

# DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

**SYLLABUS FOR BCA PROGRAMME**



**RAJIV GANDHI UNIVERSITY,  
RONO HILLS, DOIMUKH**

## Course Structure

### FIRST SEMESTER

Paper Code	Title	Credit	Mark Distribution			
			End Semester	Sessional	Practical	Total
CSUG-101	Fundamental of Computers	3-1	50	20	30	100
CSUG-102	Introduction to Programming	2-2	50	20	30	100
CSUG-103	Digital Electronics	3-1	50	20	30	100
CSUG-104	Mathematics –I	3-0	80	20	-	100
CSUG-105	Sociology and Environmental Studies	2-0	80	20	-	100

### SECOND SEMESTER

Paper Code	Title	Credit	Mark Distribution			
			End Semester	Sessional	Practical	Total
CSUG-106	Computer Organization and Architecture	3-0	80	20	-	100
CSUG-107	Introduction to Theoretical Computer Science	3-0	80	20	-	100
CSUG-108	Data Structure	3-1	50	20	30	100
CSUG-109	Object Oriented Programming	3-1	50	20	30	100
CSUG-110	Mathematics –II	3-0	80	20	-	100

### THIRD SEMESTER

Paper Code	Title	Credit	Mark Distribution			
			End Semester	Sessional	Practical	Total
CSUG-201	Java Programming	2-2	50	20	30	100
CSUG-202	Introduction to Database Management System	3-1	50	20	30	100
CSUG-203	Operating System	3-1	50	20	30	100
CSUG-204	Data Communication and Computer Network	3-0	80	20	-	100
CSUG-205	Financial Management Concept and Techniques	3-0	80	20	-	100

#### FOURTH SEMESTER

Paper Code	Title	Credit	Mark Distribution			
			End Semester	Sessional	Practical	Total
CSUG-206	Internet and E-Commerce	3-1	50	20	30	100
CSUG-207	Computer Graphics and Multimedia	3-1	50	20	30	100
CSUG-208	System Software	3-0	80	20	-	100
CSUG-209	ICT Hardware	2-2	50	20	30	100
CSUG-210	Algorithm Design	3-0	80	20	-	100

#### FIFTH SEMESTER

Paper Code	Title	Credit	Mark Distribution			
			End Semester	Sessional	Practical	Total
CSUG-301	Programming Paradigm	3-1	50	20	30	100
CSUG-302	Software Engineering	3-1	50	20	30	100
CSUG-303	Communication Skills and Technical writing	2-0	80	20	-	100
CSUG-304	Project – I	0-6	-	-	-	200

#### SIXTH SEMESTER

Paper Code	Title	Credit	Mark Distribution			
			End Semester	Sessional	Practical	Total
CSUG-305	System and Network Administration	3-1	50	20	30	100
CSUG-306	Principle of Management	2-0	80	20	-	100
CSUG-307	Project – II	0-8	-	-	-	300

# **BACHELOR OF COMPUTER APPLICATIONS (BCA)**

## **FIRST SEMESTER**

### **CSUG- 101: FUNDAMENTALS OF COMPUTERS (3-1)**

Current trends in Computer System, current hardware and software. Functional units comprising a typical computer configuration: input/output, fixed and removable data storage, internal storage, control and arithmetic/logic unit. The concepts relating to execution speed, data access times, storage capacities and similar comparative aspects of hardware performance.

The alternatives available for hardware configuration, including mainframe architecture, stand-alone workstations, networks, client-server.

The alternatives available for data storage, their operational characteristics and relative advantages and disadvantages.

Operating Systems, Windows, Linux etc. Application software, role and functions of commonly available applications such as word processors, spreadsheets, SPSS, data managers, presentation and publication software etc.

Programming Concept: Flow charts and algorithms. Data communications concepts, transmission media; network concepts such as network types, network topologies and TCP/IP; Hardware essentials for a computer network; Computer network applications, typical applications within an organisation, e.g. financial, inventory and personnel management.

Internet, Multimedia, WWW, FTP, E-mail, Web pages. Concept of VPNs, Corporate Networks. Concept of Network security and management.

#### **Books/References:**

1. Fundamentals of Computers, ITL ESL, PEARSON, 1<sup>st</sup> Edition, 2007
2. Fundamental of Computer Science and Information Technology: U K Singh, S Jain, AMaheshwari, SSDN Publication, 1<sup>st</sup> Edition, 2012.
3. Foundations of Information Technology: D. S. Yadav; New Age International, 3<sup>rd</sup> Edition, 2006.

### **CSUG-102: INTRODUCTION TO PROGRAMMING(2-2)**

The problem solving process and strategies; programming paradigms – procedural, structured, object oriented and generic approaches; algorithms; programs (algorithm+data structure); data abstraction.

Basic data types and fundamental programming constructs (control structures); syntax and semantics of a higher-level language; variables, constants, operators, expressions, and assignment; functions as building blocks of structured programming; recursions; searching and

sorting algorithms. Array data type and use of arrays; character data type and text processing; functional and procedural abstraction; Pointer data type and simple applications of pointers.

Principle of modeling (abstraction and decomposition); graphic models for structured programming; problems with structured programming; modular programming and abstract data types; program design and evaluation (module coupling and module strength); problem solving using structured programming - coding, debugging and testing using C.

