# PROF. RAJENDRA SINGH (RAJJU BHAIYA) UNIVERSITY, PRAYAGRAJ

## Credit and Grading System
## as per National Education Policy-2020

(Syllabus for University and All Colleges)

# B.Sc.
# COMPUTER APPLICATION

[As per Syllabus Development Guidelines
For first three years of Higher Education  (UG)]

## (Session 2020-2021 Onwards)

Restructured and Approved by BoS on 26.10.2021

# PROF. RAJENDRA SINGH (RAJJU BHAIYA) UNIVERSITY,
# MIRZAPUR ROAD, NAINI, PRAYAGRAJ-211010

## WWW.PRSUNIV.AC.IN

# PROF. RAJENDRA SINGH (RAJJU BHAIYA) UNIVERSITY, PRAYAGRAJ

## Semester wise Courses/Papers of B.Sc. (Computer Application) as per Credit and Grading SystemNEP-2020

| Year | Semester | Course Code | Course Name | Theory/ Practical | Credits | Evaluation (MM -100) | |
|---|---|---|---|---|---|---|---|
| | | | | | | CIE | ETE |
| B.Sc.-I Year | I | B120101T | COMPUTER FUNDAMENTAL & INTERNET | Theory | 4 | 25 | 75 |
| | I | B120102P | PRACTICAL | Practical | 2 | 25 | 75 |
| | II | B120201T | DATA COMMUNICATION | Theory | 4 | 25 | 75 |
| | II | B120202P | PRACTICAL | Practical | 2 | 25 | 75 |
| B.Sc.-II Year | III | B120301T | C PROGRAMMING & DATA STRUCTURE | Theory | 4 | 25 | 75 |
| | III | B120302P | PRACTICAL | Practical | 2 | 25 | 75 |
| | IV | B120401T | SYSTEM ANALYSIS AND DEVELOPMENT | Theory | 4 | 25 | 75 |
| | IV | B120402P | PRACTICAL | Practical | 2 | 25 | 75 |
| B.Sc.-III Year | V | B120501T | DBMS AND RDBMS | Theory | 4 | 25 | 75 |
| | V | B120502T | OBJECT ORIENTED PROGRAMMING WITH C++ | Theory | 4 | 25 | 75 |
| | V | B120503P | PRACTICAL | Practical | 2 | 25 | 75 |
| | V | B120504R | RESEARCH PROJECT | Project | Qualifying | - | 100 |
| | VI | B120601T | JAVA PROGRAMMING | Theory | 4 | 25 | 75 |
| | VI | B120602T | ADVANCE TOPICS IN COMPUTER | Theory | 4 | 25 | 75 |
| | VI | B120603P | PRACTICAL | Practical | 2 | 25 | 75 |
| | VI | B120604R | RESEARCH PROJECT | Project | Qualifying | - | 100 |

**(Restructured and Approved by Board of Studies on 26.10.2021)**

There is: CIE – Continuous Internal Evaluation
ETE – End Term Examination (University Examination)

## Prof. Rajendra Singh (Rajju Bhaiya) University, Naini, Prayagraj

## (www.prsuniv.ac.in)

# PROF. RAJENDRA SINGH (RAJJU BHAIYA) UNIVERSITY, PRAYAGRAJ

## B.Sc. - I Year

| Year | Semester | Course Code | Course Name | Theory/ Practical | Credits | Evaluation (MM -100) | |
|------|----------|-------------|-------------|-------------------|---------|------|------|
| | | | | | | CIE | ETE |
| B.Sc.-I Year | I | B120101T | COMPUTER FUNDAMENTAL & INTERNET | Theory | 4 | 25 | 75 |
| | I | B120102P | PRACTICAL | Practical | 2 | 25 | 75 |
| | II | B120201T | DATA COMMUNICATION | Theory | 4 | 25 | 75 |
| | II | B120202P | PRACTICAL | Practical | 2 | 25 | 75 |

