

**DEPARTMENT OF COMPUTER SCIENCE
ALIGARH MUSLIM UNIVERSITY ALIGARH,
U.P. - 202002**

SYLLABUS

B.Sc. (Hons.) Computer Applications - I Semester

**Course Title: Fundamentals of Information Technology
Course Number: CCB-152**

OBJECTIVES OF THE COURSE

- Understand the fundamentals of information technology
- Learn core concepts of computing and modern systems
- Understand modern software programs and packages
- Learn about upcoming IT & ICT technologies

**Credit: 02
Sessional Marks: 30
Exam Marks: 70**

UNIT-I

Introduction to Information Technology (IT), Advantages and impacts of IT, Applications of IT, Past, present, and future of IT, Introduction to Computers, Hardware/Software/Firmware etc., Evolution, History, Generations and Types of Computers, Number systems and data representation, Functional components, Memories and storage media types and technologies, Peripherals of computers: I/O devices, Configuration of Hardware Devices, Purchasing Computer System for Specific Application.

UNIT-II

Computer Software: System Software, Application Software, GUIs, Office Suites, Introduction to Operating System: Functions/Services, Types, Properties, Popular OS: DOS, Windows, Mac, Linux, Mobile OS etc, Concept of Programming, Classification of Programming languages, Language translators, Introduction to Multimedia and Utility software: Working with Images, Recording and editing Audios and Videos, Handling Portable Document Formats, Compressing and extracting files, Handling optical media etc., Protecting Computer systems.

UNIT-III

Introduction to Information and Communication Technology (ICT): Basic Ideas of Computer Networks: PAN, LAN, MAN, WAN etc., Wired and Wireless Networks and technologies, Internet technologies, Introduction to Networking devices, Client Server and Distributed Computing, Cellular Technology : 2G/3G/4G and upcoming generations,

Email: Client-Based and Web-Based email, World Wide Web, Search Engines, Internet Browsing, Web Hosting, Social Media: Major Types of Websites, Wikis, Social Networking, Creating and hosting blogs, Internet Service Providers., Managing ICTs in organizations.

UNIT-IV

Using MS-Office Suites: MS-Word, MS-Power Point, MS- Excel, MS- Access,

BOOKS:

1. Efraim Turban, R. Kelly Rainer, Richard E. Potter, "*Introduction to Information Technology*", John Wiley & Sons
2. Williams Sawyer, "*Using Information Technology*", TMH
3. Dr. Mohd. Ubaidullah Bokhari, et.al, "*Fundamentals of Information Technology*", Dhanpat Rai Publications.
4. P. K. Sinha and Preeti Sinha, "*Computer Fundamentals*", B.P.B
5. V. Rajaraman, "*Introduction to Information Technology*", PHI.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - I Semester

**Course Title: Programming Using C
Course Number: CCB-153**

OBJECTIVES OF THE COURSE

- Introduce the fundamental concepts of computer programming.
- To learn procedural and structured programming concepts.
- To learn write/debug/execute programs in C.

**Credit: 02
Sessional Marks: 30
Exam Marks: 70**

UNIT-I

Introduction to Information Technology: Algorithm and its characteristics, flowchart, Developing Algorithms and Sketching Flowcharts for various problems, Pseudo code, top down & bottom up approaches of program design. Introduction and Features of —C language, Structure of —C program , Identifiers and Keywords, Constants, Variables, Scope of variables, Typedef, Type Conversion, Arithmetic Operators, Library Functions, Input/Output Statements,

UNIT-II

Relational Operators, Logical Operators, Bitwise Operators, Unary Operators, If—Else Statement,?: Operators, Switch statement, goto statement and Label. Iteration statements: For Loop, While Loop, Do While Loop, Nested Loop, Continue and Break statements.

UNIT-III

Array and Structures: Declaration, Concept of One Dimensional and Multi Dimensional arrays, Defining Structure, Declaration of Structure Variable, Accessing Structure members, nesting of structures, Array of structures, pointers, file handling: creating, reading and writing to files.

UNIT-IV

Functions: Need of —C function, User Defined and Library Functions, Prototype of Function, Call by Value, Call by Reference, Recursion, Array as Function Argument, use of pointers with function, Structure as Function Argument. String—Declaration, Initialization and use. Command Line Arguments, Storage Classes – Auto, Extern, Static, Register.