### **Books/References:**

1. The C Programming Language (Ansi C Version), Brian W. Kernighan, Dennis M. Ritchie, PHI Learning
2. Computing Fundamentals and C Programming, Balaguruswamy, TMH
3. Programming Language-Paradigm and Practice, Doris Appleby, Julius J. VandeKopple, TMH
4. Mastering C Programming, Dixit, New Age

### **CSUG-103: DIGITAL ELECTRONICS (3-1)**

#### **UNIT – I**

Data types and Number systems, Binary number system, Octal & Hexadecimal number system, 1's & 2's complement, Binary Fixed-Point Representation, Arithmetic operation on Binary numbers, Overflow & underflow, Floating Point Representation, Codes, ASCII, EBCDIC codes, Gray code, Excess-3 & BCD, Error detection & correcting codes

#### **UNIT – II**

Logic Gates, AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates, Boolean Algebra, Basic Boolean Law's, Demorgan's theorem, MAP Simplification, Minimization techniques, K -Map , Sum of Product & Product of Sum

#### **UNIT – III**

Combinational & Sequential circuits, Half Adder & Full Adder, Full subtractor, Flip-flops - RS, D, JK & T Flip-flops, Shift Registers, RAM and ROM, Multiplexer, Demultiplexer, Encoder, Decoder, Idea about Arithmetic Circuits , Program Control, Instruction Sequencing

#### **UNIT – IV**

I/O Interface , Properties of simple I/O devices and their controller, Isolated versus memory-mapped I/O, Modes of Data transfer, Synchronous & Asynchronous Data transfer, Handshaking, Asynchronous serial transfer, I/O Processor

#### **UNIT – V**

Auxiliary memory, Magnetic Drum , Disk & Tape, Semi-conductor memories , Memory Hierarchy, Associative Memory, Virtual Memory, Address space & Memory Space, Address

Mapping, Page table, Page Replacement, Cache Memory, Hit Ratio, Mapping Techniques, Writing into Cache.

**Books/References:**

1. BARTEE, Digital Computer Fundamentals ,TMH Publication.
2. MALVINO, Digital Computer Electronics, TMH Publication.
3. MORRIS MANO, Computer System Architecture, PHI Publication.

**CSUG-104: MATHEMATICS-I(3-0)**

**Set Theory:**

- Set, relations, equivalence relations; mappings-one-one and on to ;
- Definition of an algebraic structure;
- **Introduction to** groups, subgroups, normal subgroups, isomorphism, homeomorphism; automorphism of groups; semigroups, monoids, rings, vector space.

**Matrix and Determinant:**

- Matrices and system of linear equations; Determinants; Algebra of Matrices, Inverse of Matrices, Solution of linear equation by matrices.

**Logic :**

- Logic operators, Truth table, Normal forms
- Theory of inference and deduction.
- Mathematical induction.
- Predicate calculus; predicates and quantifiers.
- Boolean algebra.
- Lattice.

**Combinatorics :**

- Basic counting techniques.
- Permutations and combinations, the Binomial theorem
- Recurrence relations and their solutions.
- Generating functions.

**Graph Theory:**

- Elements of graph theory; Circuits and graph theory; Trees; Applications of graphs as models

**Books/References:**

1. Discrete Mathematics: D. P. Acharjya; New Age International
2. Discrete and Combinatorial Mathematics: Ralph P Grimaldi; Pearson Education

**CSUG-105: SOCIOLOGY AND ENVIRONMENT (2-0)**SOCIOLOGY PART:

**The nature of sociology:** The meaning of sociology, the scientific and humanistic orientations to sociological study.

**Basic concepts:** Society, community, institution, association, group, social structure, status and role etc.

**Institutions:** Family and kinship, religion, education, politics, etc.

**The individual in/and society:** Society, culture, and socialization, relation between individual and society Social control: norms, values, and sanctions.

**Social change:** Meaning and type: evolution and revolution, progress and development, factors of social change.

**The uses of sociology:** Introduction to applied sociology, sociology and social problems, sociology and social change, sociology and social policy and action, sociology and development, sociology and professions.

ENVIRONMENT PART:

Environmental studies: definition, scope and importance.

Need for public awareness:

Institutions in environment, people in environment

Natural resources: introduction:

Natural resources and associated problems

Non-renewable resources

Renewable resources

Forest resources: use and over-exploitation, deforestation timber extraction, mining, dams and their effects on forests and tribal people

Water resources: use and over-utilisation of surface and ground water floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources

Food resources: world food problems, changes in land use by agriculture and grazing, effects of modern agriculture, fertilizer/ pesticide problems, water logging and salinity

Energy resources: increasing energy needs, renewable/ non renewable, use of alternate energy sources

Land resources: land as a resource, land degradation, man-induced land-slides soil erosion and desertification.

Role of an individual in conservation of natural resources.

Equitable use of resources for sustainable lifestyles.

Ecosystems:

Concept of an ecosystem

Biodiversity and its conservation:

Definition: genetic, species, ecosystem diversity

Value of biodiversity: consumptive, productive use, social, ethical, aesthetic and option values

Biodiversity at global, national and local levels

India as a mega diversity nation

Endangered and endemic species of india

Environmental pollution:

Definition, causes, effects and control measures of:

Air, water, soil, marine, noise, thermal pollution and nuclear hazards

Role of individuals in pollution prevention.

Disaster management: floods, earthquakes, cyclones, landslides.

Urban problems related to energy.



Water conservation, rain water harvesting, watershed management.

