COMPUTER ORIENTED NUMERICAL & STATISTICAL TECHNIQUES (BMA-253)

Type	L	T	P	Credits
BSC	3	1	0	4

Prerequisite:

Course Content:

UNIT I: Nonlinear Equations and Simultaneous Linear Equations:
Roots of nonlinear equation, Methods of solution, Order of convergence of iterative methods, Simple roots: Bisection, False position, Secant, Newton-Raphson, Chebyshev, Iteration and multi point iteration methods, Multiple roots: Newton-Raphson and Chebyshev, Complex roots: Newton-Raphson and Muller's method, a system of nonlinear equations: Newton-Raphson and iteration methods, Polynomial equations: Bairstow's method, convergence analysis of above methods.
Linear systems: Introduction, Direct methods, Operation count, Pivoting, III conditioned linear systems & condition number, Iteration methods: Jacobi, Gauss-Seidel, SOR methods, convergence conditions. Special system of equations: Thomas algorithm. Eigen value problems: Power methods.

UNIT II: Interpolation, Differentiation and Integration:
Curve fitting: Polynomial interpolation, error, Existence and Uniqueness, Truncation error bounds, difference operators, Newton forward and backward difference interpolations, Lagrange, Newton divided difference and Iterated interpolations, Stirling and Bessel's interpolations, Spline interpolation, Least squares and Chebyshev approximations. Numerical Differentiation: Methods based on interpolation, Error analysis.
Numerical Integration: Methods based on interpolations (Trapezoidal, Simpson's 1/3, Simpson's 3/8 rule), Gauss quadrature methods, Romberg integration, Error bounds and estimates.

UNIT-III: Numerical Solution of Ordinary Differential Equations:
Initial-value problems, Single step methods; Taylor's, Picard's, Modified Euler's method and Runge- Kutta method (fouth order), Error estimates, Multi-step methods: Adam's –Bashforth and Milne's methods, convergence and stability analysis, simultaneous and Higher equations: RK Fourth order method.

UNIT-IV: Curve- Fitting, Correlation, Regression and Probability:
Curve-fitting, method of least- squares, fitting of straight lines, polynomials, non-linear and exponential curves etc., correlation analysis, linear, non-linear and multi- regression analysis, probability, random variables and probability distributions, expectation, moments and transform methods, Binomial, Poisson and Normal distributions, overview of t-distribution, F-distribution and χ^2-distribution.

UNIT-V: Statistical Methods:
Sampling theory (small and large), parameter estimation, confidence intervals, tests of hypotheses and significance; z-, t-, F-, and χ^2 tests, goodness of fit test-χ^2 test, analysis of variance, non-parametric tests (Simple application), time series analysis, index numbers, quality control charts.

Text and Reference Books:

1. M.K. Jain, S.R.K. Iyengar & R.K. Jain, Numerical methods for Scientific and Engineering Computation, New age international Publication.
2. S.S. Sastry, Introductory Methods of Numerical Analysis, Eastern Economy Edition.
3. S. Rajasekaran, Numerical Method in Science and Engineering, Wheeler Publishing House.
4. B.S. Grewal, Numerical Method in Engineering & Science, Khanna Publishers.
5. D.L. Harnett, Statistical methods.
6. J.N. Kapur and H.C. Saxena, Mathematical, S. Chand, & Co., 2001.

Course Objectives:

Objectives of this course are to provide conceptual understanding of:

- Numerical methods for solving nonlinear equations and simultaneous equations.
- Numerical techniques for interpolation, differentiation, integration, and solving IVP_S .
- Curve fitting, correlation and regression, probability distributions and applied statistical methods.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Find roots of nonlinear equations and solve systems of algebraic equations.	Apply, Evaluate
CO2	Use Interpolations techniques and to find numerical differentiation/ integration of data, function.	Apply, Evaluate
CO3	Use numerical methods for finding solutions of ordinary differential equations, simultaneous and higher order equations.	Apply, Evaluate
CO4	Use statistical techniques like regression, correlation for finding relation between two or more variables. apply discrete and continuous probability distributions to various problems.	Apply, Evaluate
CO5	Use to various parametric and nonparametric tests parameter estimation, hypothesis testing and ANOVA.	Understand, Apply

CO and PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	1	1	-	-	-	-	-	3
CO2	3	2	3	3	1	1	-	-	-	-	-	3
CO3	3	2	3	3	1	1	-	-	-	-	-	2
CO4	3	3	3	3	1	1	-	-	-	-	-	2
CO5	3	3	3	3	1	2	3	2	2	1	1	2
Average	3.00	2.40	3.00	3.00	1.00	1.20	0.60	0.40	0.40	0.20	0.20	2.40

DIGITAL ELECTRONICS (EET-253)

Type	L	T	P	Credits
ESC	3	1	2	5

Prerequisite:

Course Content:

Unit-1:

Logic Families: CMOS Logic, CMOS Dynamic Electrical Behaviour, Bipolar Logic: Diode Logic, Transistor Logic Inverter, TTL Logic, NMOS, CMOS / TTL Interface, ECL

Minimization Techniques & logic gates:

Minimization Techniques: Boolean postulates and laws – De-Morgan"s Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions — Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don"t care conditions – Quine - Mc Cluskey method of minimization. Number System: Representation of Negative Numbers & 1's Complement, 10's Complement, Arithmetic Using 2's Complement.

Unit-2:

Combinational Circuits: Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator

Unit-3

Sequential Circuits: Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation –Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor- Asynchronous Ripple or serial counter – Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram- State table –State minimization –State assignment - Excitation table and maps-Circuit implementation - Modulo–n counter, Registers – shift registers - Universal shift registers – Shift register counters – Ring counter – Shift counters - Sequence generators.

Unit-4:

VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data typesand objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits

Unit-5:

Memory Devices: Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM –EAPROM, RAM – RAM organization – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell- Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell – Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

Text and Reference Books:

1. Wakerly, John F. / "Digital Design Principles & Practices" / Pearson Education / 3rd Ed.
2. Bartee , Thomas C. / "Fundamentals of Digital Computers"/ Tata McGraw-Hill.
3. Gopalan, K. "Gopal" / "Introduction to Digital Microelectronic Circuits" / Tata McGraw-Hill.

4. Taub, Herbert & Schilling, Donald / "Digital Integrated Electronics"/ Tata McGraw-Hill.
5. Millman, Jocob & Taub, Herbert / "Pulse, Digital & Switching Waveforms" / Tata McGraw-Hill.
6. Mano, M. Morris / "Digital Design"/ Prentice Hall
7. Malvino, A.P. & Leach, Donald P. / "Digital Principles & Applications" / Tata McGraw-Hill.
8. Mano, M. Morris / "Digital Logic and Computer Design"/ Prentice Hall (India).
9. Tokheim, H. Roger L. /"Digital Electronics Principles & Application"/ Tata McGraw-Hill / 6th Ed.
10. John F. Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008.
11. John. M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.
12. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.
13. Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011
14. Donald D. Givone, "Digital Principles and Design", TMH, 2003.
15. Lectures of NPTEL

Course Objectives:

1. To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
2. To introduce the methods for simplifying Boolean expressions
3. To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
4. To introduce the concept of memories and programmable logic devices.
5. To illustrate the concept of synchronous and asynchronous sequential circuits

Course Outcomes:

1. Analyse different methods used for simplification of Boolean expressions. (Analyse)
2. Design and implement Combinational circuits. (Apply, Analyse)
3. Design and implement synchronous and asynchronous sequential circuits. (Apply, Analyse)
4. Write simple HDL codes for the circuits. (Apply)

CO and PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	3	3	-	2	2	1	1
CO2	3	3	3	3	2	3	3	-	2	2	-	1
CO3	2	3	3	3	3	3	3	-	2	2	1	-
CO4	2	3	3	3	3	3	3	-	2	2	1	1

DATA STRUCTURE USING C (ECS-251)

Type	L	T	P	Credits
PCC	3	0	2	4

Prerequisite: Computer Concepts & 'C' Programming (ECS-101/102)

Course Content:

Unit -1:

Introduction: Basic Terminology, Elementary Data Organization, Structure operations, Algorithm Complexity and Time-Space trade-off.

Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List, Sparse Matrices and Vectors.

Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array and Linked Representation of Stack, Operations associated with Stacks, Applications of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack, Applications of recursion in problems like 'Tower of Hanoi'.

Unit-2:

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues.

Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

Unit-3:

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.

Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

Unit-4:

Sorting: Insertion Sort, Bubble Sort, Quick Sort, Two Way Merge Sort, and Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.

Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.

Unit-5:

Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

Text and Reference Books:

1. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., New Delhi.
2. R. Kruse et. al, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002
3. A. M. Tenenbaum, "Data Structures using C & C++", PHI Pvt. Ltd., New Delhi.

4. K Loudon, "Mastering Algorithms with C", Shroff Publisher & Distributors Pvt. Ltd.
5. Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.
6. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia Pvt. Ltd.(Singapore)

Lab Work:

Write Program in C or C++ for the following

1. Array implementation of Stack, Queue, Circular Queue, List.
2. Implementation of Stack, Queue, Circular Queue, List using Dynamic memory Allocation.
3. Implementation of Tree Structures, Binary Tree, Tree Traversal, Binary Search Tree, Insertion and Deletion in BST.
4. Implementation of Searching and Sorting Algorithms.
5. Graph Implementation, BFS, DFS, Min. cost spanning tree, shortest path algorithm.

Course Outcomes:

1. Analyze the algorithms to determine the time and computation complexity and justify the correctness. (Analyze)
2. Implement Arrays, Stacks, Queues and linked list based problems and analyze the algorithm to determine the time complexity. (Apply, Analyze)
3. Implement search and traversal algorithms on Trees and Graphs and determine the time complexity. (Apply, Analyze)
4. Algorithms for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of space and time complexity. (Apply, Analyze, Evaluate)
5. Understand file structures and file handling. (Understand)

CO and PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	-	-	-	-	-	-	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	-

CO and PSO Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	1
CO2	3	2	1	1
CO3	3	2	1	1
CO4	3	2	1	1
CO5	2	1	-	-

Python Programing (ECS-253)

Type	L	T	P	Credits
PCC	2	1	2	4

Prerequisite: Computer Concepts & 'C' Programming (ECS-101/102)

Course Content:

Unit 1: Introduction
The Programming Cycle for Python, Python IDE, Interacting with Python Programs, Elements of Python, Type Conversion. Basics: Expressions, Assignment Statement, Arithmetic Operators, Operator Precedence, Boolean Expression.

Unit 2: Conditionals and Loops
Conditional statement in Python: if-else statement, its working and execution, Nested-if statement and Elif statement in Python, Expression Evaluation & Float Representation, Loops: Purpose and working of loops, while loop including its working, For Loop, Nested Loops, Break and Continue.

Unit 3: Strings and Functions
Strings: Length of the string, Concatenation and Repeat operations, Indexing and Slicing of Strings. Python Data Structure: Tuples, Unpacking Sequences, Lists, Mutable Sequences, List Comprehension, Sets, Dictionaries, Functions: Parts of a Function, Execution of a Function, Keyword and Default Arguments, Scope Rules, Higher Order Functions: Treat functions as first class Objects, Lambda Expressions.

Unit 4: Classes and Files
Generate prime numbers with the help of Sieve of Eratosthenes algorithm, File I/O: File input and output operations in Python Programming Exceptions and Assertions Modules: Introduction, Importing Modules, Abstract Data Types: Abstract data types and ADT interface in Python Programming, Classes: Definition and operations in the classes, Special Methods (such as _init_, _str_, comparison methods and Arithmetic methods etc.), Class Example, Inheritance, Inheritance and OOP.

Unit 5: Iterators & Recursion
Recursive Fibonacci, Tower of Hanoi, Search: Simple Search, Binary Search, Estimating Search Time in Simple Search and Binary Search, Sorting & Merging: Selection Sort, Merge List, Merge Sort, Higher Order Sort.

Text and Reference Books:

1. Allen B. Downey, ''Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016, (http://greenteapress.com/wp/thinkpython/)
2. Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. John V Guttag, —Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press, 2013.

4. Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
5. Timothy A. Budd, Exploring Pythonl, Mc-Graw Hill Education (India) Private Ltd., 2015.
6. Kenneth A. Lambert, Fundamentals of Python: First Programsl, CENGAGE Learning, 2012.
7. Charles Dierbach, Introduction to Computer Science using Python: A Computational Problem Solving Focus, Wiley India Edition, 2013.
8. Paul Gries, Jennifer Campbell and Jason Montojo, Practical Programming: An Introduction to Computer Science using Python 3l, Second edition, Pragmatic Programmers, LLC, 2013. Mapped With: https://ict.iitk.ac.in/product/python-programming-a-practical

Lab Work:

1. To read and write simple Python programs.
2. To develop Python programs with conditionals and loops.
3. To define Python functions and to use Python data structures –- lists, tuples, dictionaries
4. To do input/output with files in Python
5. Write a Python Program to perform Linear Search
6. Write a Python Program to perform Binary Search
7. Write a Python Program to perform selection sort
8. Write a Python Program to perform insertion sort.

Course Objectives:

1. Understanding Fundamentals of Python Programming
2. Understand and implement Control Structures.
3. Learn and implement Strings and Functions in Python.
4. Understand and implement advance functions like iteration and recursion.
5. Implement Object Oriented Programming concepts in Python

CO and PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	0	0	0	0	0	2	0	0	2
CO2	3	3	3	0	0	0	0	0	2	0	0	2
CO3	3	3	1	0	0	0	0	0	2	0	0	2
CO4	3	3	3	0	0	0	0	0	2	0	0	2
CO5	3	3	3	0	0	0	0	0	2	0	0	2

CO and PSO Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	1
CO2	3	2	1	1
CO3	3	2	1	1
CO4	3	2	1	1
CO5	2	1	-	-

COMPUTER ORGANIZATION & ARCHITECTURE (ECS-255)

Type	L	T	P	Credits
PCC	2	0	0	2

Prerequisite: Computer Concepts & 'C" Programming (ECS-101/102)

Course Content:

Unit-1: Introduction
Von Neumann Architecture, Number System, Character Codes (BCD, ASCII, EBCDIC), Logic gates. Arithmetic and Logical Unit (ALU), Micro-Operation, ALU Chip.

Unit-2: Basic Organization
Instruction Cycle, Organization of Central Processing Unit, Hardwired & micro programmed control unit, General Register Organization, Stack Organization, Addressing modes, Instruction formats.

Unit-3: Memory Organization
Memory Hierarchy, Main memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache memory, Virtual Memory, hit/miss ratio, magnetic disk and its performance, magnetic Tape etc.

Unit-4: I/O Organization
Peripheral devices, I/O interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input Output Processor and Serial Communication. Asynchronous data transfer, Strobe Control, Handshaking.

Unit-5: Processor Organization
Basic Concepts of a Microprocessor, Advanced Processors, Pipelining, Vector and Array Processors.

Text and References Books:

1. William Stalling, "Computer Organization & Architecture", Pearson education Asia
2. Mano Morris, "Computer System Architecture", PHI

3. Zaky & Hamacher, "Computer Organization", McGraw Hill
4. B. Ram, "Computer Fundamental Architecture & Organization",
5. New Age, A.S. Tannenbaum, "Structured Computer Organization", PHI.

Course Outcomes:

1. Understand Number systems, Logic Gates, Boolean algebra, Design of Combinational and sequential circuits. (Understand)
2. Understand Von Neumann architecture, instruction cycle and the concept of Hardwired and Micro programmed control unit, addressing modes, register organization. (Understand)
3. Apply the concepts of memory organization in calculating hit-miss ratio and access time of magnetic disks. (Apply)
4. Understand the working of various I/O devices, buses, interrupt and interfaces etc. (Understand)
5. Understand the basics of pipelining and Multicore architecture. (Understand)

CO and PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	-	-	-	-	-	-	-	-	-
CO2	2	2	1	1	-	-	-	-	-	-	-	-
CO3	2	1	1	1	-	-	-	-	-	-	-	-
CO4	2	1	1	-	-	-	-	-	-	-	-	-
CO5	1	1	1	-	-	-	-	-	-	-	-	-

CO and PSO Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4
CO1	2	-	2	-
CO2	2	-	1	-
CO3	2	2	1	-
CO4	2	-	1	-
CO5	2	-	1	-

ENGINEERING ECONOMICS & MANAGEMENT (HHS-251)

Type	L	T	P	Credits
HSMC	3	0	0	3

Prerequisite:

Course Content:

Unit-1: Introduction to Economics
Overview: production possibility curve, choices-what, how and for whom, micro- and macro-economics, inflation, unemployment, GDP and business cycle; demand and supply, elasticity of demand, consumer surplus and its applications, utility theory.

Unit-2: Production and Cost
Factors of production, production function, law of variable proportion, isoquant analysis, return to scale, economies of scale; Types of costs: direct and indirect costs, explicit and implicit costs, opportunity cost, economic cost, fixed cost and variable costs, average and marginal costs, short-run and long-run costs, optimal combination of factor-inputs.

Unit-3: Market Structure
Perfectly Competitive Market, Imperfect market: Monopoly, Oligopoly, Monopolistic Market

Unit-4: Fundamentals of Management:
Development of Management Thoughts, Objectives, Functions of Management: Planning, Organising, Directing, Controlling and Coordination.

Unit-5: Business Enterprises
Business Ownership: Sole Proprietorship, Partnership, Company: Promotion, Formation & Development, Cooperative Firms.

Text and Reference Books:

1. Koutsoyiannis, A., 'Modern Microeconomics', English Language Book Society, Macmillan.
2. Joseph, L Massod, "Essential of Management", Prentice Hall, India.
3. Armstrong, Michel, "A Handbook of Management Techniques", Kogan Page Limited.
4. Babcock, D L and Lucy C Morse, "Managing Engineering and Technology", third edition, Pearson Education, 2006.
5. Pindyck, R S, Rubinfeld, D L & Mehta, 'Microeconomics', 6 th Edition, Pearson Education India.
6. Barthwal, R R , Microeconomic Analysis.
7. Samuelson, Paul A, 'Economics', 5th edition, McGraw Hill New York.
8. Henderson, J M and Quadnt, R E, 'Microeconomic Theory: A Mathematical Approach', Tata MacGraw Hill, New Delhi, 2003.
9. H. Varian, 'Intermediate Micro Economics'.
10. G. Mankiw,''Principles of Micro Economics.

Course Outcomes:

1. Understanding essential economic principle for solving economic problem with suitable policy alternatives and know how rational consumers can maximize their satisfaction with limited incomes and make best use of their resources. (Understand)

2. Understand production principles and cost analysis. (Understand)
3. Gain market knowledge and study the contemporary market situations, market strategy to manage the industries. (Understand, Apply)
4. Understand and gain basic knowledge of management technique. (Understand)
5. Develop Entrepreneurship skills towards formation of partnership, companies and their functions. (Apply)

CO and PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	1	-	2	1	3	1	3	3	3
CO2	1	-	-	-	-	2	1	3	3	3	3	3
CO3	-	-	-	1	-	2	2	3	2	3	3	3
CO4	-	-	-	-	-	2	2	3	3	3	3	3
CO5	-	-	-	-	-	2	3	3	3	2	3	3

INDIAN CONSTITUTION (HHS-255)

Type	L	T	P	Credits
HSMC	2	0	0	0

Prerequisite:

Course Content:

Unit-1: Indian Constitution
Sources and Features, Preamble, Fundamental Rights, Fundamental Duties and Directive Principles of State Policy

Unit-2: Union Executive
President, Vice President, Prime Minister, Council of Ministers, State Executives- Governor, Chief Minister and Council of Ministers

Unit-3: Union Legislature
Parliament- Composition and Functions, Speaker of Lok Sabha, Amendment Process, State Legislature- Vidhaan Sabha, Panchaayati Raj, Institutions- History, Basic Features and 73rd Amendment

Unit-4: Judiciary
Supreme Court, High Courts, Judicial Review and Judicial Activism

Unit-5: Election Commission
Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the Welfare of SC/ST/OBC and Women.

Text and Reference Books:

1. Indian Constitution: D.D Basu.
2. Indian Administration: Avasthi and Avasti.
3. The Indian Constitution: Corner Stone of a Nation, G. Austin, Oxford University Press.
4. Indian Politics: Contemporary Issues and Concerns, M. P. Singh and Rekha Saxena, Prentice Hall of India, Delhi.

Course Outcomes:

1. Configure the preambles & fundamental rights.
2. Actuate the governance & functioning of constitutional functionaries.
3. Describe the functions of legislative bodies.
4. Decipher the judiciary system & its role in governance.
5. Develop a democratic process through electoral mechanism into system.

CO and PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	0	0	0	0	0	2	1	2	2	0	0	2
CO2	0	0	0	0	0	1	0	2	1	0	0	1
CO3	0	0	0	0	0	1	0	2	1	0	0	1
CO4	0	0	0	0	0	2	1	2	2	0	0	2
CO5	0	0	0	0	0	1	1	2	2	0	0	2

DISCRETE MATHEMATICAL STRUCTURES (BMA-254)

Type	L	T	P	Credits
ESC	3	1	0	4

Prerequisite:

Course Content:

Unit-1: Fundamentals of Logic

Propositional Logic: Propositions, Basic logic operations and truth tables, Tautologies, Contradictions, Contigency, Algebra of propositions, Logical equivalence: the laws of logic, Logical implication: Rules of inference, Logical analysis of argument, Some computing application (Normal forms), Functionally complete set of operations, Formal proofs.

First Order Predicate Logic: Predicates & quantifiers, Nested quantifiers, Use of quantifiers, Rules of inference, Validity of arguments and proof methods.

Unit-2: Set Theory, Relations and Functions

Set Theory: Sets & subsets, Venn diagrams, set operations and laws, countable set, Cartesian product, Cardinality, Principle of inclusion- exclusion.