BOOKS:

1. Paul Deitel, Harrey Deitel, "*C-How to Program*", Second Edition (2010), Pearson Education, Inc.
2. J. Hanly and E. Koffman. "*Problem Solving and Program Design in C*", Third Edition Update. Addison Wesley.
3. ISRD Group, "*Programming and Problem Solving Using C Language*", Tata Mcgraw Hill.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - I Semester

**Course Title: Practical Lab – 1
(Windows, MS-Office and C programming)
Course Number: CCB-1P1**

OBJECTIVES OF THE COURSE

- To acquire skills of using Operating Systems (Windows)
- To learn necessary skills for using PC-Software.
- To acquire skills of procedural programming
- To Learn to develop C based Applications

**Credit: 02
Cont. Assessment : 40
Exam Marks : 60**

Course Content

LAB:

1. Introduction to Operating system MS-DOS, WINDOWS
2. MS-Word: Exercises as provided.
3. MS Power Point: Developing Simple Presentations.
4. MS Excel: Spreadsheets Handling for Simple Applications.
5. MS-Access: Simple Data Base Creation using Wizard, with 2 or 3 Tables, and Very Simple Queries.
6. Introduction to procedural and structured programming.
7. Basic programs using C constructs such as for, while, if-else etc.
8. Developing programs using C structure.
9. File handling using C.
10. Developing C based Applications.

NOTE:

For detail Problems/Assignments related to LAB, students are advised to consult the *LAB MANUAL* for CCB-1P2.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - II Semester

Course CCB-261: Data Structures

OBJECTIVES OF THE COURSE

- To introduce the concept of algorithm and its analysis.
- To familiarize students with different data structures and their operations
- To introduce the concept searching and sorting techniques

**Credit: 02
Sessional Marks: 30
Exam Marks: 70**

- UNIT-I** **Introduction:** Introduction to Algorithm, Pseudo code for expressing algorithms, Analysis of algorithm, Asymptotic notations, time complexity and space complexity, O-notation, Flow chart and its different building blocks, Basics of sorting and searching. Introduction to linear and Non-linear data structures.
- UNIT-II** **Linear Data Structures:** Linear Data Structures, Arrays, Stacks, Queues, Circular Queues, Linked Lists, Operations on linear data structures, Representation and Algorithms for Manipulating Linear Data Structures, Polish Notation, Application of Linear Data structures.
- UNIT-III** **Sorting, Searching Techniques:** Sorting and Searching Algorithms, Internal and External Sorting, Merging, Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Heap Sort, Quick Sort, comparison of different sorting algorithm, Linear and Binary Search, comparison of search techniques. Complexities of Sorting and Searching Algorithms.
- UNIT-IV** **Non-Linear Data Structures:** Trees: Binary Trees, Operations on Binary Trees, Representation and Manipulation of Binary Trees. Binary Tree traversal. Binary Search Trees: Insertion, Deletion and Searching Operations. Graphs: Basic Terminology, Representation and Manipulation of Graphs, Matrix and Linked Representation of Graphs, BFS and DFS traversal of Graph.

BOOKS:

1. Seymour Lipschutz, —Data Structures‖, Tata McGraw Hill (Indian Adapted Edition - Adapted by G.A.V. Pai).
2. Alfred V. Aho, —Data Structures and Algorithms‖, Pearson
3. Thomas H. Coreman, —Introduction to Algorithm‖,Prentice Hall India Learning Private Limited; 3rd edition (2010)

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SYLLABUS

B.Sc. (Hons.) Computer Applications - II Semester

Course CCB-262: Programming with Python

OBJECTIVES OF THE COURSE:

- To develop, debug and document programs in Python.
- To define Python functions and call them.
- To use Python data structures -- lists, tuples, dictionaries.
- To do input/output with files in Python.

Credit: 02
Sessional Marks: 30
Exam Marks: 70

UNIT-I

DATA, EXPRESSIONS, STATEMENTS

Introduction to Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT-II

CONTROL FLOW, FUNCTIONS

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT-III

LISTS, TUPLES, DICTIONARIES

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT IV

FILES, MODULES, PACKAGES

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

BOOKS:

1. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 ([http://greenteapress.com/wp/think - python/](http://greenteapress.com/wp/think-python/))
2. Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. John V Guttag, —Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013
4. Kenneth Lambert , Fundamentals of Python: First Programs, Course Technology, Cengage Learning, 2012, ISBN-13: 978-1-111-82270-5

Learning Resources

1. The official Python website provides a comprehensive learning material that you can use to learn

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SYLLABUS

B.Sc. (Hons.) Computer Applications - II Semester

Course CCB-2P1: Practical Lab – 2

OBJECTIVES OF THE COURSE

- To learn the implementation of linear and non-linear data structures.
- To learn the implementation of searching and sorting algorithms.
- To learn to develop, debug and implement programs in Python.