Environmental ethics: issues and possible solutions .

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and nuclear holocaust.

Environment protection act.

Population explosion – family welfare program.

Environmental and human health.

Human rights.

HIV/AIDS.

Women and child welfare.

Role of information technology in environment and human health.

**Books/References:**

1. UGC recommended Text Book on Environmental Studies available free in the UGC website, [www.ugc.ac.in](http://www.ugc.ac.in)
2. Introductory level books on Sociology, or/and materials/references recommended/provided by the instructor/department.

## SECOND SEMESTER

### **CSUG-106:COMPUTER ORGANISATION AND ARCHITECTURE(3-0)**

**UNIT-I:** Instruction set architecture- types, formats, addressing modes; Register set; Processor organization, Register organization and stack organization. Assembly language programming. Data path organization, Control unit design - Hardwired control, Microprogramming.

**UNIT-II:** Computer arithmetic- Review of addition and subtraction; Multiplication- Booth's, Array; Division- Restoring and non-restoring; Floating point arithmetic. ALU.

**UNIT-III:** Memory Organization: Interfacing of memory with processor, Memory hierarchy, Multiple-module memory, Cache memory, Virtual memory. Memory Devices.

**UNIT-IV:** Input/ output Organization: Synchronization of data transfer- strobed and handshaking; I/O mapping and control- Program controlled, Interrupt driven, DMA, Interrupt and DMA mechanisms and controllers.

**UNIT-V:** CISC and RISC architecture, Instruction pipelining. Concept of parallel processing.

#### **Books/References:**

1. Computer organization and architecture: Williams Stallings, PHI Pvt. Ltd.
2. Structured Computer organization: Tanenbaum, PHI Pvt. Ltd.
3. Computer organization: Carl Hamachar, ZvonkoVranesic and SafwatZaky, McGraw Hill International/Tata McGraw Hill.

### **CSUG-107: INTRODUCTION TO THEORETICAL COMPUTER SCIENCE (3-0)**

**UNIT I:** Basics of Theory of Computation; Discrete Structure, Logic Automata, Computational Complexity. Algorithm Design Techniques : Recursion, Iteration, etc. Static & Dynamic Data Structures.

**UNIT II:** Alphabets, classes of Languages, formal Grammars. Finite automata: regular expressions, regular languages.

**UNIT III:** Time complexity and NP-completeness. Applications to programming languages and analysis of algorithms.

**UNIT IV:**Context free languages: pushdown automata, DCFLs, LL(k) and LALR grammars. Context sensitive languages: linear bound automata.

**UNIT V:** Turing machines: recursively enumerable languages. Operations on formal languages and their properties. Decision questions on languages, decidable and Undecidable problems.

**Books/References:**

1. Theory of Computer Science: K L P Mishra, N Chandrasekaran; PHI Pvt. Ltd.
2. Theory of Computation: A M Natarajan, A Tamilarasi, P balasubramani; New Age International
3. Discrete and Combinatorial Mathematics: Ralph P Grimaldi; Pearson Education
4. Introduction to Automata Theory: John E Hopcroft, Rajeev Motwani, Jeffrey D Ullman; Pearson Education

**CSUG-108: DATA STRUCTURES(3-1)**

*Basic Concepts:* Data Structures, Algorithms, Complexity of algorithms.

*Basic data types, Lists, Stacks, Queues.*

*Trees:* Definition and Implementation; Binary trees, Tree traversal, Postfix, Prefix notations.

*Sets:* Implementation; Dictionary, Hash table, Priority queues; Advanced Set Representation Methods - Binary search tree, AVL tree, Balanced tree, Sets with Merge and Find operation.

*Directed graphs:* Representation; Single source shortest path problem, All pair shortest path problem, Transitive closure.

*Undirected graph :* Minimum spanning tree

*Sort Algorithms:* Quick-sort, Heap-sort, Bin-sort, Selection,

*Memory management, Garbage Collection.*

**Books/References:**

1. Data Structures using C and C++ Yedidyahlangsam, Moshe J. Augenstein, Aaron M. Tenenbaum, PHI (EEE)
2. Data Structures and Algorithms: Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Pearson
3. Data Structures in C++: N.S. Kutti, P.Y. Padhye, PHI

## **CSUG-109:OBJECT ORIENTED PROGRAMMING (3-1)**

**Unit I:** Structured Programming & Object oriented Programming Paradigms.

**Unit II:** Classes, objects, abstraction and encapsulation; constructors and destructors; friend functions and class; inheritance, polymorphism and overloading; templates; exception handling, RTTI, STL;

**Unit III:**OO design basics: finding objects (informal descriptions, domain analysis, etc.), finding classes, classification techniques, class roles, finding interactions, etc., Dynamic Model and functional Model; Phases of Object oriented Development.

**Unit IV:** Unified Modeling Language (UML) : History, Goals, Concepts of UML.

UML Views: Static View, Case View, Interaction View, State Machine View, Activity View, Physical View, and diagrammatic representations.

Case studies in object oriented application design.

### **Books/References:**

1. Herbert Shield: The Complete Reference to C++, Tata McGraw Hill.
2. Ram Baugh et al: Object Oriented Modeling and Design, PHI(EEE).
3. Ram Baugh, Booch, Jacobson: Unified Modeling Language Reference Manual.

