

BACHELOR OF COMPUTER APPLICATIONS
(BCA)
Session 2014-2015

Bachelor of Computer Applications Semester – I

Paper No.	Paper	M. Marks
Paper–I	Introduction to Programming C - I	75
Paper–II	Introduction to Computers and Information Technology	75
Paper–III	Mathematical Foundation of Computer Science	75
Paper–IV	Communication Skills in English – I	50
Paper–V	Punjabi / Basic Punjabi (Mudhli Punjabi) (Compulsory)	50
Paper–VI	Practical–I (MS Office 2010 and Basic C Programming)	75

Bachelor of Computer Applications (Semester – I)

Paper–I: Introduction to Programming (C) – I

M. Marks: 75

TERM –I (Before September 2014)

Logic Development and Program Development Tools: Data Representation, Flowcharts, Problem Analysis, Decision Trees/Tables, Pseudo code and algorithms.

Fundamentals: Character set, Identifiers and Key Words, Data types, Constants, Variables, Expressions, Statements, Symbolic Constants.

Operations and Expressions: Arithmetic operators, Unary operators, Relational Operators, Logical Operators, Assignment and Conditional Operators, Library functions.

Data Input and Output: single character Input, single character output, entering input data, more about scan functions, writing output data, more about print functions, gets and puts functions, interactive programming.

TERM –II (From September 2014)

Control Statements: Preliminaries, While, Do–while and For statements, Nested loops, If–else, Switch, Break – Continue statements.

Functions: Brief overview, defining, accessing functions, passing arguments to function, specifying argument data types, function prototypes, recursion.

Arrays: Defining, processing arrays, passing arrays to a function, multi–dimensional arrays.

Bachelor of Computer Applications (Semester – I)

Paper–II: Introduction to Computers and Information Technology

M. Marks: 75

TERM –I (Before September)

Introduction to Computers and its Applications:

- Computer as a system, basic concepts, functional units and their inter relation.
- Milestones in Hardware and Software.
- Batch oriented / on–line / real time applications.
- Application of computers.

Interacting with the Computer:

Input Devices: Keyboard, mouse, pens, touch screens, Bar Code reader, joystick, source data automation, (MICR, OMR, OCR), screen assisted data entry: portable / handheld terminals for data collection, vision input systems.

Output Devices: Monitor, Serial line page printers, plotters, voice response units.

Data Storage Devices and Media: Primary storage (Storage addresses and capacity, type of memory), Secondary storage, Magnetic storage devices and Optical Storage Devices

TERM –II (From September)

MS–Word: Overview, creating, saving, opening, importing, exporting and inserting files, formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering. Headings, styles, fonts and font size Editing, positioning and viewing texts, Finding and replacing text, inserting page breaks, page numbers, book marks, symbols and dates. Using tabs and tables, header, footer and printing

MS–Power Point: Presentation overview, entering information, Presentation creation, opening and saving presentation, inserting audio and video

Bachelor of Computer Applications (Semester – I)

Paper – VI: Practical – I
(MS Office 2010 & Basic C Programming)
M. Marks: 75

TERM – I (Before September)

1. C Programming

TERM – II (From September)

2. Windows Based Operating System
3. MS – OFFICE (Word and Power Point)

Bachelor of Computer Applications (Semester – II)

Semester – II

Paper No.	Paper	M. Marks
Paper – I	Introduction to Programming C – II	75
Paper – II	Principles of Digital Electronics	75
Paper – III	Numerical Methods & Statistical Techniques	75
Paper – IV	Communication Skills in English – II (Th.35+Pr.15)	50
Paper – V	Punjabi/Basic Punjabi (Mudhli Punjabi) (Compulsory)	50
Paper – VI	Practical – I (Advanced C Programming)	75

Bachelor of Computer Applications (Semester – II)

Paper–I: Introduction to Programming (C) - II

M. Marks: 75

TERM –I (Before March)

Strings: String declaration, string functions and string manipulation

Program Structure Storage Class: Automatic, external and static variables, multiple programs, more about library functions.