Credits: 02
Cont. Assessment: 40
Exam Marks: 60

Course Content

LAB:

1. Writing Programs for Linked List, Queue, Stack and their operations using C language.
2. Writing Programs for Non-Linear data structures such as Binary tree, Binary search tree, etc. and their operation using C language.
3. Writing Programs for different sorting(Bubble Sort, Insertion Sort, Merge Sort, Heap Sort, Quick Sort) and searching techniques (Linear and Binary) using C language.
4. Writing programs in python programming language, as given in the Lab Manual.

NOTE:

For detail Problems/Assignments related to LAB, students are advised to consult the LAB MANUAL for CCB-2P1.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - III Semester

COURSE CCB-352: Database Management System

OBJECTIVES OF THE COURSE

- To introduce the concept of DBMS.
- To learn SQL and PL/SQL using ORACLE
- To learn to develop database for a system

Credit: 04
Sessional Marks: 30
Exam Marks: 70

UNIT-I

Introduction and Conceptual Modeling: Basic Concepts, Database & Database Users, Characteristics of the Database, Database Systems Concepts & Architecture, Data Models, Schemas & Instances, DBMS Architecture & Data Independence, Data Base Languages & Interfaces, Data modeling using the Entity-Relationship Approach

UNIT-II

Relational Model: Relational Model Concepts, Relational Data Model, Relational Model Constraints, Relational Algebra. SQL-A Relational Database Language, Data Manipulation in SQL, View & Queries in SQL, Specifying Constraints & Indexes in SQL

UNIT-III

A Relational Database Management Systems ORACLE: Introduction to Oracle, Oracle database structure, Oracle Processes. Introduction to PL/SQL, PL/SQL, Data types, PL/SQL environment, PL/SQL syntax. Cursors, Use of cursors, Type of cursors. DATABASE TRIGGERS: Introduction, Use of Database Triggers, Type of Triggers.

UNIT-IV

Relational Database Design: Function Dependencies & Normalization for Relational Databases, Functional Dependencies, Normal forms based on primary keys (1NF, 2NF, 3NF & BCNF), Loss less join & Dependency preserving decomposition, Transaction Processing Concepts, Concurrency Control & Recovery Techniques: Concurrency Control Techniques, Locking Techniques: Time stamp ordering, Recovery Techniques, Recovery concepts.

BOOKS:

1. Elmsari and Navathe, "Fundamentals of Database Systems", 7th Edition, Pearson.
2. A. Silberschatz, H. Korth and S. Sudarshan, Database System Concepts, McGraw Hill.
3. Desai, B., "An Introduction to Database Concepts", Galgotia Publications, New Delhi.
4. Ullman, J.D., "Principles of Database Systems", Galgotia Publications, New Delhi.
5. James Mortin- Principles of Database Management Object Oriented Modeling & Design.
6. Philip Lewis, Arthur Berstein and Michael Kifer, Databases and Transaction Processing and application oriented approach, Addison Wesley.
5. Date, C.J., "An Introduction to Database Systems", Narosa Publishing House, New Delhi.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - III Semester

**Course Title: Practical Lab – 3
(Database Management System)
Course Number: CCB-3P1**

OBJECTIVES OF THE COURSE:

- To learn the concepts of database design model
- To design a database system
- To study the usage of DDL, DCL and DML commands
- To learn programming using PL/SQL

**Credit: 02
Cont. Assessment: 40
Exam Marks: 60**

Course Content

LAB :

1. To create database and tables
2. Data Manipulation in SQL, View & Queries in SQL, Specifying Constraints & Indexes in SQL
3. Writing cursors and Database Triggers.
4. Programming using PL/SQL
5. Case Studies: Design and Development of databases for small systems like Employee Information System, Student Information System, Inventory Control System, Payroll System etc. using MySQL/Oracle.

NOTE:

For detail Problems/Assignments related to LAB, students are advised to consult the *LAB MANUAL* for CCB-3P1.

