

**ELEMENTS OF
MATHEMATICAL
FOUNDATIONS OF
COMPUTER SCIENCE**

BCA-03
KURUKSHETRA UNIVERSITY

EVANSONS PUBLICATIONS

CONTENTS

<i>Chapter</i>	<i>Pages</i>
----------------	--------------

UNIT - I

1. Differential Equations and their Formation	1 - 14
Order and degree of differential equation ...	2
Solution of differential equations ...	2
Formation of differential equations ...	3
Geometrical meaning of the differential equation ...	12
2. Differential Equations of First Order and First Degree	15 - 52
Variables separable ...	15
Equations reducible to variables separable ...	20
Homogeneous differential equations ...	24
Equations reducible to homogeneous differential equations ...	32
Linear differential equations ...	37
Equations reducible to linear differential equations ...	45
3. Exact Differential Equations	53 - 73
Solution of exact differential equations ...	55
Integrating factor ...	60
Rules for finding the integrating factors ...	65
4. Linear Differential Equations with Constant Co-efficients	74 - 124
The differential operator D ...	74
Auxiliary equation ...	76
Complete solution of linear differential equations ...	76
The inverse operator $\frac{1}{f(D)}$...	85
5. Homogeneous Linear Equations	125 - 147
Solution of homogeneous linear equations ...	125
Equations reducible to homogeneous linear equations ...	141

UNIT - II

6. Sets and Set Operations	151 - 194
Representation of sets	152
Sub-sets	153
Power sets	154
Set operations	161
Venn-diagrams	161
Difference of two sets	166
De Morgan's Laws	167
Partition of a set	180
Minsets	181
Duality principle for sets	182
Practical applications of sets	184
Ordered pairs	191
Cartesian product of sets	191
7. Logical Statements and Truth Tables	195 - 216
Logical statement	195
Truth table	196
Compound statements	196
Logical connectives	197
Negation	199
Logical equivalence	200
Tautologies	201
Contradictions (Fallacy)	201
Laws of logic	203
Implications	206
Argument	208
Joint Denial	209
Quantifiers	211
8. Permutations and Combinations	217 - 250
Factorial notation	217
Principle of association of events	218
Permutations	221
Circular permutations	237
Combinations	238
Division into groups	248
9. Mathematical Induction	251 - 262
The principle of mathematical induction	251

UNIT - III

194		265 - 385
152	10. Matrix Algebra	
153	Introduction	... 265
154	Types of matrices	... 269
161	Basic operations on matrices	... 272
161	Multiplication of matrices	... 285
166	Properties of matrix multiplication	... 287
167	Determinants	... 304
180	Properties of determinants	... 314
181	Solution of linear equations using determinants	... 324
182	Transpose of a matrix	... 338
184	Symmetric and skew-symmetric matrices	... 339
191	Singular and non-singular matrices	... 350
191	Adjoint of a matrix	... 350
195 - 216	Inverse of a matrix	... 356
	Solution of system of linear equations using matrices	... 372
195	11. Characteristic Equation of a Matrix	386 - 414
196	Characteristic equation	... 386
196	Characteristic roots or Eigen values	... 386
197	Characteristic vector or Eigen vector	... 389
199	Cayley-Hamilton theorem	... 397
200	Rank of a matrix	... 406
201	Diagonalization	... 408
201	12. Notion of Groups, Rings and Fields	415 - 456
203	Binary operation	... 415
206	Composition tables	... 415
208	Groups	... 417
209	Complexes and subgroups of a group	... 427
211	Cosets	... 431
17 - 250	Normal subgroups	... 434
217	Homomorphism and Isomorphism	... 434
218	Rings	... 436
221	Fields	... 442
237	Subrings	... 451
238	Question Papers	... 457 - 462
248		
51 - 262		
252		