## B.Sc. - II Year

| Year | Semester | Course Code | Course Name | Theory/ Practical | Credits | Evaluation (MM -100) | |
|------|----------|-------------|-------------|-------------------|---------|------|------|
| | | | | | | CIE | ETE |
| B.Sc.-II Year | III | B120301T | C PROGRAMMING & DATA STRUCTURE | Theory | 4 | 25 | 75 |
| | III | B120302P | PRACTICAL | Practical | 2 | 25 | 75 |
| | IV | B120401T | SYSTEM ANALYSIS AND DEVELOPMENT | Theory | 4 | 25 | 75 |
| | IV | B120402P | PRACTICAL | Practical | 2 | 25 | 75 |

## B.Sc. - III Year

| Year | Semester | Course Code | Course Name | Theory/ Practical | Credits | Evaluation (MM -100) | |
|------|----------|-------------|-------------|-------------------|---------|------|------|
| | | | | | | CIE | ETE |
| B.Sc.-III Year | V | B120501T | DBMS AND RDBMS | Theory | 4 | 25 | 75 |
| | V | B120502T | OBJECT ORIENTED PROGRAMMING WITH C++ | Theory | 4 | 25 | 75 |
| | V | B120503P | PRACTICAL | Practical | 2 | 25 | 75 |
| | V | B120504R | RESEARCH PROJECT | Project | Qualifying | - | 100 |
| | VI | B120601T | JAVA PROGRAMMING | Theory | 4 | 25 | 75 |
| | VI | B120602T | ADVANCE TOPICS IN COMPUTER | Theory | 4 | 25 | 75 |
| | VI | B120603P | PRACTICAL | Practical | 2 | 25 | 75 |
| | VI | B120604R | RESEARCH PROJECT | Project | Qualifying | - | 100 |

# PROF. RAJENDRA SINGH (RAJJU BHAIYA) UNIVERSITY, PRAYAGRAJ

## SYLLABUS

### B.Sc.-I (COMPUTER APPLICATION)

## Computer Fundamentals and Internet

### UNIT- I

Introduction to Computer and Problem Solving-Information and Data
Hardware-CPU, Primary and Secondary storage, I/O devices, Bus structure, Computer Peripherals- VDU, Keyboard, Mouse, Printer.
Software and Types of Software, Programming Languages- Machine Language, Assembly Language, High Level Language, Object Oriented Language.
Problem Solving- Algorithm, Flow charts, Decision tables & Pseudo codes.

### UNIT-II

Number systems and Codes- Number representation- weighted codes, Non-weighted codes, Position, Binary, Octal, Hexadecimal, Binary Coded Decimal (BCD), Conversion of bases, Complement notations, Binary Arithmetic, Binary Codes- Gray, Alphanumeric, ASCII.

### UNIT-III

Microprocessor- Architecture of 8-bit and 16-bit microprocessor, Machine language instructions, Addressing Modes, Instruction formats, Instruction sets, Instruction cycle, Clock cycles, Timing diagrams, Interrupts, Bus standards and Interfacing concepts.
Boolean algebra- Fundamentals of Boolean algebra, Switches and inverters, Functionally Complete Gates (AND, OR, NOT), NAND, NOR, switching function and Boolean function, De Morgan's Theorem, Application of Boolean Algebra, Algebraic & K-map .

### UNIT-IV

Internet- Introduction to networks and internet, history, working of Internet, Modes of connecting to internet, ISPs, Internet address, standard address, domain name, Modems .
World Wide Web- Introduction, Miscellaneous Web Browsers details, searching the www- Directories search engines and meta search engines, search fundamentals, search engines, working of the search engines, Telnet and FTP.

### SUGGESTED BOOKS
1. Computer Organization & Architecture –Designing & Performance, William Stallings, Prentice Hall of India.
2. Alfred Glkossbrenner- Internet 101 Computing MGH, 1996
3. Microprocessor Architecture and Programming and Applications with the 8085, R.S.Gaonkar, PRI

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## SYLLABUS

### B.Sc.-I (COMPUTER APPLICATION)

## Data Communication

**UNIT-I**

Introduction, Data communications, Components, Data representation (ASCII, ISO etc.), Direction of data flow(Simplex, Half duplex, Full duplex), Networks-Distributed Processing, Network Criteria, Physical structure( type of connection, topology), Types of network.