## **CSUG-110: MATHEMATICS II(3-0)**

Limits & continuity; Differentiation & its applications; Integration & its applications; Derivatives of elementary functions and their inverse, L'Hospital's rule. Extreme values of functions.

Techniques of integration (substitution, by parts, partial fraction, trigonometric integrals, trigonometric substitution);

Elementary ideas of Series and Sequence of real numbers and their convergences by GP series and ratio test.

Elementary ideas of Functions of several variables and partial derivatives; Introduction to ordinary differential equations.

Error analysis; Solving linear and nonlinear equations by approximation, Newton Raphson method; Interpolation and extrapolation; Numerical integration.

### **Books/References:**

1. Differential Calculus: Das and Mukherjee, S. Chand
2. Integral Calculus: Das and Mukherjee, S. Chand
3. Finite Diffrence: H. C. Saxena;



## **THIRD SEMESTER**

### **CSUG-201- JAVA PROGRAMMING (2-2)**

**UNIT1:** Introduction - History-Java and the Internet-Java Applets and Applications-Features of Java-Data types-Literals-Variables-Type conversion and casting-Arrays-one and Multidimensional arrays-Operators-Arithmetic, Boolean logical, Relational and Bitwise operators-Operator Precedence. Classes and Objects - General form of a class-Creating objects-Constructors-Parameterized constructors-Defining methods-Overloading methods-Returning a value-Returning an object-Recursion-Access control-Garbage collection-finalize () method-this keyword and instance variable hiding-Static variables and methods-Defining constants using final.

**UNIT 2:** String Handling - String Constructors-String length-String Literals-String Concatenation-String concatenation with other data types-String conversion and toString()-Character Extraction- String Comparison-Searching Strings- Modifying a String- Data Conversion and valueOf()-Changing the case of characters-String Buffer.

**UNIT 3:** Inheritance - Basics-Member Access and Inheritance- Super class variable referring to a sub class-Applications of keyword super- Creating a Multilevel Hierarchy-Order of calling constructors-Method Overriding-Dynamic method dispatch-Abstract classes-Using final with Inheritance. Packages and Interfaces - Defining a package- CLASSPATH -Defining an Interface - Implementing interfaces-Variables in interfaces-Extending interfaces.

**UNIT 4:** Exceptions- Types - Uncaught Exceptions - try and catch - Multiple catch - Nested Try - throw, throws and finally-Built-in Exceptions. Multithreaded Programming - The Java Thread Model- Thread Priorities- Synchronization.

**UNIT 5:** Java.io Package-I/O Basics-Reading console Input-Writing console output-PrintWriter class-Reading and Writing files-Java I/O classes and interfaces-File class-Stream classes-Byte Streams-Character Streams.

**UNIT 6:** Applets-Applet basics-Applet Architecture-Applet life cycle-Applet display methods-Repaint-Status window-passing parameters to applets-getDocumentBase() and getCodeBase()-

AppletContext and showDocument().Event Handling-Event handling mechanisms-Delegation Event Model-Event classes-Sources of events-Event listener interfaces-Handling mouse and keyboard events-Adapter classes-Inner classes.

**UNIT 7:** AWT-AWT classes-Window fundamentals-working with frame windows-Creating a frame window in an applet-Creating a windowed program-Displaying information within a window AWT Controls, Layout Managers and Menus – Control fundamentals-Labels-Buttons-CheckBoxes-CheckBoxGroup-ChoiceControl-Lists-ScrollBar-TextField-TextArea-LayoutManagers-MenuBar and Menus-DialogBoxes-FileDialog- Handling events by extending AWT components.

**Books/References:**

1. Herbert Schildt, The Complete Reference- Java, TMH Publication
2. Deitel and Deitel, Java Programming, PHI
3. E. Balagurusamy, Programming with JAVA a Primer, TMH Publication

**CSUG-202: INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS (3-1)**

*Overview :* Concept of database, data independence, redundancy Control; Database architecture - ANSI model.

*Modeling of real world situation:* Entity-relationship model; Data models: Network, Hierarchical, Relational.

*Relational data model:* DDL, DML: relational algebra and calculus; functional dependencies, normal forms, decomposition, integrity rules; Query languages for relational systems: SQL, QBE, query optimization, embedded SQL.

Database transactions, concurrency control, recovery and security issues in databases.

*Brief treatment of:* Client-server models, distributed databases, object-oriented databases, deductive databases, multimedia databases, active databases.

**Books/References:**

1. Database system concepts: Silberschatz and Korth; McGraw Hill.
2. Fundamentals of database systems: Elmasri and Navathe; Narosa Publishing
3. Database Management System: Rajesh Narang; PHI Pvt. Ltd.
4. Database Development: An Overview: NIIT: PHI Pvt. Ltd.

## **CSUG-203: OPERATING SYSTEM (3-1)**

**INTRODUCTION:** Operating System, Multiprocessor Systems, Distributed Systems, Parallel Systems, Real-Time System, Batch processing System, Computing Environments

**COMPUTER- SYSTEM STRUCTURES :**Computer- System Operation, I/O Structure, Storage Structure, Storage Hierarchy, Hardware Protection, Network Structure

**OPERATING SYSTEM STRUCTURES:** System Components, Operating- System Services, System Calls, System Programs, System Structure, Virtual Machines, System Design and Implementation, System Generation

**PROCESSES AND MULTITHREADING:** Process Concept, Process Scheduling, Operations on Processes, Cooperating Processes, Interprocess Communication, Communication in Client – Server Systems, Multithreading Models

**CPU SCHEDULING:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Algorithm Evaluation, Process Scheduling Models

**MEMORY MANAGEMENT:** Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging,

**FILE- SYSTEM INTERFACE & IMPLEMENTATION: File-system interface-**File Concept, Access Methods, Directory Structure, File- System Mounting, File Sharing, Protection.**File System implementation-**File- System Structure, File- System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and performance, Recovery

**I/O SYSTEMS& MASS STORAGE STRUCTURE: I/O Systems:** I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O to Hardware Operations, STREAMS, Performance. **Mass Storage Structure:** Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management.

### **Books/References:**

1. Tanenbaum, Operating System, Pearson Education
2. Milenkovic, Operating Systems: Concepts and Design, McGraw Hill.
3. Sillberschatz et. al, Operating Systems, Wiley India.
4. Bill Fenner, A M Rudoff, UNIX network programming Vol-1: W R Stevens, PHI Pvt. Ltd.

## **CSUG-204: DATA COMMUNICATION AND COMPUTER NETWORK (3-0)**

1. Data Communication
  - 1.1 Data Communication concepts and terminologies
    - 1.1.1 Data representation
    - 1.1.2 Data transmission
    - 1.1.3 Transmission channels



- 1.1.4 Signal encoding
- 1.1.5 Transmission impairments
- 1.2 Transmission media
  - 1.2.1 Guided transmission media
    - Twisted pair, Coaxial and Optical fiber*
  - 1.2.2 Wireless transmission
    - Terrestrial microwave, satellite microwave, Broadcast Radio and Infrared*
- 1.3 Data communication interface
  - 1.3.1 Asynchronous and Synchronous transmission
  - 1.3.2 Baseband and Broadband transmission
  - 1.3.3 Modulation methods
  - 1.3.4 Modems
  - 1.3.5 Multiplexing
- 2. Evolution of computer networks:
  - 2.1 Circuit switching
  - 2.2 Development of packet switching: 1961-1972
  - 2.3 Proprietary networks and internetworking: 1972-1980
  - 2.4 Proliferation of networks: 1980-1990
  - 2.5 The internet explosion: 1990s
- 3. Network standards and protocols
  - 3.1 The IEEE standards
  - 3.2 OSI 7 layer model
  - 3.3 TCP/IP protocol suit
- 4. OSI model implementation
  - 4.1 Data Link Layer: Frame design, Flow control, Error handling, HDLC, PPP, Sliding window protocol
  - 4.2 Network Layer: IPv6, X.25, Frame Relay, ATM, Routing, Queuing theory
  - 4.3 Transport Layer: TCP, UDP, Congestion control, Flow control, Socket interface
  - 4.4 Application Layer: SNMP, Authentication, Encryption, Web and HTTP, FTP, Email, DNS, Network File System (NFS) and File sharing, Remote Procedure Calling (RPC)
- 5. Local Area Network (LAN)
  - 5.1 Needs, Architecture and Technology
  - 5.2 Ethernet: CSMA/CD operation, parameters and specifications
  - 5.3 Cabling: 10Base5, 10Base2, 10BaseT, 10BaseF, Hubs, patch panels and wiring closets
  - 5.4 Bridges, Switches, 100BaseT, 100BaseVGANY, Gigabit Ethernet
  - 5.5 FDDI, Token Ring, Wireless, ISDN, B-ISDN
- 6. VSAT technology
- 7. Multimedia networks
- 8. Network Computing
- 9. Network security and management

### **Books/References:**

1. Stallings, W.; Data and Computer Communications; Prentice Hall of India.
2. Tanenbaum A.S.; Computer Networks; Prentice Hall of India.

3. Kurose and Ross; Computer Networking; Addison Wesley
4. Prakash C. Gupta; Data Communication; Prentice Hall of India

### **CSUG-205: FINANCIAL MANAGEMENT: CONCEPT AND TECHNIQUES(3-0)**

**Unit I:** An overview of entrepreneurship, Entrepreneurial characteristics, Rewards and drawbacks of entrepreneurship, Entrepreneurship and innovation, Entrepreneurial creative-innovative process, Planning finance for entrepreneurial ventures, Organizing and financing the new venture, Marketing and new venture development, Product and service concept for new ventures, Managing entrepreneurial ventures.

**Unit II:** Financial Management: Meaning and role. Ratio Analysis, Fund Flow statements : Meaning of the terms- fund, flow and fund, working capital cycle, preparation and interpretation of the fund flow statement. Costing : Nature, Importance and basic principles. Budget and Budgetary Control : Nature and scope, Importance, Method of finalization of master budgets and functional budgets.

**Unit III:** Financial records and statements. Principles and practices of financial managements. Tools for financial management. IT as a tool for financial management.

Current trends in electronic financial management.

**Unit IV:** Accounting : Principles, Concepts and conventions, Double entry system of Accounting, Introduction of basis books of accounts of sole propriety concern, Control accounts for debtors and creditors, closing of books of accounts and preparation of Trail Balance. Final Accounts: Trading, Profit and Loss Accounts and Balances Sheet of Sole Proprietary concern with normal closing entries.

**Unit V:** Introduction to Computerised Accounting Systems : Master files, Transaction files, Introduction to documents used for data collection, processing of different file and output obtained.

#### **Books/References:**

1. Financial Accounting: Maheswari S. K.: TMH publishers
2. Financial Management: Khan M. Y. and Jain, P K., TMH publishers
3. Fundamentals of Business Organisation and Management: Y. K. Bhusan: Sultan Chand Publication

## **FOURTH SEMESTER:**

### **CSUG-206:INTERNET AND E-COMMERCE (3-1)**

**UNIT-I:** Internet: Evolution, Concepts, Internet Vs Intranet, Growth of Internet , ISP, ISP in India, Types of connectivity - Dial-up, Leased line , DSL, Broadband , RF, VSAT etc., Methods of sharing of Internet connection, Use of Proxy server. Internet Services – USENET, GOPHER, WAIS, ARCHIE and VERONICA, IRC WORLD WIDE WEB (WWW) - History, Working, Web Browsers, Its functions, URLs, websites, Domain names, Portals. Concept of Search Engines, Search engines types, searching the Web, WebServers, TCP/IP and others main protocols used on the Web. E-Mail: Concepts, POP and WEB Based E- mail, merits, address,

Basics of Sending & Receiving, E-mail Protocols, Mailing List, Free E-mail services, e -mail servers and e-mail clients programs .

**UNIT-II:** Concepts of Hypertext, HTML introduction, features, uses & versions Using various HTML tags, Elements of HTML syntax, Head & Body Sections, , Inserting texts, Text alignment, Using images in pages, Hyperlinks – text and images, bookmarks, Backgrounds and Color

controls, creating an d using Tables in HTML, and presentation, Use of font size & Attributes, List types and its tags. Cascading Style sheets – defining and using simple CSS.

**UNIT-III:** Introduction to WYSIWYG Design tools for HTML, Overview of MS Front Page, Macromedia Dream weaver , and other popular HTML editors, designing websites using MS FrontPage ( using atleast FrontPage 2000) Use of Frames and Forms in web pages, Image editors, Issues in Web site creations & Maintenance , Web Hosting and publishing Concepts , Hosting considerations, Choosing Web servers – Linux Vs Windows Web servers, Choosing Domain names, Domain name Registration, Obtaining space on Server for Website , FTP software for upload website . Add your website on search engines

**UNIT-IV:** Javascript Overview, Javascript and the WWW, Javascript vs. VBScript, Javascript vs. Java, Javascript versions, Script element,. Functions: Functions introduction, Calling functions, JavascriptComments, Variables: Variables overview, declaring variables, Types of variables, Casting variables, Alert box , Prompt &confirm. Expressions : Arithmetic operators, Assignment operators, Logical operators, Expressions and precedence , Statements: If statement, For statement, While statement, Break/Continue Creating arrays/ event handlers , JavaScript Object model, Object and Events in JavaScript – OnClick, On MouseOver, On Focus, OnChange, OnLoad etc. Getting data with forms.

**UNIT-V:** E - Commerce An introductions, Concepts, Advantages and disadvantages, Technology in E-Commerce , Internet & E-business, Applications, Feasibility & various constraints. E- transitionchallenges for Indian corporate , the Information Technology Act 2000 and its highlights related to e - commerce. Electronic Payment Systems: Introduction, Types of Electronic Payment Systems, Digital To ken-Base d Electronic Payment Systems, Smart Cards and Electronic Payment Systems, Credit Card- Based Electronic Payment Systems,

Risk and Electronic Payment Systems. E-security – Security on the internet, network and website risks for e-business, use of firewalls, secure physical infrastructure.

### **Books/References:**

1. Frontiers of Electronic Commerce, By- Kalakota, Ravi ; Stone, Tom ; Whinston, Andrew B, Addison Wesley Publishing Co , IS BN 81780 805 75
2. E-Commerce An Indian Perspective (Second Edition) – by P. T. Joseph, S.J. Prentice-Hall of India
3. Internet & Web Design By A . Mansor, PragyaPublications.
4. Learn HTML in a week end by Steven E . Calihan, PHI
5. Using HTML By Lee Anne Phillips, PHI
6. SAMS Teach Yourself Javascript in 24 Hrs. By Michael Moncur, TechMedia

### **CSUG-207: COMPUTER GRAPHICS AND MULTIMEDIA (3-1)**

**Unit I:** Nature and types of computer graphics, manual drafting vs computer graphics, functions and characteristics of computer graphics. Applications of computer graphics. Graphic Mathematics: cubic splines, bezier curves, regression analysis.

**Unit II:** Brief Review of input and output hardware. Computer output modes, display coordinate system, aspect ratio, aliasing and anti aliasing, limitation of raster scan, effects on prints and plots.

**Unit III:** Line drawing algorithm, scan conversion of lines, general techniques for scan conversion, parametric representation, incremental line drawing, DDA for straight lines, circles. Graphics environment, programming considerations: object and image, scaling, location, proportion, plotting, image plotting, sizing, sorting.

**Unit IV:** Window and viewport, Clipping, shading. Two-dimensional transformations, homogeneous coordinates and the use of matrices in representing chain of transformations.

**Unit V:** Review of typical interactive multimedia systems; Aspects of multimedia systems; Multimedia design techniques, Multimedia technology; Network-based multimedia systems.

### **Books/References:**

1. Introduction to Computer Graphics: N Krishnamurthy: Tata McGraw Hill
2. Computer Graphics: Zhigang Xiang, Roy A Plastock: Tata McGraw Hill
3. Computer Graphics using OpenGL: F.S. Hill, Jr.: Prentice Hall of India Pvt. Ltd.

## **CSUG-208: SYSTEM SOFTWARE (3-0)**

**Unit I:** Overview: Definition and classification of system software.

**Unit II:** Assembler: Assembly language, assembly process, assembler data structures, assembler macros and microprocessors.

**Unit III:** Linkers and loaders: Basic concepts, static and dynamic linking, shared libraries, loaders, overlays.

**Unit IV:** Compilers: Introduction and phases of a compiler: Lexical Analysis, parsing & intermediate code generation

### **Books/References:**

1. Aho, Ullman, Sethi, *Compiler Design*, PEARSON
2. Dhamdhere, *System Programming & Operating system*, Tata McGraw Hill

## **CSUG-209: ICT HARDWARE (2-2)**

**UNIT I:** Evolution of computer system, Modern computer, Classification of computer, Personal Computer hardware: Monitor, Keyboard, Mouse, Scanner, printer, speaker

**UNIT II:** Hard Disk Drive: logical structure and file system, FAT, NTFS. Hard disk tools: Disk cleanup, error checking, defragmentation, scanning for virus, formatting, installing additional HDD. New trends in HDD. Floppy Disk Drive

**UNIT III:** Optical Media, CDROM, theory of operation, drive speed, buffer, cache, CD-R, CD-RW, DVD ROM, DVD technology, preventive maintenance for DVD and CD drives. Recent trends and developments in related technologies. Driver installation, Writing and cleaning CD and DVD.

**UNIT IV:** Processor: Intel processor family. Latest trends in processor, Motherboard, Sockets and slots, power connectors. Peripheral connectors. Bus slots, USB, pin connectors. Different kinds of motherboards. RAM, different kinds of RAM. RAM upgradation. SMPS. BIOS.

**UNIT V:** Network Interface Card, network cabling, I/O Box, Switches, RJ 45 connectors, Patch panel, Patch cord, racks, IP address.

### **Books/References:**

1. Comdex: Hardware and Networking Course Kit: Vikas Gupta: DreamTech press
2. PC hardware: A beginners Guide: Ron Gilster: Tata McGraw Hill.

## **CSUG-210: ALGORITHM DESIGN (3-0)**

Review of basic data structures such as stack, queue, linked list, trees and graphs.

Algorithm Design Methods: General Consideration, Algorithm design paradigms

Divide and Conquer: Binary search, Merge Sort, Quick Sort, Arithmetic with Large integers

Greedy Method: Minimal Spanning Tree, Shortest Paths, Knapsack

Dynamic Programming: Chained Matrix Multiplication, Optimal Storage on Tapes, Shortest Paths, Optimal Search Trees

Backtracking: 8-queens problem, Graph Colouring, Hamiltonian Cycles

Branch and Bound: 0/1 Knapsack problem, Travelling Salesperson

Approximation: Graph Colouring, Task Scheduling, Bin Packing

Probabilistic Algorithms: Numerical Integration, Primality Testing

### **Books/References:**

1. Aho, J. Hopcroft and J.Ullman, The design and Analysis of Computer Algorithms, Addison Wesley.
2. E. Horowitz and S. Sahani, Fundamentals of Computer Algorithms, Galgotia, New Delhi.
3. S.E. Goodman and S.T. Hedetniemi, Introduction to the Design and Analysis of Algorithms, McGraw Hill.
4. G. Brassard and P.Bratley, Algorithmics, PHI.
5. S.K. Basu, Design Methods and Analysis of Algorithms, PHI.
6. T.H. Cormen, et. al, Introduction to Algorithm, PHI.

## FIFTH SEMESTER

### CSUG-301: PROGRAMMING PARADIGMS (3-1)

**Unit I:** Overview of the declarative style programming versus the imperative style.

**Unit II: Functional paradigm:** Introduction to value-oriental programming in the functional style in the context of a language such as ml, local definitions and scope, block structure, principle of qualification.

**Unit III:** Functions, principle of abstraction, call by name and call by value parameter passing mechanisms; principle of correspondence, recursive functions and their implementation, type checking, type constructions such as products, sums (tagged unions), function types (higher order functions), lists and user defined data types, parametric polymorphism (ml style) and simple programs using higher order functions, lists and other user defined types.

**Unit IV: Relational paradigm:** Introduction to logic programming using a language such as PROLOG.

**Unit V: Imperative paradigm:** Variable declarations and allocation of space, implementation of simple control constructs such as sequencing, conditionals and loops, block structure, parameter passing mechanisms (call by value, call by name), implementation of recursive procedures in a block structured language (call stacks and display records).

**Unit VI: Object oriented paradigm:** data abstraction, classes, inheritance, dynamic, dispatch, derived classes, friend classes, virtual functions, operator overloading, templates.

**Object oriented design methodology:** object oriented software architecture; introduction to uml.

#### Books/References:

1. Programming Languages – Concepts & Constructs , Ravi Sethi, Pearson Education.
2. Programming Languages – Design & Implementation , Terrance W. Pratt, Marvin V. Zelkowitz, Pearson Education.
3. Concepts of Programming Languages – Robert L. Sebesta, Pearson Education.

### CSUG-302: SOFTWARE ENGINEERING (3-1)

**Unit I: Introduction to software engineering:** Concept of a software project, size factor, quality and productivity factor different phases of Software development life cycle.

**Unit II: Software project management:** planning, scheduling, monitoring, controlling etc. requirements specifications

**Software design:** function oriented, object oriented approaches, user interfaces.

**Software programming:** Structured coding techniques, coding styles, standards.

**Unit III: Software verification and validation:** theoretical foundation, black box and white box approaches, integration and system testing

**Software reliability:** definition and concept of reliability, software faults, errors, repair and availability.

**Unit IV:** CASE studies

### **Books/References:**

1. Jalote, P., *An Integrated approach to software engineering*, Narosa Publishing House.
2. Pressman, R. S., *Software Engineering: A practical Approach*; McGraw-Hill.
3. Humphrey, W. S., *Managing software Procedures*, Addison-Wesley

### **CSUG-303: COMMUNICATION SKILLS AND TECHNICAL WRITING (2-0)**

**Unit I:** Communication: an overview; vitals of communication, creativity in communication, communications with concern and empathy, Johari window, interpersonal; communication, communicating body, body language, distance and positioning, body orientation.

**Unit II:** Hearing and Listening, barriers of good listening, Speaking, speech style, presentation, visual aids, group discussion, ,meeting, telephonic communication.

**Unit III:** Act of negotiation, negotiation style, know your opponent, hurdles in negotiation, negotiating cultural diversities.

**Unit IV:** Talk in team, team talk dynamics, social distance, conflict management, communication in teams.

**Unit V:** Instructional writing, abstract writing, business terminology, business letters, minute writing, report writing. Technical writing: Defining the objectives, identifying and assessing the audience, organization and language, writing process, technical reports, proposal writing, technical description, process description.

(In addition to those, students may go for self studies on topics like mind mapping, learning process, creativity and profession, creativity in workplace etc.,)

### **Books/References:**



1. Communication Skills for Engineers: Sunita Mishra, C. Muralikrishna; Pearson Education.
2. Professional Communication for UP Technical University: M Ashraf Rizvi; McGraw Hill.

**CSUG-304: PROJECT – I (0-6)**

## **SIXTH SEMESTER**

### **CSUG 305: SYSTEMS AND NETWORK ADMINISTRATION (3-1)**

Major components of the Linux operating systems. File system, setting user and group ownership of files and directories and access permissions, basic commands for starting and stopping processes, basic process attributes and their role in access control, mounting and unmounting file systems and partitions.

Python Programming:

Linux kernel program, starting and stopping a Linux system, setting up user and group accounts on single machines, the basics of backup and restore procedures.

Linux system monitoring and logging. Examining the list of running processes on the system and understand the data presented there. Monitoring memory usage and disk space usage on the system. Customizing system log configuration.

The rules governing IP address classes and netmasks, Configuring the resolver library to arrange for TCP/IP name service, Bringing interfaces up and down, and set their IP addresses and netmasks, Setting the default route in the kernel routing table. Understanding the significance of the /etc/services file and well-known port numbers, Configuring the inet daemon, Using telnet to contact servers directly, using the ping command to test network connectivity, netstat command to examine kernel tables pertaining to networking, traceroute command to discover network paths, tcpdump to examine all network traffic. Methods used to bring interfaces up and down.

Basics of configuring and using the Domain Name Service, sendmail, the Network Information System, Network File System: Structure and function of the Domain Name Service (DNS), Setting up a Linux machine to function as a DNS server, Configuring and using sendmail, Setting up an NIS domain with an NIS master server and NIS clients.

Basic network security issues and solutions.

Setting up a Linux machine to act as an NFS server, Setting up a Linux machine to act as an NFS client

Incremental back up. Monthly back. Mail server setup

#### **Books:**

1. Red Hat Linux: Proffitt: PHI
2. UNIX Network Programming- Vol-I and Vol-II: Stevens: PHI

### 3. Introduction to System Administration: IBM series: PHI

#### **CSUG306: PRINCIPLE OF MANAGEMENT (2-0)**

**Unit I:** Management: Meaning, nature, importance and elements of management. Administration and management, limitations of management. Levers of management. Development of management through different schools of management.

Critical study of Taylor, Fayol, Siman and Peter Brucker, Hawthorne experiments and contribution of behavioural scientists.

**Unit II:** Planning: Nature of planning, problems of planning, types of planning, steps in planning. Management by Objectives.

**Unit III:** Organization : Definition~ Theories of organization Classical, Neoclassical and modern theory. Principles of organization different approaches of analysis decision approach empirical approach etc. Types of organization~ line functional~ line of staff, formal and informal etc. Departmentation, delegation, de-centralization.

**Unit IV:** staffing: Nature and object, manpower planning, sources of supply of manpower, recruitment, training & development and leadership.

**Unit V:** Motivation: Meaning, importance, Financial and Non-financial incentives

**Unit VI:** Coordination: Meaning, importance, methods.

**Unit VII:** Controlling: steps involved in controlling, essentials of a good control system, budgetary and non-budgetary control.

**Unit VIII:** Decision making : Meaning, importance, process and quantitative techniques of decision making. Fore-casting: elements of forecasting, methods of forecasting.

**Unit IX:** Direction and communication: Meaning, types and importance.

**Unit X:** Management and Society: Need of management in society, Social responsibility of management.

#### **Reference Books:**

1. Harold Koontz, Principles Of Management (Ascent Series), TMH
2. D.K.Sharma, Business Administration, Centrum Press
3. Tripathi, Principles of management, TMH

#### **CSUG 307: PROJECT-II (0-8):**