Structures & Unions: Defining and processing a structure, user defined data types, structures and pointers, passing structures to functions, self referenced structure, unions.

TERM –II (From March)

Pointers: Fundamentals, pointer declaration, passing pointer to a function, pointer and one dimensional arrays, operation on pointers, pointers & multi–dimensional arrays of pointers, passing functions, other functions, more about pointer declarations.

Data Files: Opening, closing, creating, processing and unformatted data files.

Bachelor of Computer Applications (Semester – II)

Paper–II: Principles of Digital Electronics

M. Marks: 75

TERM –I (Before March)

Number System: Introduction, number conversion system , binary arithmetic, representation of signed binary numbers, 1's and 2's complement, Codes: straight binary code, BCD Code Excess3 Code, Grey Code ASCII, Integer and floating point representation

Logic Gates and Boolean Algebra: Logic gates, Universal Gates, Boolean algebra and Minimization techniques, canonical forms of Boolean expressions, K-Map

Combinational Circuits: Adder, Subtractor, Multiplexer, Demultiplexer, Decoder, Encoder

TERM –II (From March)

Sequential Circuits: Flip-flops, clocks and timers, registers, counter

Semiconductor memories: Introduction, Static and dynamic devices, read only & random access memory chips, PROMS and EPROMS Address selection logic. Read and write control timing diagrams for ICs

Bachelor of Computer Applications (Semester – II)

Paper–III: Numerical Methods & Statistical Techniques

M. Marks: 75

TERM –I (Before March 2015)

1. Numerical Methods, Numerical methods versus numerical analysis, Errors and Measures of Errors.
2. Non–linear Equations, Iterative Solutions, Multiple roots and other difficulties, Interpolation methods, Methods of bi–section, False position method, Newton Raphson – Method.
3. Simultaneous Solution of Equations, Gauss Elimination Method Gauss Jordan Method.
4. Numerical Integration and different Trapezoidal Rule, Simpson’s 3/8 Rule.
5. Interpolation and Curve Fitting, Lagrangian Polynomials, Newton’s Methods: Forward Difference Method, Backward Difference Method Divided Difference Method.

TERM –II (From March 2015)

6. Least square fit linear trend, Non–linear trend.
 $Y = ax^b$
 $Y = ab^x$
 $Y = ae^x$
Polynomial fit: $Y = a+bx+cn^2$

Statistical Techniques:

1. Measure of Central Tendency, Mean Arithmetic, Mean geometric, Mean harmonic, Mean, Median, Mode.
2. Measures of dispersion, Mean deviation, Standard deviation, Co–efficient of variation.
3. Correlation.

Bachelor of Computer Applications (Semester – II)

Paper – VI: Practical-I

(Advanced C Programming)

M. Marks: 75

Operational Knowledge and Implementation of Numerical Methods & Statistical techniques using C language division as per theory.

Bachelor of Computer Applications (Semester – III)

Semester – III

Paper No.	Paper	M. Marks
Paper–I	Computer Architecture	75
Paper–II	Database Management System & Oracle	75
Paper–III	C++ (OOP Language)	75
Paper–IV	* Environmental Studies – I (Compulsory)	50
Paper–V	Programming Lab – C++	50
Paper–VI	Programming Lab – Oracle	25

Bachelor of Computer Applications (Semester – III)

Paper – I: Computer Architecture

M. Marks: 75

TERM –I (Before September)

Information Representation : Register Transfer, Various Registers, Implementing Common Bus Using Multiplexers: Logical; Arithmetic & Shift Micro – operations.

Basic Computer Design Instruction Codes, Interfacing various Registers, Computer Instructions, Timing Signals, Instruction Cycle, Design of a Basic Computer.

CPU Design Stack Organized CPU, Instruction Formats, Addressing Modes, Program Control, Hardwired & Microprogrammed (Wilhe’s Design) Control Unit.

TERM –II (From September)

Memory Organization Memory Hierarchy, Designs & Concepts of Main Memory, Auxiliary Memory, Associative Memory, Cache and Virtual Memory.

I/O Organization I/O Interface, Modes of Transfer, Program Interrupt, DMA & I/O Processor.

Pipeline & Vector Processing Parallel Processing Pipelining, Parallel & Distributed Computers, SISD, SIMD & MISD, MIMD Machines, Vector Processing.

Bachelor of Computer Applications (Semester – III)

Paper – II: Database Management System & Oracle

M. Marks: 75

TERM –I (Before September)

Introduction to data, field, record, file, database, database management system. Structure of database system, Advantage and disadvantage, levels of database system, Relational model, hierarchical model, network model, comparison of these models, E–R diagram, different keys used in a relational system, SQL.

DBA, responsibilities of DBA, Relational form like 1NF, 2NF, 3NF, BCNF, 4th NF, 5th NF, DBTG, concurrency control and its management, protection, security, recovery of database.

TERM –II (From September)

SQL *PLUS : Introduction to Oracle–8, SQL–DDL, DML, DCL, Join methods & sub query, Union Intersection, Minus, Tree Walking, Built in Functions, Views, Security amongst users, Sequences, Indexing, Object Oriented Features of Oracle 10g.

PL/SQL : Introduction to PL/SQL, Cursors– Implicit & Explicit, Procedures, Functions & Packages Database Triggers.

Bachelor of Computer Applications (Semester – III)

Paper – III: C++ (OOP Language)

M. Marks: 75

TERM – I (Before September)

- 1 **Getting Started**
 - 1.1. Introduction.
 - 1.2. A brief history of C++
 - 1.3. Variable, constant, Expression, Statements, Comments and keywords of C++
 - 1.4. **Operator:** Arithmetic, Relational, Logical, Assignment, Increment/Decrement, Conditional, Precedence of Operators.
 - 1.5. Data type, Type Conversion, library function.

- 2 **Input / Output Statements**
 - 1.1. Inputting using in and outputting using cout statements.
 - 1.2. Preprocessor directives.
 - 1.3. Basic program construction.
 - 1.4. **A Complete C++ Program:** Invoking Turbo C++, naming your program, using the editor, saving your program, compiling and linking, running the program.
 - 1.5. **Errors :** Compiler, linker and runtime.
 - 1.6. **Other IDE Features :** Compiling and linking shortcut exiting from IDE, examining files, opening an existing file, DOS shell.

- 3 **DecisionMaking and Looping Statement**
 - 3.1. If Statement, If..else statement, nesting of if statement, switch statement, conditional operator statement.
 - 3.2. While loop, do loop, for loop, nesting of loops, break and continue statement, go to statement.

- 1 **Arrays**
 - 1.1. Defining an array, array type, array elements, Accessing and averaging array elements, initializing array.
 - 1.2. Programming of C++ with array.
 - 1.3. String handling, array of strings.

2 Functions

- 5.1. What is a function?
- 1.2. Declaring and defining function.
- 1.3. Local, global variables, execution of function.
- 1.4. Passing argument to function.
- 1.5. Return values.
- 1.6. Reference arguments.
- 1.7. Overloading functions.
- 1.8. Inline function and default parameter.
- 1.9. Variable and storage classes.

TERM –II (From September)

1 Object Oriented Programming

- 1.1. Objects & Classes.
- 1.2. Constructor & Destructor.
- 1.3. Operator overloading.
 - a) Overloading unary operators.
 - b) Overloading binary operators.
 - c) Data conversion.
 - d) Pitfalls operator overloading and conversion.
- 1.4. **Inheritance**
 - a) Derived class and Base Class.
 - b) Derived Class Constructors.
 - c) Overriding member functions.
 - d) Inheritance in the English distances class, class hierarchies.
 - e) Public and Private inheritance.
 - f) Level of inheritance.
- 1.5. **Polymorphism**
 - a) Problems with single inheritance.
 - b) Multiple inheritance.

2 Structures

- 7.1. A simple structure, specifying the structure, defining a structure variable.
- 7.2. Accessing Structure member.
- 7.3. Other structure features.
- 7.4. Structure within structure.
- 7.5. Structure and classes.
- 7.6. Arrays of structure.

Bachelor of Computer Applications (Semester – III)

Paper – V (Programming Lab-I) 50 Marks

Lab – I: Based on C++ Programming Language division as per theory.

Paper – VI (Programming Lab-II) 25 Marks

Lab – II: Practical in Oracle division as per theory.

Bachelor of Computer Applications (Semester – IV)

Semester – IV

Paper No.	Paper	M. Marks
Paper – I	Data Structure & File Processing	75
Paper – II	Information Systems	75
Paper – III	Internet Applications	75
Paper – IV	System Software	75
Paper – V	* Environmental Studies – II (Compulsory)	50
Paper – VI	Lab – Data Structures Implementation using C++	50
Paper – VII	Lab – Web Designing and use of Internet	50

Bachelor of Computer Applications (Semester – IV)

Paper – I: Data Structures and File Processing

M. Marks: 75

TERM –I (Before March)

Basic Data Structures: Introduction to elementary Data Organization and operations, complexity of Algorithms and Time space trade off, string processing. Arrays, Stacks, Queues, Linked Lists, Trees Binary Trees & Binary Search Trees. Graphs and Algorithms to manipulate them.

Searching Techniques: Linear and Binary Search.

TERM –II (From March)

Sorting Techniques: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort.

File Organization: Concept of field, record, file, blocking and compaction.

File Organization Techniques: Sequential, indexed, indexed sequential, Direct, Hashing. Concept of master and transaction files.

Bachelor of Computer Applications (Semester – IV)

Paper – II: Information Systems

M. Marks: 75

TERM –I (Before March)

Fundamental aspects of Information, Capturing of Information, Converting Information to Computer – readable form, source of Information, on–line Information access and capture.

What are systems? Information Systems? Categories of Information Systems, Development Life Cycle of Information system.

Technologies for Information System: Latest trends in Hardware and Software.

TERM –II (From March)

Various types of information systems: Transaction processing systems, office Automation systems, MIS and decision support system.

Case studies of the Information System: Accounting Information systems, Inventory control systems & Marketing systems.

Bachelor of Computer Applications (Semester – IV)

Paper – III: Internet Applications

M. Marks: 75

TERM –I (Before March)

Introduction: About internet and its working, business use of internet, services offered by internet, evaluation of internet, internet service provider (ISP), windows environment for dial up networking (connecting to internet), audio on internet, internet addressing (DNS) and IP addresses).

E-Mail Basic Introduction; Advantage and disadvantage, structure of an e-mail message, working of e-mail (sending and receiving messages), managing e-mail (creating new folder, deleting messages, forwarding messages, filtering messages) Implementation of outlook express.

Internet Protocol: Introduction, file transfer protocol (FTP), Gopher, Telnet, other protocols like HTTP and TCPIP.

TERM –II (From March)

WWW: Introduction, working of WWW, Web browsing (opening, viewing, saving and printing a web page and bookmark), web designing using HTML, DHTML with programming techniques.

Search Engine: About search engine, component of search engine, working of search engine, difference between search engine and web directory.

Intranet and Extranet: Introduction, application of intranet, business value of intranet, working of intranet, role of extranet, working of extranet, difference between intranet and extranet.

Bachelor of Computer Applications (Semester – IV)

Paper – IV: SYSTEM SOFTWARE

M. Marks: 75

TERM –I (Before March)

Introduction to System Software and its components Translators, loaders, interpreters, compiler, assemblers

Assemblers

Overview of assembly process, design of one pass and two assemblers

Macroprocessors

Macro definition and expansion, concatenation of macro parameters, generations of unique labels, conditional macro expansion, Recursive macro expansion

TERM –II (From March)

Phases of Compilation Process, Lexical Analysis, Parsing, Storage Management Optimization Incremental Compilers, Cross Compilers.

Loaders and Linkage editors

Basic loader functions. Relocation, program linking, linkage, editors, dynamic linking, Bootstrap loaders

Bachelor of Computer Applications (Semester – IV)

Paper – VI: LAB - I **M. Marks: 50**

Lab – Data Structure implementation using C++ division as per theory.