**UNIT-II**

Analog & Digital Transmission, Modulation, Need for Modulation, Modulation Techniques. Transmission media- Twisted pair cable, coaxial cable, fiber optic cable, Microwave and Satellite Communication. Switching and Switching Techniques.

**UNIT-III**

Reference Models- OSI and TCP/IP Reference Models. Network Devices- Repeaters, Hubs, Bridges, Switches, Router, Gateway. Multiplexing- TDM, FDM, CDM.

**UNIT-IV**

Modern Topics-ISDN services & ATM, Wireless LAN-IEE 802.11, Bluetooth, Cellular Mobile Systems, Difference between wireless and fixed telephone networks.

**SUGGESTED BOOKS**
1. B.A. Forouzan- Data Communications and networking (3rd Ed.)-TMH
2. W. Stallings- Data Computer Communications (5th Ed.)- PHI
3. Wireless Communications: Theodore S. Rappaport, Pearsons

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## SYLLABUS

### B.Sc.-II (COMPUTER APPLICATION)

## C Programming & Data Structure

**UNIT - I**

C Fundamentals- Character set, Identifiers and keywords, Data Types, Constants, Variables and Arrays, Declarations, Operators & Expressions, Library functions, Statements, Symbolic Constants, Preprocessor directives

Data Input and Output- getchar(), putchar(), scanf(), printf(), gets(), puts() functions
Control Statements- if-else, while, do-while, goto , for statements, nested control structures, switch, break, continue statements, comma operator.

**UNIT - II**

Functions- Function prototypes, Passing arguments to a function by value, Recursion, Storage classes, Automatic, External, Static, Register variables in single file environment
Arrays- Definition, Processing arrays, Passing arrays to functions, Introduction to multidimensional arrays, arrays and strings

Pointers- declaration, referencing and de-referencing, passing pointers to functions, pointer to arrays, operations of files using pointers

Structures and Unions.

**UNIT - III**

Data Structure- Definition and abstract data types, Stacks- definition, Array based implementation of stacks, Linked list, infix, prefix, postfix representation, Conversions, Applications. Queues , Dqueues and its implementation using C, Trees: Definition of trees and Binary trees : Properties ,Implementation ,Traversal pre-order ,post order ,In-order traversal.
Graphs & Sorting Algorithms - Graphs- Definition of Undirected and Directed graphs Graph Traversal – Breadth first Traversal, Depth First Traversal, Array based implementation using C.

**UNIT- IV**

Sorting Algorithm- Introduction of Sorting, Sorting by Exchange, Selection, Insertion- Bubble sort, selection sort, Efficiency of above algorithms Merge sort and algorithms, Quick sort algorithm.

**SUGGESTED BOOKS**
1. Programming in C by Schaum Series
2. Let Us C by Yashwant Kanitkar BPB
3. Data Structure Using C by A.M , LPE
4. Data Structure and Program by Jr. Symour Lipschetz , Schaum's outline by TMH

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## SYLLABUS

### B.Sc.-II (COMPUTER APPLICATION)

## System Analysis and Development

**UNIT- I**
a) System Concepts and Information System Environment: Introduction, The system Concept, Definition, Characteristics of system, Types of system- Physical or Abstract System, Elements of a system, System Models.
b) System Development Life Cycle- Introduction, SDLC- Recognition of need, Feasibility Study, Analysis , Design, Implementation, Post –Implementation and Maintenance.
c) The Role of Analyst- Introduction, Definition, Historical Perspective, Academic and Personal Qualification, Multifaceted role of analyst - change Agent, Investigator, Monitor, Architect, and Psychologist.

**UNIT- II**
a) System Planning and Initial Investigation - Introduction, Base for planning, Dimension of Planning, Initial Investigation, Need of Investigation, determination of feasibility.
b) Information Gathering : Introduction ,What kind of information Needed ,Where does information originate ?Tools for information gathering
c) Tools for Structured Analysis- DFD, Data Dictionary, Decision Tree and structured English, Decision Tables Pros and cons of each tool.

**UNIT- III**
a) Process of Design- Logical and Physical Design, Design Methodologies, Form –Driven Methodology-: The IPO charts, Forms, Classification of Forms, Requirements of from Design .Types of Forms.
b) System Testing & Quality Assurance- What is Testing? Why Testing? ,Nature of Test Data , The Test Plan :Activity, Network for system testing ,System testing, Unit , Integration , Alpha , Beta , White-box and Black Box testing . Levels of Quality Assurance, Role of Data Auditor, Verification and Validation.

**UNIT- IV**
Security, Disaster / Recovery and Ethics in System Development –Introduction, System Security- Definitions, Threats to system Security, Control Measures, Disaster/Recovery. Ethics codes and standard of Behavior.

**SUGGESTED BOOKS**
1. System Analysis and Design by Elias M. Awad.
2. Software Engineering by Pressmen.

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## SYLLABUS

## B.Sc.-III (COMPUTER APPLICATION)

## DBMS AND RDBMS

**UNIT-I**

Introduction to databases-Database and its Hierarchies, History of Databases, Types of DBMS, Data Environment –Database and DBMS software, Database Architecture, Three layered Architectural /O Functions, Characteristics of database approach.
Relational Model – Logic Data models, Relational Data Model, Querying Relational Data Model, Relational Algebra, and Relational Calculus.

**UNIT – II**

SQL – SQL Language, SQL Database object, SQL Data Types, DDL, DML, and DCL commands, Deleting data, Retrieving Data, Insertion of Data, Updating Data , Integrity constraint ,Keys, Creating and altering tables ,Views, Sequence, Index.

**UNIT – III**

  a) E-R Modeling, Normalization-Database Design, Entity ,Attributes, and Entity sets, Relationship and Relation sets, ER Diagram, Features of ER Diagram, Conceptual Database Design with ER model, Anomalies in Database, Redundancy, Inconsistency, Update Anomalies, Good Database Designing.
  b) Database Security – Access Control , Discretionary Access Control, Mandatory Access Control, Additional Issues to Security. File Organization – Sequential ,Direct ,Index Sequential Files Hashing , B-Trees.

**UNIT – IV**

Data warehousing Definition, usage, trends. DBMS vs Data Warehouse ,Data marts , Metadata Multidimensional Data Mode , Data Cubes, Schemas for Multidimensional Database- Star, snowflakes, and fact constellation, Datawarehouse process & architecture, OLTP vs OLAP, ROLAP vs MOLAP, types of OLAP, 3-tier Data warehouse architecture, Distributed and Virtual Data warehouses, Data warehouse manager, Data warehouse implementation.
Data mining- Definition & Task, KDD vs Data mining, Data mining techniques-Association rules, Clustering techniques, Decision tree, Data mining tools and applications, Data mining query languages.

**SUGGESTED BOOKS**
  1. Database Systems and Concepts, Henry F. Korth
  2. DBMS by Date
  3. Database Management System by Bipin Desai

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## SYLLABUS

### B.Sc.-III (COMPUTER APPLICATION)

## Object Oriented Programming with C++

**UNIT- I**

Principals of OOP- Basic Concept of OOP, Benefits of OOP, Object oriented VS Procedural and structured programming, header files, I/O statements, Datatypes- User defined, Basic, Derived Data-types. Access specifier, this operator, Member variable, Member function, Scope resolution operator.

**UNIT- II**

Control statements, Looping, Array, Array Declaration, Array Initialization, Multidimensional Array.

**UNIT- III**

Functions in C++ - Call by value, Call by reference, Inline function, Friend function, Function Overloading, Virtual function.
Class and object, Constructors and Destructors: Introduction, Multiple Constructors in a class, Operator Overloading, Inheritance- Introduction, types of Inheritance, Abstract class, Virtual base class, Polymorphism, Data Encapsulation.

**UNIT- IV**

Working with Files – Introduction, Classes for File Stream Operations, Opening and Closing a File, Detecting End-of File.

**SUGGESTED BOOKS**
1. Let Us C++ by Yashwant Kanitkar, BPB
2. Object Oriented Programming , Robert Lafore

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## SYLLABUS

## B.Sc.-III (COMPUTER APPLICATION)

## JAVA PROGRAMMING

### UNIT-I
Java programming language overview, Referring to applets and applications, The first step in writing Java application, Basic Java application, Primary application components, Class code block, Data, Method code block, Using semicolon and braces, Compiling and running a program, Requirement for your source file, Compiling, Running the program

### UNIT-II
Java Primitive Types and Reference Types- Integral primitive types, Floating point primitive types, Textual primitive types- char, Logical primitive types- Boolean, Variable identifier conventions and rules, using variables in program, how primitives and constants are stored in memory, using a string class as a data type, using string and the new modifier, using string without the new modifier, Using string without using modifier, Value you can assign to string, How string can be stored in memory , Using string reference variables, Using main method.

### UNIT-III
Abstract classes and Inheritance, Java2 Platform Class Library packages, Grouping classes in packages, Coding structure, Source file layout , Filenames, Java Methods and Object Interaction, Java Methods, Declaring Methods, Invoking Methods, Types of method, Passing Arguments, Method Overloading , Arithmetic operators, Operators precedence, Increment and decrement operators, The if construct, The While loop, The for loop, while VS for, The do loop, The switch Construct, The break statement, The continue statement , Java keywords.

### UNIT- IV
Graphical user interface development, Java AWT Package Class Hierarchy, GUI Project, Frame, Adding a button, Creating panels and complex layout, ActiveX Technologies & Implementation, ActiveX-based architecture, ActiveX controls, ActiveX documents, ActiveX code components, Implementing Client-Side Solutions, Introduction to scripting, Client-side scripting, Implementing ActiveX controls, Implementing Server-side solutions, Introducing Server-side scripting, Authoring active server pages(ASP), Reading a hypertext transfer protocol(HTTP) request, Creating HTTP response, Saving user information, User ActiveX server components.

### SUGGESTED BOOKS

1. The Complete Reference, Herbert Schildt, TMH

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## SYLLABUS

### B.Sc.-III (COMPUTER APPLICATION)

## Advanced Topics in Computer

**UNIT-I**

Computer Graphics- Introduction, Co-ordinate system, Information handling software, Graphics software, Area of application, translation, rotation, scaling, matrix representation. Homogenous co-ordinate system, composite transformation, inverse transformation, computer art, animation, morphing, projection and clipping, 2D & 3D transformation, lines, curves and their representation

**UNIT-II**

Basics of multimedia technology, computers, communication & entertainment, multimedia and introduction, frame work for multimedia systems, multimedia devices like CD- Audio, CDROM, CD-I, Presentation devices and the user interface, multimedia presentation and authoring, professional development tools, LANs and multimedia, internet , WWW and multimedia distribution network- ATM and ADSN, Multimedia servers and databases, vector graphics, video on demand

**UNIT-III**

Artificial Intelligence- Introduction to AI, Knowledge base system, Properties of AI, Software of AI, Organization working for AI, Fuzzy logic base machines, Work of cell and their classification. Data Encryption- Coding and Decoding techniques, First stage and second stage decoding, standard for data encryption.
Image Processing- Introduction, Digital Image Processing, Various Phases of Image Processing.

**UNIT-IV**

Operating System- Introduction, OS concepts, Types of OS, OS Structure, System calls and Types, Processes- Introduction to process, Inter-process Communication, Process Scheduling, Memory Management- Introduction, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory Management- Demand Paging, Page Replacement, Deadlock- Prevention, Avoidance, Detection, Recovery, Algorithms

**SUGGESTED BOOKS**

1. Operating System Principles , Arbraham Silberschatz & Peter Baer Galvin
2. Digital Image Processing & Analysis, B. Chandra, D. Dutta Majumdar