Skill Enhancement Courses

Course Title	Course Code	Semester	Total Credit
Logic and Sets	MAT/SEC1	III	3
Computer Graphics	MAT/SEC2		
Introduction to Numerical Methods	MAT/SEC3		
Graph Theory	MAT/SEC4	IV	3
Operating System: LINUX	MAT/SEC5		
Introduction to Number Theory	MAT/SEC6		

MAT/SEC1: Logic and Sets

UNIT 1

Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators.Prepositional equivalence: Logical equivalences, Predicates and quantifiers: Introduction, Quantifiers, Binding Variables and Negations.

UNIT 2

Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Counting principle. Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set.

UNIT 3

Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections.

Relation: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation, Partial ordering relations.

Books Recommended

1. R.P. Grimaldi, B.V. Ramana -- Discrete Mathematics and Combinatorial Mathematics: An Applied Introduction, Pearson Education.
2. P.R. Halmos -- Naive Set Theory, Springer.
3. E. Kamke -- Theory of Sets, Dover Publishers.

MAT/SEC2: Computer Graphics

UNIT 1

Development of computer graphics: Raster Scan and Random Scan graphics storages, displays processors and character generators. Colour display techniques, interactive input/output devices.

UNIT 2

Points, lines and curves.Scan conversion, line-drawing algorithms, circle and ellipse generation, conic-section generation.

UNIT 3

Polygon filling anti aliasing.Two-dimensional viewing. Coordinate systems, linear transformations, line and polygon clipping algorithms.

Books Recommended

1. D. Hearn, M.P. Baker -- Computer Graphics, Prentice Hall.
2. J.D. Foley, A.V. Dam, S.K. Feiner, J.F. Hughes -- Computer Graphics: Principles and Practices, Pearson.
3. D.F. Rogers -- Procedural Elements for Computer Graphics, McGraw Hill.
4. D.F. Rogers, A.J. Adams -- Mathematical Elements for Computer Graphics, McGraw Hill.

MAT/SEC3: Introduction to Numerical Methods

(Use of Scientific Calculator is allowed)

UNIT 1

Introduction, Forward differences, backward differences, central differences, symbolic relations, nth differences of some functions, newton's formulae for interpolation, central difference interpolation formulae: Gauss' forward and backward interpolation formulae, Stirling's formula, Bessel's formula

UNIT 2

Interpolation with unevenly spaced points, divided differences and properties, Newton's divided differences formula, Lagrange's interpolation formula, Lagrange's inverse interpolation formula

UNIT 3

Derivatives using Newton's forward and backward difference formulae, derivatives using central difference formula, General quadrature formula, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule

Books Recommended

1. S.S Sastry -- Introductory Methods of Numerical Analysis, Prentice Hall of India Pvt. Ltd.
2. H.C. Saxena -- Finite Differences and Numerical Analysis, S. Chand & Company Pvt. Ltd.
3. V.N. Vedamurthy, N. Ch. S. N. Iyengar -- Numerical Methods, Vikas Publishing House Pvt. Ltd.

MAT/SEC4: Graph Theory

UNIT 1

Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bi-partite graphs. Sub graphs-matrices-connectedness, walks, trials and paths, connectedness and components.

UNIT 2

Isomorphism of graphs, paths and circuits, Eulerian circuits, Hamiltonian cycles, the adjacency matrix, weighted graph.

UNIT 3

Trees: characterization of trees, centre of trees. Travelling salesman's problem, shortest path, Dijkstra's algorithm, Floyd-Warshall algorithm.

Books Recommended

1. S. Arumugam, S. Ramachandran -- Invitation to Graph Theory, Scitech Publications.
2. B.A. Davey, H.A. Priestly -- Introduction to Lattices and Order, Cambridge University Press.
3. E.G. Goodaire, M.M. Parameter -- Discrete Mathematics with Graph Theory, Pearson.
4. J.A. Bondy, U.S.R. Murty – Graph Theory, Springer.

MAT/SEC5: Operating Systems: LINUX

UNIT 1

Linux: The Operating System: Linux history, Linux features, Linux distributions, Linux's relationship to Unix, Overview to Linux Architecture.

UNIT 2

Installation, Start up scripts, system processes (an overview), Linux Security, The Ext2 and Ext3. File systems: General characteristics of The Ext3 File system, file permissions.

UNIT 3

Use Management: Types of Users, the powers of Root, managing users (adding and deleting): using the command line and GUI tools.

Books Recommended

1. A. Robbins -- Linux Programming by Examples: The Fundamentals, Pearson.
2. K. Cox -- Red Hat Linux: Administrator's Guide, Prentice Hall.
3. W. R. Stevens -- UNIX Network Programming, Pearson.
4. S. Das – UNIX: Concepts and Applications, McGraw Hill.
5. E. Siever, S. Figgins, R. Love, A. Robbins -- Linux in a Nutshell, O'Reilly Media.
6. N. Mathew, R. Stones, A. Cox -- Beginning Linux Programming, Wiley.

MAT/SEC6: Introduction to Number Theory

UNIT 1

Division Algorithm, Greatest Common Divisor, Euclid's Algorithm, Least Common Multiple, Fundamental Theorem on Arithmetic, Fermat Number, Mathematical Induction

UNIT 2

Basic Properties of Congruences, Divisibility Test with the Congruence Relation, Complete System of Residues, Linear Congruence, Chinese Remainder Theorem, Fermat's Theorem

UNIT 3

Reduced System, Euler- Fermat's Theorem, Wilsons Theorem, Lagrange's Theorem, Polynomial Congruence Modulo m

Books Recommended

1. Niven, Zukerman & Montgomery, Introduction to the Theory of Numbers
2. David, M. Burton, Elementary Number Theory, 6th Ed, Tata McGraw
3. Ajay Kr. Chaudhuri, Introduction to Number Theory, NCBA