**DEPARTMENT OF COMPUTER SCIENCE ALIGARH MUSLIM
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SYLLABUS

B. Sc. (Hons.) Computer Application – IV Semester

COURSE CCB-452: Analysis & Design of Information System

OBJECTIVES OF THE COURSE

- To learn basic concepts of Systems,
- To learn various tools and techniques related to System Analysis, Design and Implementation
- To apply the concepts in analyzing and designing real life systems

Credit: 04
Sessional Marks: 30
Exam Marks: 70

- UNIT-I** System concept, Data, information, formal versus informal information, information attributes, Data operations, Organization perceived as a system. Information requirements for Organization, Management requirements, planning, controlling, decision-making, programmed decision making non-programmed decision making. Design making requirement, operations requirements.
- UNIT-II** System Development Life Cycle, Information Sources And Gathering Methods, Interviewing Techniques, Role & Task of a System Analyst, Attributes of a System Analyst, Tools used by System Analyst.
- UNIT-III** Data Flow Diagrams, Developing A Proposal: Feasibility Study And Cost Estimation: Cost-Benefit Analysis, Feasibility Study Report.
- UNIT-IV** System Implementation & Testing: Making The System Operational: Systems Implementation, Conversion And Support, Testing, System Conversion, Follow-Up To Implementation, Input, Output & Controls.

BOOKS:

1. Haryszkiewicz, I.T., "Introduction of Systems Analysis and Design", Prentice Hall of India, 1989.
2. Rajarman, V., "Analysis and Design of Information Systems", Prentice Hall of India, 1989.
3. Senn, J.A., "Analysis and Design of Information Systems", Tata Mc-Graw Hill Book Company, 1986.
4. Whiten, J.K., Bentley, L.D., Beslow, V.M., "Systems Analysis and Design Methods", Galgotia Publications Pvt. Ltd., 1994.
5. Booch, G., "Object Oriented Analysis and Design", 2nd Edition, Benjamin/Cummins Publishing Co. Redwood City, Ca, U.S.A., 1994.
6. Rebecca Wirfs-Brock, et.al, "Designing Object Oriented Software", Prentice Hall of India, 1996.
7. Rumbaugh, J., Et al "Object Oriented Modelling and Design", Prentice Hall of India, New Delhi, 1991.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - IV Semester

Course CCB-4P1: Practical Lab – 4

OBJECTIVES OF THE COURSE

- To give students hands-on practice on establishment and administration of LAN
- To apply the concepts of SSAD in analyzing and designing/modeling real life systems
- To learn using various tools for modeling the system
- To learn to develop and implement software application using PHP.

Credits: 02
Cont. Assessment: 40
Exam Marks: 60

Course Content

LAB:

1. To learn establishment and administration of LAN.
2. To apply the concepts of SSAD in analyzing and modeling the real life software systems using various tools (like, Lucid chart / Visual Paradigm, ERD Plus / Smart Draw, Star UML / BOUML, etc).
3. To implement a real life software system using PHP.

NOTE:

For detail Problems/Assignments related to LAB, students are advised to consult the LAB MANUAL for CCB-4P1.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - IV Semester

**Course Title: Introduction to Information Technology (OPEN ELECTIVE)
Course Number: CCB-491**

**NOTE: *This course may be opted by students of B.Sc. (2nd Year), F/O Science
(Other than Computer Science Students)***

OBJECTIVES OF THE COURSE

- To understand the fundamentals of information technology
- To learn core concepts of computing and modern systems
- To understand modern software applications and packages
- To learn about upcoming IT & ICT technologies.

**Credits : 02
Sessional Marks : 30
Exam Marks : 70**

UNIT - I

Introduction to Information Technology, Information Systems, Various types of Information systems in modern organizations, Computer Hardware: Computer System as Information processing System; Computer Software: System Software, Utilities and Application Software, GUIs, Office Suites, Past, present, and future of IT. Applications of Information Technology: Applications in; Home, Education and training, Entertainment, Science, Medicine, Engineering etc.

UNIT - II

Personal Computer: PC and its main Components, Numeral Systems: Decimal, Binary, and Hexadecimal, Basics of memory, types of memory, cache and registers, Secondary Storage Devices: Hard Disks, Optical Media etc., Next Generation Media, Other Peripherals Used With PC: Input Devices, Output Devices, Configuration of Hardware Devices ,CPU and Clock Speed etc. Purchasing Computer System for Specific Application.

UNIT - III

Introduction to Operating System: Functions of Operating Systems - Windows, Mac, and Linux, Introduction to Programming Language; Introduction to Multimedia and Utility software: Working with Images, Recording and editing Audios and Videos, Handling Portable Document Formats, Compressing and extracting files, Handling optical media etc., Protecting Computer systems.

UNIT - IV

Introduction to Information and Communication Technology (ICT): Basic Ideas of Computer Networks: PAN, LAN, MAN, WAN etc., Wired and Wireless Networks and technologies, Internet technologies, Introduction to Networking devices, Client Server and Distributed Computing, Cellular Technology : 2G/3G/4G and upcoming generations, Email: Client-Based and Web-Based email, World Wide Web, Search Engines, Internet Browsing, Web Hosting, Social Media: Major Types of Websites, Wikis, Social Networking, Creating and hosting blogs, Internet Service Providers., Managing ICTs in organizations.

BOOKS:

1. Efraim Turban, R. Kelly Rainer, Richard E. Potter, "*Introduction to Information Technology*", John Wiley & Sons.
2. Williams Sawyer, "*Using Information Technology*", TMH.
3. Dr. Mohd. Ubaidullah Bokhari, et.al, "*Fundamentals of Information Technology*", Dhanpat Rai Publications.
4. P. K. Sinha and Preeti Sinha, —*Computer Fundamentals*", B.P.B.
5. V. Rajaraman, "*Introduction to Information Technology*", PHI.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - V Semester

**Course Title: Operating System and System Programming
Course Number: CCB - 561**

OBJECTIVES OF THE COURSE

- To develop the understanding of the structure and functioning of Operating System.
- To learn about Processes, Threads and Scheduling algorithms
- To understand the principles of concurrency and Deadlock
- To learn various memory management schemes
- To introduce the concepts of System Programming.
- To understand the compilation process

**Credits : 04
Sessional Marks : 30
Exam Marks : 70**

UNIT-I

Operating System and its function, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Evolution of operating system, Batch Processing, Multiprogramming and time sharing Operating System. Multiprocessor and Multicore Organization, Process States, Process Description and Process Control. Processes and Threads.

UNIT-II

Principles of Concurrency and Scheduling, Introduction to various scheduling techniques. Memory management requirements, Partitioning, Paging and Segmentation, Virtual memory, Case Study of Linux/Windows memory management.

UNIT-III

Introduction to Software Processor, Interactive Computing and Program Development, Interpreters, Elements of Assembly Language Programming, Assemblers: Overview of Assembly Translation Process, General design procedures, Design of single and two pass assemblers.

UNIT-IV

Compiler, Aspect of Compilation, Overview of Compilation Process, Programming Language grammar, Scanning, Parsing, Compilation of expressions.

BOOKS:

1. D.M. Dhamdhere , “*System Programming & Operating System*”
2. Silberschatz, Galvin and Gagne , “*Operating Systems Concepts*”, John Wiley & Sons
3. J.J. Donovan , “*System Programming*”
4. Milan Milenkovic, “*Operating System*”
5. J.P. Tremblay & P.G. Sorenson, “*Compiler Writing*”

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SYLLABUS
B.Sc. (Hons.) Computer Applications - V Semester
COURSE CCB-562: Web Engineering

OBJECTIVES OF THE COURSE

- To learn to create and document reference architecture for a Web based technological product.
- To learn phases of Web Site development.
- To learn the technologies of web application.

Credit: 04
Sessional Marks: 30
Exam Marks: 70

UNIT-1

An Introduction to Web Engineering: Motivation, Categories of Web Applications, Characteristics of Web Applications, Evolution and Need for Web Engineering, Software Engineering v/s Web Engineering. Web Engineering: Concepts, Principles, Framework, Component. Tools and Technology, Web Engineering Best Practices. Web Engineering Process: Defining the Framework, Incremental Process Flow, Generic Actions and Tasks for the Framework, Increment Plan, Modeling, Elements of a Design Model, Construction, Deployment of Web application, Umbrella Activities, Management of change, Risk. Introduction to Web Servers: Features of web servers, Configuring web servers. World Wide Web: Introduction to TCP/IP and WAP etc.

UNIT- 2

Communication: Communication Activity, Formulation, Elicitation. Planning: Understanding Scope, Refining Framework Activities, Building a Web engineering Team, Managing Risk, Developing a Schedule, Managing Quality, Managing Change, Tracking the Project. Modeling Activity: Modeling as a Concept, Modeling Frameworks, Modeling Languages. Analysis Modeling for Web Applications: Understanding the Users, The Content Model, The Interaction Model, The Functional Model, The Configuration Model

UNIT- 3

Web Application Design: Design Goals. Interaction Design: Interface Design Principles and Guidelines, Interface Design Workflow, Interface Design Steps, Aesthetic Design, Information Design: Information Architecture, Accessing Information, Functional Design: Functional Architecture, Detailed Functional Design. Construction and Deployment: Construction Principles and Concepts. Design Patterns: Understanding the Concept, Web Application Patterns, Pattern Repositories. Technologies and Tools: General Issues, Implementation Tools and Technologies, Development Tools and Technologies. Technologies for Web Applications: HTML and DHTML, HTML Basic Concepts, Static and dynamic HTML, Introduction to CGI PERL, JAVA SCRIPT, PHP, XML etc.

UNIT-4

Testing Web Applications: Testing Concepts, Testing Process, Content Testing, User Interface Testing, Usability Testing, Compatibility Testing, Component-Level Testing, Security and

Performance Testing. Change and Content Management: Change Management for Web Engineering, Content Management, Criteria for Implementing a CMS. Operation and Maintenance of Web Applications: Challenges Following the Launch of a Web Application, Promoting a Web Application, Usage Analysis. Future Directions: The Changing Nature of the Web and Web Applications. The Changing Nature of Web Engineering

Recommended Books:

1. Roger S.Pressman, David Lowe, "Web Engineering", Tata Mcgraw Hill Publication,
2. Gerti Kappel, Birgit Proll, Siegfried Reich, Werner Retschitzegger "Web Engineering: The Discipline of Systematic Development of Web Applications", John Wiley & Sons Ltd.
3. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hil

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SYLLABUS

**B.Sc. (Hons.) Computer Applications – V Semester
Course Title: Computer System Architecture
Course Number: CCB - 581**

OBJECTIVES OF THE COURSE:

- To understand basic architecture and operation of a digital computer.
- To study in detail the organization of the Control unit, the Arithmetic and Logical unit, the Memory unit and the I/O unit.

**Credits: 04
Sessional Marks: 10
Mid Sem Marks: 30
Exam Marks: 60**

UNIT-I

Introduction to computer system and its sub modules, Von-Neumann Architecture, Basic operational concepts, Instruction: operations and operands, representing instructions, Logical operations, control operations, Addressing and addressing modes, Concepts of Machine level programming, Assembly level programming and High level programming.

UNIT-II

Number System and Representation of information, Addition and subtraction of signed and unsigned numbers, Multiplication and division of signed and unsigned numbers, IEEE 754 standards of Floating-Point numbers, Floating point operations. Arithmetic and logic unit,

UNIT-III

Fundamental concepts, Execution of a complete instruction, Introduction to instruction set architecture, CISC and RISC characteristics, Basic MIPS implementation, Building basic datapaths, Pipelining: general consideration and speedup, Pipelining hazards- Data hazards, Instruction hazards & Control hazards, Exceptions.

UNIT-IV

Concepts of semiconductor memory, CPU-memory interaction, organization of memory modules, Cache memory-Organization and Structure, Cache mapping algorithms, Cache replacement policies, Secondary storage, Accessing I/O devices, Interrupts, Direct Memory Access, Buses, Interface circuits, Standard I/O Interfaces (PCI, SCSI, USB).

References

1. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Ninth Edition, 2012.
2. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The hardware / software interface”, Fifth Edition.
3. Morris Mano, Computer System Architecture, Third Edition, Pearson Education

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SYLLABUS

B.Sc. (Hons.) Computer Applications - V Semester

**Course Title: Programming using Java
Course Number: CCB-585**

OBJECTIVES OF THE COURSE:

- To understand Object Oriented Concepts using Java Language.
- To develop, debug and document programs in Java using OOP paradigms.

**Credits : 04
Sessional Marks : 30
Exam Marks : 70**

UNIT-I

Object Oriented Programming: Introduction of OOPS, basics of OOP, fundamental characteristics of OOP, benefits of object oriented programming, applications of OOP, Introduction to Programming Languages, The Evolution of Java, Object-Oriented Programming Concepts and Java, Differences between C++ and Java, The Primary Characteristics of Java, The Architecture, Programming with Java.

UNIT-II

Objects, classes and methods, Constructing objects, Accessor and mutator methods, object references, Java classes: Abstract classes, static classes, Inner classes, Wrapper classes, static methods, static field, scope, introduction to strings, string tokenization, methods, method overloading, constructor overloading, use of this keyword, use of to String () method, arrays.

UNIT-III

Extending Classes and Inheritance: Use and Benefits of Inheritance in OOP, Types of Inheritance in Java, Inheriting Data Members and Methods, Role of Constructors in inheritance, Overriding Super Class Methods, Polymorphism, Type Compatibility and Conversion, Implementing interfaces.

UNIT IV

Exception handling: Importance of exceptions, throwing exceptions, checked and unchecked exceptions, Files and Streams: streams, readers, and writes, reading and writing text files
Database Connectivity JDBC architecture Establishing connectivity and working with connection interface, Creating and executing SQL statements.

BOOKS:

1. Cay Horstmann , “*Java Concepts*”, John Wiley & Sons, Inc., 5th Edition.
2. Cay Horstmann, “*Big Java*”, John Wiley & Sons, Inc.
3. Deitel and Deitel , “*Java, How to Program*”, Prentice-Hall, 6th Edition.
4. David Flanagan , “*Java in a Nutshell*”, O'Reilly, 5th Edition.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - V Semester

Course Title: Mini Project/Computer Lab-5

Course Number: CCB – 5P1

**Credit: 04
Cont. Assessment : 40
Exam Marks : 60**

Course Content

Mini Project/Computer Lab: In addition to completing the Lab Assignments given by respective course teachers, students are required to develop a mini project. The topic of the mini project needs to be approved by the Lab Teachers.

NOTE:

- Students are advised to consult the *LAB MANUAL* of CCB-5P1 for details related to Mini-Project development.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - V Semester

Course Title: Seminar Presentation

Course Number: CCB – 5P2

Credit: 02

Cont. Assessment : 40

Exam Marks : 60

Course Content

Seminar Presentation: Students are required to give seminar presentations on various topics related to IS, IT and/or recent developments in the field of IS&IT. The topics for seminar presentation needs to be approved by the Teacher in-charge/Lab Teachers.

NOTE:

- Students are advised to consult the *LAB MANUAL* of CCB-5S1 for details related to Seminar Presentations.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - VI Semester

COURSE CCB-651: Data Communication & Computer Networks

OBJECTIVES OF THE COURSE

- To introduce the basic concepts of Data Communication and Computer Network.
- To help students in understanding the concepts, establishment and administration of LAN.

**Credits : 04
Sessional Marks : 30
Exam Marks : 70**

- UNIT-I** **Introduction to Computer Networks:** Evolution of Computer Networks, Networks goals, uses and applications;
- Network models:** OSI Model, Peer-to-peer processes, Interfaces, Layers in OSI model, TCP/IP model-Architecture, Layers in TCP/IP model, Similarities and differences between OSI and TCP/IP model:
- Addressing:** Physical, logical and port addressing, **Signals:** Analog and digital signals:
- Digital-to-Digital conversion:** Line coding schemes;
- Analog-to-Digital conversion:** Pulse code modulation, Delta modulation;
- Transmission modes:** Parallel and Serial;
- Digital-to-Analog conversion:** Amplitude, frequency and phase shift keying;
- Analog-to-analog conversion:** Amplitude, frequency and phase modulation.
- UNIT-II** **Multiplexing:** TDM, FDM, STDM, WDM, DAM, CDMA;
- Wired Media:** Magnetic media, Twisted wire-pair, Co-axial Cable, Fibre optics; **Wireless media:** Infrared, Radio and Microwave Transmission;
- Satellite Communication:** Orbits, Footprints, GEO, MEO and LEO;
- Terminal Handling:** Polling Techniques;
- Switching:** Message, Circuit and Packet Switching;
- Serial and Parallel Transmission-**Asynchronous and Synchronous Transmission;
- Error detection and correction-** Types of errors, Detection versus correction.

UNIT-III **Flow and error control:** Noisy and Noiseless channels, Stop-and-Wait protocol, Stop-and-Wait ARQ, Go-back-N-ARQ, Selective Repeat ARQ;
Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA;
Controlled Access and Channelization: Reservation, Polling, FDMA, TDMA, CDMA;
Wired LANs: Ethernet, Standard Ethernet and others;
Wireless LANs: IEEE 802.11 standard, Bluetooth network;
Connecting devices: Hubs, Repeaters, Bridges, Routers and Gateways, Virtual LANs;
Network layer: IPv4 addressing, classful and classless addressing, Masking, subnet, supernet;
Address mapping: ARP, RARP, BOOTP, DHCP;
Error Reporting and Multicasting: ICMP, IGMP.

UNIT-IV **LAN Establishment and Administration-** Components of LAN- Hardware and Software;
Popular LAN models: Client Server, Peer to Peer, LAN topologies;
IEEE project 802: Data link layer protocols in LAN, Logical Link Control, Media Access Control;
 A case study of Ethernet- 10Base5, 10Base2, 10Base-T, Introduction to Token Bus, Token ring, Fibre-Optic LAN, ATM LANs and Wireless LANs;
LAN Establishment- Physical devices and LAN settings;
LAN administration: User authentication management, User and Group Management and Resource management.

BOOKS :

1. Forouzan,B. Data Communications and Networks, 5th Edition, TMH.
2. Forouzan,B. Local Area Networks, TMH.
3. Tanenbaum, A. S., Computer Networks, 4th Edition, PHI.
4. Stallings, W., Data and Computer Communication, 8th Edition, PHI, 2007
5. Kurose, J. F., Ross, K.W., Computer Networking, 2nd Edition Pearson Education

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SYLLABUS

B. Sc. (Hons.) Computer Application – VI Semester

COURSE CCB-652: Analysis & Design of Information System

OBJECTIVES OF THE COURSE

- To learn basic concepts of Systems,
- To learn various tools and techniques related to System Analysis, Design and Implementation
- To apply the concepts in analyzing and designing real life systems

**Credits : 04
Sessional Marks : 30
Exam Marks : 70**

- UNIT-I** System concept, Data, information, formal versus informal information, information attributes, Data operations, Organisation perceived as a system. Information requirements for Organisation, Management requirements, planning, controlling, decision-making, programmed decision making non-programmed decision making. Design making requirement, operations requirements.
- UNIT-II** System Development Life Cycle, Information Sources And Gathering Methods, Interviewing Techniques, Role & Task of a System Analyst, Attributes of a System Analyst, Tools used by System Analyst.
- UNIT-III** Data Flow Diagrams, Developing A Proposal: Feasibility Study And Cost Estimation: Cost-Benefit Analysis, Feasibility Study Report.
- UNIT-IV** System Implementation & Testing: Making The System Operational: Systems Implementation, Conversion And Support, Testing, System Conversion, Follow-Up To Implementation, Input, Output & Controls.

BOOKS:

1. Haryszkiewicz, I.T., "Introduction of Systems Analysis and Design", Prentice Hall of India, 1989.
2. Rajarman, V., "Analysis and Design of Information Systems", Prentice Hall of India, 1989.
3. Senn, J.A., "Analysis and Design of Information Systems", Tata Mc-Graw Hill Book Company, 1986.
4. Whiten, J.K., Bentley, L.D., Beslow, V.M., "Systems Analysis and Design Methods", Galgotia Publications Pvt. Ltd., 1994.
5. Booch, G., "Object Oriented Analysis and Design", 2nd Edition, Benjamin/Cummins Publishing Co .Redwood City, Ca, U.S.A., 1994.
6. Rebecca Wirfs-Brock, et.al, "Designing Object Oriented Software", Prentice Hall of India, 1996.
7. Rumbaugh, J., Et al "Object Oriented Modelling and Design", Prentice Hall of India, New Delhi, 1991.

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SYLLABUS

B. Sc. (Hons.) Computer Applications - VI Semester

Course CCB-661: Fundamentals of Internet and Web Technology

OBJECTIVES OF THE COURSE

- To introduce Web Technologies.
- To develop dynamic websites with advance functionalities

**Credits : 04
Sessional Marks : 30
Exam Marks : 70**

UNIT-I Internet and WWW: Introduction to Internet, Web. History and Growth of Internet and WWW. **Communicating on the Internet:** Internet domain, IP Address, URL, etc.

General Concepts: Web Client and Web Server, Web sites, Web Browsers, