Paper Code & Title: **BC-101- Computer Fundamental & Programming in C**

Credits Point**: 4**

		L	T	P
		3	1	0

Unit	Contents	Contact Hours
I	Introduction to any Operating System [Unix, Linux, Windows], Programming Environment, Write and execute the first program, Introduction to the Digital Computer; Concept of an algorithm; Termination and correctness. Algorithms to programs: Specification, top-down development and stepwise refinement. Introduction to Programming, Use of high level programming language for the systematic development of programs. Introduction to the design and implementation of correct, Efficient and maintainable programs, Structured Programming, Trace an algorithm to depict the logic, Number Systems and conversion Methods.	14
II	Standard I/O in "C", Fundamental Data Types and Storage Classes: Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external, Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity, Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch, Program Loops and Iteration: Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue, Modular Programming: Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules.	14
III	Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size, Sequential search, Sorting arrays, Strings, Structures: Purpose and usage of structures, declaring structures, assigning of structures, Pointers to Objects: Pointer and address arithmetic, pointer operations and declarations, using pointers as function arguments, Dynamic memory allocation, Union , Enumeration, The Standard C Preprocessor: Defining macros and calling macros, utilizing conditional compilation, passing values to the compiler, The Standard C Library: Input/output : fopen, fread, etc, string handling functions, Math functions :log, sine, like Other Standard C functions.	14

Reference Books:

1. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.
2. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition [India Edition], 2007.

Paper Code & Title: **BC-102-Language & Communication**

Credits Point**: 4**

		L	T	P
		3	1	0

Unit	Contents	Contact Hours
I	Fundamentals of Communication Technical Communication: features: Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communications; The flow of Communication: Downward, Upward, Lateral of Horizontal (Peer group): Importance of technical communication; Barriers to Communication.	14
II	Constituents of Technical Written Communication Words and Phrases: Word formation. Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; Correct Usage: all Parts of Speech; Modals; Concord; Articles; Infinitives; Requisites of Sentence Construction: Paragraph Development: Techniques and Methods- Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation-various steps. Business Communication Principles, Sales & Credit letters; Claim and Adjustment Letters; Job application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance. Negotiation & Business Presentation skills.	14
III	Presentation Strategies and Listening Skills. Defining Purpose; Audience & Local; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice; Listening Skills: Active Listening, Passive Listening. Methods for improving Listening Skills.	14

Reference Books:
1. Communication Skills for Engineers and Scientists, Sangeeta Sharma et.al. PHI Learning Pvt.Ltd, 2011, New Delhi.
2. Business Correspondence and Report Writing by Prof. R.C.Sharma & Krishna Mohan, Tata McGraw Hill & Co.Ltd.,2001, New Delhi.

Text Books:
1. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
2. Technical Communication: A Practical Approach: Madhu Rani and Seema Verma- Acme Learning, New Delhi-2011
3. Technical Communication- Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press,2007, New Delhi.

Paper Code & Title: **BC-103:- Computer Organization**

Credits Point**: 4**   **L   T   P**

                                                                                                                          3   1   0

Unit	Contents	Contact Hours
I	Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Micro operation, Arithmetic Logic Shift Unit, Design of Fast address, Arithmetic Algorithms (addition, subtraction, Booth Multiplication), IEEE standard for Floating point numbers. Hardwired & Micro Programmed (Control Unit): Fundamental Concepts (Register Transfers, Performing of arithmetic or logical operations, Fetching a word from memory, storing a word in memory), Execution of a complete instruction, Multiple-Bus organization.	14
II	Hardwired Control, Micro programmed control (Microinstruction, Micro-program sequencing, Wide-Branch addressing, Microinstruction with Next address field, Prefetching Microinstruction). Processor Organization: General register organization, Stack organization, Addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer. I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.	14
III	Memory Organization: Memory Hierarchy, Main Memory (RAM and ROM Chips), organization of 2D and 21/2D, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.	14

Reference Books:

1. Computer Organization, Vravice, Zaky & Hamacher (TMH Publication).
2. Structured Computer Organization, Tannenbaum (PHI).
3. Computer Organization, Stallings (PHI).
4. Computer Organization, John P.Hayes (McGraw Hill).

Text Book:
1. Computer System Architecture, M. Mano (PHI).

