

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

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

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

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, 1st Edition, 2007
2. Fundamental of Computer Science and Information Technology: U K Singh, S Jain, AMaheshwari, SSDN Publication, 1st Edition, 2012.
3. Foundations of Information Technology: D. S. Yadav; New Age International, 3rd 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, Exces-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 device s 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 landuse 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
2. Introductory level books on Sociology, or/and materials/references recommended/provided by the instructor/department.

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. Silberschatz, 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

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. Humphery, 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)