT- IV

Characteristic equations of a square matrix, Cayley-Hamilton Theorem, Eigen values and eigen vectors, Eigen values and eigen vectors of symmetric skew symmetric, Hermitian and skew –Hermitian matrices, Diagonalization of a square matrix.

### REFERENCE BOOKS

1. Babu Ram : Discrete Mathematics
2. Shanti Naryana : A text book of matrices
3. Alan Doerr And Kenneth Levaseur, Applied Discrete Structures For Computer Science, Galgotia Publications Pvt. Ltd., New Delhi.
4. Seymour Lipschutz And Marc Lars Lipson, Discrete Mathematics", Mcgrraw- Hill International Editions, Schaum's Series, New York.