Paper Code & Title: **BC-104:-Discrete Mathematics**

Credits Point**: 4**

		L	T	P
		3	**1**	**0**

Unit	Contents	Contact Hours
I	Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets. Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, equivalence relation, partial ordering relation. Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions.	**14**
II	Mathematical Induction: Piano's axioms, Mathematical Induction Discrete Numeric Functions and Generating functions Simple Recurrence relation with constant coefficients, Linear recurrence relation without constant coefficients. Algebraic Structures: Properties, Semi group, Monoid, Group, Abelian group, properties of group, Subgroup, Cyclic group, cosets, Permutation groups, Homomorphism, Isomorphism and Automorphism of groups.	**14**
III	Propositional Logic: Preposition, First order logic, Basic logical operations, Tautologies, Contradictions, Algebra of Proposition, Logical implication, Logical equivalence, Normal forms, Inference Theory, Predicates and quantifiers, Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, and complemented lattices.	**14**

Reference Books:

1. Chowdhary, K. R. "Fundamentals of discrete Mathematical Structures", 2^{Ed}, PHI Learning.
2. Liptschutz, Seymour, "Discrete Mathematics", TMH.
3. Kenneth H. Rosen, "Discrete Mathematics and its applications", TMH.

Text Books:
1. Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application toComputer Science", TMH.

Paper Code & Title: **BC-105:-Principle of Management**

Credits Point**: 4**   **L   T   P**
                                                        3   1   0

Unit	Contents	Contact Hours
I	Evolution of Management: - Contribution of Taylor, Mayo & Fayol, Different approaches of management, role of manager, tasks of a professional manager, Management & its functions. Level of Management, managerial skills at various levels. Planning & Decision making: - Definition, Nature for planning, importance, Process of planning, decision making, nature importance & process, types of plans.	**14**
II	Organization & staffing: - Definition, organizing process, importance of organizing, Departmentation manpower planning, Recruitment, Selection, Training & promotion. Directing & Leadership:- X Theory, & Y Theory, Hawthorne & Tinstone studies Leadership. Definition, Stogdill trait theory, Managerial grid, Fiedlers contingency approach.	**14**
III	Motivation – Meaning, Missions, Herzberg's theory, V Room's expectancy theory & Porter & Lawler model of Motivation. Communication & control Communication Definition, importance, process, types, factors affecting communication methods, barriers & remedies.	**14**

Reference Books:

1. Principles & Practice of Management – L. M. Prasad
2. Management – Theory & Practice – C. B. Gupta

Paper Code & Title: **BC-201-Data Structure using 'C'**

Credits Point**: 4**   L   T   P
                                                                                                                   3   1   0

Unit	Contents	Contact Hours
I	Introduction: Basic Terminology, Elementary Data Organization, Data 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 Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. Recursion: Recursive definition and processes, recursion in C, example of recursion, Tower of Hanoi Problem, simulating recursion. Backtracking, recursive algorithms, principles of recursion, tail recursion, removal of recursion.	**14**
II	Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Dequeue, and Priority Queue, 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.	**14**
III	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. Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, 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.	**14**

Reference Books:
1. Y. Langsam, M. Augenstin and A. Tannenbaum, Data Structures using C and C++,Pearson Education Asia, 2nd Edition, 2002.
2. Ellis Horowitz, S. Sahni, D. Mehta Fundamentals of Data Structures in C++, Galgotia Book Source, New Delhi.
3. S. Lipschutz, Data Structures Mc-Graw Hill International Editions, 1986.
4. Jean-Paul Tremblay, Paul. G. Soresan, An introduction to data structures with Applications, Tata Mc-Graw Hill International Editions, 2nd Edition 1984.
5. A. Michael Berman, Data structures via C++, Oxford University Press, 2002.

Paper Code & Title: **BC-202:-Organization Behavior**

Credits Point**: 4**

			L	T	P
			3	1	0

Unit	Contents	Contact Hours
I	Organizational Behavior – What is O.B., Nature and Structure and Structure of O.S. approaches to O.B. behaviorists frame work, social learning frame work. Basic understanding of Individual behaviors:-personality – meaning, development, Freudian stage, Neo Freudian stage.	14
II	Perception-nature, Importance, meaning, learning & perception. Attitudes & satisfaction:- nature, dimensions of attitudes, meaning of job satisfaction. Sources & consequences of job satisfaction. Job stress – meaning, causes & effects. Group dynamics: - Nature of Groups, types- committee organization, its nature & functions. Informal Organization structure, Informal communication system	14
III	Conflicts – Organizational conflicts, types of conflict, Strategies of interpersonal conflicts. Group decision making & control:- Nature and meaning of decision making, phases of decision making process, Meaning of Control, elements of control process.	14

Reference Books:

1. Business Organization and Management by Bhushan Y.K.
2. Business Organization by Gupta C.B
3. Organizational Behavior by L.M. Prasad

Paper Code & Title: **BC-203-Computer Based Numerical & Statistical Techniques**

Credits Point**: 4**

		L	T	P
		3	1	0

Unit	Contents	Contact Hours
I	Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation. Errors in numerical computation. Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods. Finite differences and Interpolation: Finite Differences, Difference tables. Polynomial Interpolation: Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula, Sterling's, Bessel's, Everett's formula. Lagrange's Interpolation, Newton Divided difference formula, Hermit's Interpolation for unequal intervals.	14
II	Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Boole's Rule, Weddle's Rule Euler-Maclaurin Formula. Simultaneous Linear Equations: Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Jacobi and Gauss Seidel iterative methods, Rate of Convergence. Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, Predictor-corrector methods	14
III	Curve fitting, Approximations and Regression Analysis: Method of least squares, fitting of straight lines, polynomials, exponential curves etc. Approximation of functions by Chebyshev polynomials. Linear, Non-linear and Multiple regressions. Statistical methods: Sample distributions, Test of Significance: Chi-Square Test, t and F test.	14

Reference Books:
 1. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
 2. Gupta S.P. and Kapoor, V.K., Fundamentals of Applied statistics, Sultan Chand & Sons.
 3. Gupta S.P. and Kapoor, V.K., Fundamentals of Mathematical Statistics, Sultan Chand & Sons.

Text Books:
 1. Rajaraman V., "Computer Oriented Numerical Methods", PHI
 2. Gerald & Wheatley, "Applied Numerical Analyses", AW

Paper Code & Title: **BC-204-Computer Networks**

Credits Point**: 4**

		L	T	P
		3	1	0

Unit	Contents	Contact Hours
I	Basic Concepts: Components of data communication, distributed processing, standards and organizations. Line configuration, topology, Transmission mode, and categories of networks. OSI and TCP/IP Models: Layers and their functions, comparison of models. Digital Transmission: Interfaces and Modems: DTE-DCE Interface, Modems, Cable modems. Transmission Media: Guided and unguided, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength, Shannon capacity, comparison of media.	14
II	Telephony: Multiplexing, error detection and correction: Many to one, One to many, WDM, TDM, FDM, Circuit switching, packet switching and message switching. Data link control protocols: Line discipline, flow control, error control, synchronous and asynchronous protocols, character and bit oriented protocols, Link access procedures. Point to point controls: Transmission states, PPP layers, LCP, Authentication, NCP. ISDN: Services, Historical outline, subscriber's access, ISDN Layers and broadcast ISDN.	14
III	Devices: Repeaters, bridges, gateways, routers, The Network Layer; Design issues, Routing algorithms, Congestion control Algorithms, Quality of service, Internetworking, Network-Layer in the internet. Transport and upper layers in OSI Model: Transport layer functions, connection management, functions of session layers, presentation layer and application layer.	14

Reference Books:

1. A.S.Tanenbaum, "Computer Networks"; Pearson Education Asia, 4th Ed. 2003.
2. Behrouz A. Forouzan, "Data Communication and Networking", 3rd Ed, Tata McGraw Hill, 2004.
3. William stallings, "Data and computer communications", Pearson education Asia, 7th Ed., 2002.

Paper Code & Title: **BC-205-Digital Electronics**

Credits Point**: 4**

		L	T	P
		3	**1**	**0**

Unit	Contents	Contact Hours
I	Digital computers and Digital systems, Number systems : Binary number system, Octal & Hexadecimal number system, Conversion of Number System, Complements: r's and (r-1)'s complement, Signed Binary numbers, Binary codes, Arithmetic operations on Binary numbers. Logic Gates: AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates. Boolean Algebra: Law's, Postulates and theorems, Universal building blocks, logic diagrams, Converting circuits to universal logic, Minimization techniques: K -Map, Sum of Product & Product of Sum, Tabulation method.	**14**
II	Combinational circuits: Adders, Subtractors, Binary parallel adders, Adder/Subtractor, Decimal adder, Code conversion, Magnitude comparator, Multiplexers, Demultiplexers, Decoders & Encoders.	**14**
III	Flip-flops: Types of Flip Flop: R-S, D, J-K, T, Master Slave, Triggering of flip-flops, state reduction and assignment, Conversion of flip-flops and State Realization of one Flip Flop Using Other Flip Flop. Registers and Counters: Shift Registers, Types of registers, Universal Shift Register with parallel load, Bi-directional Shift register, Ripple counters, synchronous counters, Ring counters, Johnson counter, Mod counters.	**14**

Reference Books:

1. Moris Mano, Digital Logic and Computer Design, Prentice Hal of India.
2. Moris Mano, Digital Design, Prentice Hal of India.
3. R.K. Gaur, Digital Electronics and Microcomputer, Dhanpat Rai Publication
4. R.P. Jain, Modern Digital Electronics, Tata McGraw-Hil
5. Malvino & Leach, Digital Principles and Aplications, Tata McGraw-Hil.
6. Rajaraman & Radhakrishanan, An introduction to Digital Computer Design, Prentice Hall of India.

Paper Code & Title: **BC-301-Object Oriented Programming Using C++**

Credits Point**: 4**

		L	T	P
		3	**1**	**0**

Unit	Contents	Contact Hours
I	Introduction: Introducing Object – Oriented Approach, Relating to other paradigms (Functional, Data decomposition). Basic concepts: Abstraction, Encapsulation, Inheritance, Polymorphism, Review of C, Difference between C and C++ cin, cout, new, delete, operators. Classes and Objects: Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, State identity and behavior of an object, Constructors and destructors, instantiation of objects, Default parameter value, object types++ garbage collection, dynamic memory allocation, Meta class / abstract classes.	**14**
II	Inheritance and Polymorphism: Inheritance, Class hierarchy, derivation – public, private & protected, Aggregation, composition vs classification hierarchies, Polymorphism, Categorization of polymorphism techniques, Method polymorphism, Polymorphism by parameter, Operator overloading, Parametric Polymorphism.	**14**
III	Generic function: Template function, function name overloading, Overriding inheritance methods, Run time polymorphism, Multiple Inheritance. Files and Exception Handling: Streams and files, Namespaces, Exception handling, Generic Classes.	**14**

Reference Books:

1. A.R.Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997.
2. S.B.Lippman & J.Lajoie, " C++ Primer", 3rd Edition, Addison Wesley, 2000.The C programming Lang., Person Ecl – Dennis Ritchie
3. R.Lafore, "Object Oriented Programming using C++", Galgotia Publications, 2004.
4. E. Balagurusamy, "Object Oriented Programming with C++", TMH.
5. Herbert Sehlidt, "The Complete Reference c++", TMH.
6. Schaum's Outline, Programming with C++, TMH.

Paper Code & Title: **BC-302- Design and Analysis of Algorithms**

Credits Point**: 4**

		L	T	P
		3	1	0

Unit	Contents	Contact Hours
I	Introduction: Algorithms, Analysis of Algorithms, Design of Algorithms, Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences and their solution methods. Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort, Medians and order statistics Advanced Data Structure: Red Black Trees, Augmenting Data Structure, Binomial Heap, B-Tree, Fibonacci Heap, and Data Structure for Disjoint Sets, All kinds of Algorithms on these data structures, Dictionaries and priority Queues, mergeable heaps, concatenable queues.	14
II	Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow and Traveling Salesman Problem.	14
III	Randomized Algorithms, String Matching, NP-Hard and NP-Completeness, Approximation Algorithms, Sorting Network, Matrix Operations, Polynomials and FFT, Number Theoretic Algorithms.	14

Reference Books:

1. Thomas H Cormen Leiserson "Introduction to Algorithms", PHI Learning Private Limited, Delhi India.
2. Sara Baase and Allen Van Gelder ,Computer Algoritms : "Introduction to Design and Analysis", Pearson Education
3. Jon Kleinberg and Eva Tardos "Algorithm Design", Pearson Education
4. Brassard Bratley "Fundamental of Algorithms", PHI Learning Private Limited, Delhi India.
5. M T Goodrich "Algorithms Design", John Wiley
6. Aho, "Design and Analysis of Computer Algorithms", Pearson Education.
7. Horowitz and Sahani ,"Fundamentals of Computer Algorithms", Galgotia Publications Pvt. Ltd Delhi, India.

Paper Code & Title: **BC-303- System Analysis & Design**

Credits Point**: 4**   **L   T   P**
                                                                                                     3   1   0

Unit	Contents	Contact Hours
I	Overview of System Analysis and design: System Development life Cycle. Concept and models: requirements determination, Logical design, physical Design, test, planning, implementation planning and performance evaluation, interviewing, presentation skills; group – based approaches JAD. Information requirement Analysis ; process modeling with physical data flow diagrams, data modeling with logical entity relationship diagrams ; Developing a Proposal; Feasibility study and cost estimation . System Design; Design of input and control, design of output and control. File design / database design, process design, user interface design, prototyping, software construction, documentation.	14
II	Application Development Methodologies and CASE tools , information engineering , structured system analysis and design object oriented methodologies for application development data modeling , process modeling , user interface design and prototyping , use of computer aided software engineering (CASE) tools in the analysis , design implementation of information systems.	14
III	Design and Implementation of OO platform , Object Oriented Analysis and design through object modeling technique , object modeling , dynamic modeling and functional modeling , object oriented design and object oriented programming system for implementation , object oriented data bases. System Implementation, Hardware Software selection, System testing, System Training, Software design, System maintenance.	14

Reference Books:

1. Haryszkiewycz, I.T, "Introduction of System Analysis and Design" PHI 1989.
2. Raja Raman, V ," Analysis and Design of Information System" PHI 1991.

Paper Code & Title: **BC-304- Operating Systems**

Credits Point**: 4**

		L	T	P
		3	1	0

Unit	Contents	Contact Hours
I	Introduction: Definition and types of operating systems, Batch Systems, multi programming, time–sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines. Process Management: Process concept, Process scheduling, Cooperating processes, Threads, Interprocess communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and Algorithm evaluation.	14
II	Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling. Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging in MULTICS and Intel 386, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Demand segmentation, Disk structure, Disk scheduling methods, Disk management, Recovery, Disk structure, disk scheduling methods, Disk management, Swap-Space management, Disk reliability.	14
III	Security & Case Study: Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption. Windows NT-Design principles, System components, Environmental subsystems, File system, Networking and program interface, Linux system-design principles, Kernel Modules, Process Management, Scheduling, Memory management, File Systems, Input and Output, Interprocess communication, Network structure, security	14

Reference Books:

1. Abraham Siberschatz and Peter Baer Galvin, "Operating System Concepts", Fifth Edition, Addision-Wesley
2. Milan Milankovic, "Operating Systems, Concepts and Design", McGraw-Hill.
3. Harvey M Deital, "Operating Systems", Addison Wesley
4. Richard Peterson, "Linux: The Complete Reference", Osborne McGraw-Hill

Paper Code & Title: **BC-305- Financial Accounting & Management**

Credits Point**: 4**

		L	T	P
		3	1	0

Unit	Contents	Contact Hours
I	Overview: Accounting concepts, conventions and principles; Accounting Equation, International Accounting principles and standards; Matching of Indian Accounting Standards with International Accounting Standards. Mechanics of Accounting: Double entry system of accounting, journalizing of transactions; preparation of final accounts, Trading Account, Manufacturing Accounts, Profit & Loss Account, Profit & Loss Appropriation account and Balance Sheet, Policies related with depreciation, inventory and intangible assets like copyright, trademark, patents and goodwill.	14
II	Analysis of financial statement: Ratio Analysis- solvency ratios, profitability ratios, activity ratios, liquidity ratios, market capitalization ratios ; Common Size Statement ; Comparative Balance Sheet and Trend Analysis of manufacturing, service & banking organizations.	14
III	Funds Flow Statement: Meaning, Concept of Gross and Net Working Capital, Preparation of Schedule of Changes in Working Capital, Preparation of Funds Flow Statement and its analysis. Cash Flow Statement: Various cash and non-cash transactions, flow of cash, preparation of Cash Flow Statement and its analysis.	14

Reference Books:

1. Narayanswami - Financial Accounting: A Managerial Perspective (PHI, 2nd Edition).
2. Mukherjee - Financial Accounting for Management (TMH, 1st Edition).
3. Ramchandran & Kakani - Financial Accounting for Management (TMH, 2nd Edition).
4. Ghosh T P - Accounting and Finance for Managers (Taxman, 1st Edition).
5. Ashish K. Bhattacharya- Essentials of Financial Accounting (PHI, New Delhi)
6. Ghosh T.P- Financial Accounting for Managers (Taxman, 3rd Edition)
7. Maheshwari S.N & Maheshwari S K – A text book of Accounting for Management (Vikas, 1st Edition)
8. Gupta Ambrish - Financial Accounting for Management (Pearson Education, 2nd Edition)
9. Chowdhary Anil - Fundamentals of Accounting and Financial Analysis (Pearson Education, 1st Edition).

Paper Code & Title: **BC-401- .Net Framework using C#**

Credits Point**: 4**

		L	T	P
		3	1	0

Unit	Contents	Contact Hours
I	Introduction to .NET Technology, Introduction to VB.NET, Software development and Visual Basic .NET, Visual Basic .NET and .NET frame. Visual Basic fundamentals: The Visual Basic .NET Development Environment, The element of VB.NET, VB.NET operators, Software design, Conditional structure and control flow, Methods.	**14**
II	Classes and Objects: Types, Structure and Enumeration, Classes, Interfaces, Exception handling and Classes, Collections, Arrays and other Data Structure.	**14**
III	Advance design concepts, Patterns, Roles and Relationships, Advanced Interface Patterns: Adapters and Delegates and Events Data Processing and I/O. Writing Software with Visual Basic .NET, Interfacing with the End User, Introduction to ASP.NET and C#.NET and their features.	**14**

Reference Books:

1. Jeffrey R. Shapiro "The Complete Reference Visual Basic .NET" TMH (2002 Edition).
2. Rox "Beginner and Professional Edition VB.NET" Tata Mcgraw Hill.
3. Steven Holzner "Visual Basic .NET Black Book" Wiley Dreamtech Publication.
4. Alex Homer, Dave Sussman "Professional ASP.NET1.1" Wiley Dreamtech.
5. Bill Evzen,Bill Hollis "Professional VB.NET 2003" Wiley Dreamtech.
6. Tony Gaddis "Starting Out VB.NET PROG.2nd Edition" Wiley Dreamtech.
7. Chris Ullman, Kauffman "Beg. ASP.NET1.1 with VB.NET 2003" Wiley Dreamtech.

Paper Code & Title: **BC-402- Software Engineering**

Credits Point**: 4**

		L	T	P
		3	1	0

Unit	Contents	Contact Hours
I	Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.	14
II	Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design.	14
III	Software Testing and Maintenance: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing. Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Project Management and Other Software Engineering methodologies: Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.	14

Reference Books:

1. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
2. Jibitesh Mishra and Ashok Mohanty, Software Engineering: Pearson

Text Books:
1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
3. Pankaj Jalote, Software Engineering, Wiley

Paper Code & Title: **BC-403-Business Communication**

Credits Point**: 4**   **L   T   P**
                                                                        3   1   0

Unit	Contents	Contact Hours
I	Meaning, Nature, Scope, Definition of Communication, Types of Communication, Communication Barriers, Principles of Communication. Written Communication – Types of Letter, Letter lay-out, Essentials of an effective letter writing, Need and function of Business letter.	**14**
II	Oral Communication – Types of oral communication, Barriers to oral communication, speedy – Introduction & Characteristic of good speech. Mass Communication – Nature & Scope of Mass Communication, function of mass communication – Media of mass communication, Role of Mass – Media in India.	**14**
III	Report Writing - What is report, Importance of Reports, Types of reports, Characteristic of good report selecting suitable types of reports.	**14**

Reference Books:

1. Business Communication – Monopoly & Monipally.
2. Commercial Correspondence – Ghosh & Bhushan.

Paper Code & Title: **BC-404- Optimization Technique**

Credits Point**: 4** | **L** **T** **P**
                        3 **1** **0**

Unit	Contents	Contact Hours
I	Central Problem of linear Programming various definitions included Statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem, tic-tac problem, and its solution. Assignment problem and its solution. Graphical Method Formulation, Linear Programming Problem.	**14**
II	Characteristics of queuing system, Classification of Queuing Model Single Channel Queuing Theory, Generalization of steady state M/M/1 queuing models (Model-I, Model-II). Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement.	**14**
III	Cost involved in inventory problem- single item deterministic model economics long size model without shortage and with shorter having production rate infinite and finite. Introduction, solution of sequencing problem Johnson s algorithm for n jobs through 2 machines.	**14**

Reference Books:

1. L. R. Foulds, An Introduction Optimization Techniques Undergraduate Texts in Mathematics 1981
2. A.R., Balling, R., and J.D. Hedengren Optimization Methods for Engineering Design, Parkinson, Brigham Young University, 2013.
3. C. B. Gupta, Optimization Techniques in Operation Research Paperback
4. R. Panneerselvam, Operations Research Paperback, Publisher: Prentice-Hall of India Pvt. Ltd; 2nd edition edition.

Paper Code & Title: **BC-405- Database Management System (DBMS)**

Credits Point**: 4**   L   T   P
                                                                                3   1   0

Unit	Contents	Contact Hours
I	Introduction: Characteristics of database approach, data models, database users, database schema, DBMS architecture and data independence, DBMS structure. E-R Modeling: Entity types, Entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, Sub classes; Super classes, inheritance, specialization and generalization. EER and ER to relational mapping: Data base design using EER to relational language.	14
II	File Organization: Indexed sequential access files; implementation using B & B++ trees, hashing, hashing functions, collision resolution, extendible hashing, dynamic hashing approach implementation and performance. Relational Data Model: Relational model concepts, relational constraints, relational algebra SQL: SQL queries, programming using SQL.	14
III	Database Normalization: Functional Dependencies, Normal form up to 3rd normal form. Concurrency Control: Transaction processing, locking techniques and associated, database recovery, security and authorization. Recovery Techniques, Database Security.	14

Reference Books:

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, "Database Systems Concepts", 4th Edition, McGraw Hill, 1997.
2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
3. A.K.Majumdar, P. Bhattacharya, "Database Management Systems", TMH, 1996.
4. Bipin Desai, "An Introduction to database systems", Galgotia Publications, 1991

Paper Code & Title: **BC-501-Java Programming**

Credits Point**: 4**

		L	T	P
		3	1	0

Unit	Contents	Contact Hours
I	Internet: Internet, Connecting to Internet: Telephone, Cable, Satellite connection, Choosing an ISP, Introduction to Internet services, E-Mail concepts, Sending and Receiving secure E-Mail, Voice and Video Conferencing. Core Java: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.	14
II	Java Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame. JDBC: The connectivity Model, JDBC/ODBC Bridge, (5) java.sql package, connectivity to remote database, Navigating through multiple rows retrieved from a database.	14
III	Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, The Java Beans API, Session Beans, Entity Beans, Introduction to Enterprise Java beans (EJB),Introduction to RMI (Remote Method Invocation): A simple client-server application using RMI. Java Servlets: Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies, Introduction to Java Server pages (JSP).	14

Reference Books:

1. Margaret Levine Young, "The Complete Reference Internet", TMH Education Pvt. Ltd.
2. Thampi, "Object Oriented Programming in JAVA" Wiley Dreamtech Publication.
3. Balagurusamy E, "Programming in JAVA", Tata Mcgraw-hill Education Pvt. Ltd.
4. Dustin R. Callway, "Inside Servlets", Addison Wesley.
5. Mark Wutica, "Java Enterprise Edition", QUE.
6. Steven Holzner, "Java2 Black book", Wiley Dreamtech Publication.
7. Liang, "Introduction to Java Programming, Comprehensive Version", Pearson Education.
8. Deitel and Deitel, "Java: How to Program" PHI Learning Private Limited, Delhi India

Paper Code & Title: **BC-502-Artificial Intelligence**

Credits Point**: 4**

			L	**T**	**P**
			3	**1**	**0**

Unit	Contents	Contact Hours
I	Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing. Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.	**14**
II	Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks. Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning.	**14**
III	Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.	**14**

Reference Books:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", TMH Education Pvt. Ltd.
3. E. Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
4. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India

Paper Code & Title: **BC-503- Computer Graphics & Multimedia**

Credits Point**: 4**

		L	T	P
		3	1	0

Unit	Contents	Contact Hours
I	Computer Graphics : definition, classification & Applications, Development of Hardware & Software for Computer Graphics. Display devices, Hard copy devices. Interactive Input devices, display processor, Line drawing; various algorithms and their comparison, circle generation- Bresenham's mid-point circle drawing algorithm, mid-point ellipse drawing algorithm. Attributes of output primitives, line style, color and intensity, Area filling algorithms, Scan line algorithm, boundary fill flood fill algorithm, Ant aliasing techniques. Two dimensional transformations; translation, scaling, rotation, reflection sheering, composite transformation, transformation commands, character generation.	14
II	Viewing coordinates, Window, view port, clipping, Window to view port transformation, line clipping algorithm; Cohen Sutherland, polygon clipping; Sutherland hodgman algorithm, 3D clipping: normalized view volumes, view port clipping, clipping in homogeneous coordinates. Illumination model: Light sources, diffuse reflection specular reflection, reflected light, intensity levels, surface shading; phong shading ground shading, color models like RGB, YIQ, CMY, HSV etc.	14
III	3-D Viewing: Three-dimensional concepts, 3D display techniques, 3D representation polygon & curved surfaces. Design of curves & surfaces- Bezier's Method, B-Spline methods, 3D transformation transition, scaling, composite transformation rotation about arbitrary axis, projections: Parallel & Perspective, Hidden surface and line removal; back face removal, depth buffer and scan line methods. Introduction to multimedia, multimedia components, multimedia hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia tools, presentations tools, Authoring tools, presentations.	14

Reference Books:

1. D.Hearn and M.P. Baker "Computer Graphics" (2nd ed), PHI.
2. S. Harrington – "Computer Graphics - a Programming approach" (2nd ed) McGrawhill.
3. New Mann & Sprovl- "Principles of interactive computer graphics" (2nd ed) McGrawhill.
4. Roger S. David "Procedural Elements for Computer Graphics", McGraw Hill.
5. Roger S David "Mathematical Elements for Computer Graphics", McGraw Hill.
6. Foley & Vandan "Computer Graphics Principles & Practice in "C" "Addision Wesly.
7. Tay Vaugham " Multimedia Making it Work" 5th Ed. 2001, Tata McGraw Hill.
8. Prabhat K. Andleigh & Kiran Thakur "Multimedia System Design", PHI
9. Drew, "Fundamentals of Multimedia", Pearsons.
10. Nigel Chapman, J. Chapman "Digital Multimedia" Wiley India.

Paper Code & Title: **BC-504- Linux Environment**

Credits Point**: 4**

	L	T	P
	3	**1**	**0**

Unit	Contents	Contact Hours
I	Overview of Linux : What is Linux, Linux's root in Unix, Common Linux Features, advantage of Linux, Overview of Unix and Linux architectures, Linux files system, hardware requirements for Linux, Linux Internals: Introduction, Process Management, System Calls. Linux File system: Logging in, getting familiar with Linux desktop, shell interface, understanding Linux Shell, Types of Text Editors, using vi editor, prompt character, correcting typing errors, simple shell commands-date, cal, who, tty, uname, password, bc, script, echo, logging out, Environment variables, wild card characters, *, ?, absolute and relative path, listing files and directories commands, navigating file system- pwd, cd, mkdir, rmdir, ls, pr, Handling ordinary files- cat, cp, mv, wc, rm, comm.., amp, diff, Basic files attributes – file permissions, changing permissions.	**14**
II	Processes and filters : Simple filters- head, tail, cut, paste, sort, uniq, tr, Regular expression Grep utility, Shell command line, redirection, pipeline, spilt output, tee, and process- System Processes, internal and external commands, background process, premature termination of process, process priorities, process scheduling – (at, batch), nohup command. Shell Programming: Interactive scripts, Shell variables, assigning values to variables, positional parameters, command line arguments, arithmetic in shell script, exit status of a command, sleep and wait, script termination.	**14**
III	Decision taking- if else, nested if, file tests, string tests, case control structure. Loop control structure- while, for, IFS, break, continue, $* and $@, logical operators & and executing script, Debugging a script, Debugging a script, executing multiple scripts System Administration : Configuration of Linux, Installation of Linux, Connecting to remote machines- ftp, telnet, Adding and removing users.	**14**

Reference Books:

1. Kathleen Donovan, Linex (Red Hat) Introduction Spiral-bound – 2000, Element K Press; Instructor's Edition edition (2000).
2. James K. L. Linux : Learning The Essentials, Phi Learning Pvt. Ltd. 2012.
3. David Brickner - O'Reilly Media Test Driving Linux: , 2005