Paper – VII: LAB - II **M. Marks: 50**

Lab – Web Designing and use of Internet division as per theory.

Bachelor of Computer Applications (Semester System)

Semester – V

Paper No.	Paper	M. Marks
Paper – I	Computer Networks	75
Paper – II	Web Technologies using ASP.NET	75
Paper – III	Operating System	75
Paper – IV	Lab based on JAVA Programming Language	100
Paper – V	Lab based on Operating System: Operational Knowledge of UNIX/LINUX/Windows 2003	75

Bachelor of Computer Applications (Semester – V)

Paper – I: Computer Networks

M. Marks: 75

TERM –I (Before September)

1. **Introduction:** Network Definition, Basic Components of a Network, Network types and topologies, Uses of Computer Networks, Network Architecture.
Transmission Media: Coaxial cable, twisted pair cable, fibre optics & satellites. OSI reference model, TCP/IP reference model, comparison of OSI and TCP reference model.
2. **Introduction to Analog and Digital Transmission:** Telephone system, Modems, Types of modems, pulse code modulation.
Transmission & Switching: Multiplexing, circuit switching, packet switching, hybrid switching, ISDN service transmission.
3. **Local Area Network Protocols:** CSMA Protocols, BRAP, MLMA, IEEE standards 802, Token Bus, Token Ring, FDDI.

TERM –II (From September)

4. **Data Link Layer Design Issues:** Services provided to Network layer framing, error control, flow control, link management. Error detection & correction, Elementary Datalink Protocols.
5. **Design Issues of Network Layer:** Services provided to transport layer, routing, connection, internet & World Wide Web.
6. **Network Security and Privacy:** Brief Introduction to Cryptography.
7. **Network Services:** File transfer, Access & Management, Electronic Mail, Remote login

Bachelor of Computer Applications (Semester – V)

Paper – II: Web Technologies using ASP.NET
M. Marks: 75

TERM –I (Before September)

- 1. Introduction to Standard Controls:** Display information, Accepting user input, Submitting form data, Displaying images, Using the panel control, Using the hyperlink control.
- 2. Introduction to Validation Controls:** Using the required field validator control, Using the range validator control, Using the compare validator control, Using the regular expression validator control, Using the custom validator control, Using the validation summary controls.
- 3. Introduction to Rich Controls:** Accepting file uploads, Displaying a calendar, Displaying advertisement, Displaying different page views, Displaying a wizard.
- 4. Designing Website with Master Pages:** Creating master pages, Modifying master page content, Loading master page dynamically.

TERM –II (From September)

- 5. SQL Data Source Control:** Creating database connections, Executing database commands, Using ASP.NET parameters with the SQL data source controls, Programmatically executing SQL data source commands, Caching database data with the SQL data Source controls.
- 6. List Controls:** Dropdown list control, Radio button list controls, list box controls, bulleted list controls, custom list controls.
- 7. Grid View Controls:** Grid view control fundamentals, using field with the grid view control, Working with grid view control events extending the grid view control.
- 8. Building Data Access Components with ADO.NET:** Connected the data access, Disconnected data access, Executing a synchronous database commands, Building data base objects with the .NET framework.

Bachelor of Computer Applications (Semester – V)

Paper – III: Operating System

M. Marks: 75

TERM –I (Before September)

1. **Introduction:** Definition, Early Systems, Simple Batch system, Multi programmed Batch. Time Sharing Systems, Personal Computer System, Parallel Systems, Distributed Systems, Real-time Systems.
2. **Processes:** Process concepts, Process Scheduling, Threads.
3. **CPU–Scheduling:** Basic concepts, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation.
4. **Process Synchronization:** Critical – section problem, semaphores, classical problem of synchronization.

TERM –II (From September)

5. **Memory Management:** Background, Logical v/s Physical address space, swapping, continuous allocation, paging, segmentation.
6. **Virtual Memory:** Background, demand paging, performance of demand paging, page replacement, page replacement algorithms, allocation of frames, thrashing.
7. **Secondary Storage Structures:** Disk structures, Disk scheduling, Disk Reliability.
8. **Deadlocks:** System Model, Deadlock characterization, methods for handling deadlocks, Deadlocks Prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock, combined approach to deadlock handling.

Bachelor of Computer Applications (Semester – V)

Paper – IV

Marks: 100

Lab based on JAVA Programming Language division as per theory.

Paper–V:

Programming Laboratory

Marks: 75

Lab based on Operating System: Operational

Knowledge of UNIX/LINUX/Windows 2003 division as per theory.

Bachelor of Computer Applications (Semester System)

Semester – VI

Paper No.	Paper	M. Marks
Paper – I	Computer Graphics	75
Paper – II	Software Engineering	75
Paper – III	Lab. Implementation of Applications of Computer Graphics in C++/C	50
Paper – IV	Project	200

Bachelor of Computer Applications (Semester – VI)

Paper – I: Computer Graphics

Total Marks: 75

TERM –I (Before March)

1. **Overview of Graphics system:** Computer Graphics and their applications.
2. **Display Devices:** CRT Monitors (Random – Scan and Raster Scan, DVST, Plasma – Panel Display, LED and LCD Monitors.
3. **Graphics Software.**
4. **Elementary Drawing:** Points and various line drawing Algorithms and their comparisons. Circle generating algorithms, Algorithms for ellipse, arc and spiral

TERM –II (From March)

5. **Two Dimensional Transformations:** Basic Transformations, Scaling, Translation, Rotation, Reflection, Shear, Matrix representation of Basic transformations and homogenous coordinates.
6. **Composite Transformations:** Windowing and clipping. Windowing concepts, clipping and its algorithms. Window-to-view port transformations. Three Dimensional concepts. 3 D Coordinate Systems. 3 transformations. translation, scaling, rotation, projections, parallel projections. Perspective projection.
7. **Implementation in C:** C programming for drawing 2 D objects – line rectangle, arc, circle and ellipse. C Programming for 2–D and 3–D transformations.

Bachelor of Computer Applications (Semester – VI)

Paper – II: Software Engineering

M. Marks: 75

TERM –I (Before March)

1. **Introduction to Software:** Definition, Software characteristics, Software components, Software Applications.
2. **Introduction to Software Engineering:** Definition, Software Engineering Paradigms, waterfall method, prototyping, interactive Enhancement, The Spiral model, Fourth Generation Technique.
3. **Software Metrics:** Role of Metrics and measurement, Metrics for software productivity and quality, Measurement software, size-oriented metrics, function oriented metrics, Metrics for software quality.
4. **Software Requirement Specification (SRS):** Problem analysis, structuring information, Data flow diagram and data dictionary, structured analysis, Characteristics and component of (SRS).

TERM –II (From March)

5. **Planning a Software Project:** Cost estimation, uncertainties in cost estimation, Single variable model, COCOMO model, On software size estimation, Project scheduling and milestones, Software & Personal Planning, Rayleigh curve, Personal Plan, Quality Assurance Plan, Verification & Validation (V & V), inspection & review.
6. **System Design:** Design Objectives, Design Principles, problem, Partitioning, Abstraction, Top Down and Bottom-up techniques, Structure Design, Structure Charts, Design Methodology, Design Review, Automated Cross Checking, Matrix, total number of modular, number of parameters.
7. **Detailed Design:** Module specification, Specifying functional module, specifying data abstraction, PDL and Logic/Algorithm Design.
8. **Coding:** Coding by Top-down and Bottom-up, Structured Programming, Information Hiding, Programming style, Internal Documentation.
9. **Testing:** Level of testing, Test cases and test criteria, Functional Testing, Structural Testing.

Bachelor of Computer Applications (Semester – VI)

Paper – III: Programming Laboratory

Marks: 50

Implementation of Applications of Computer Graphics in C++/C division as per theory.

Bachelor of Computer Applications (Semester – VI)

Paper – IV: PROJECT

Max. Marks: 200

A software module based on the work done in the entire course is to be developed.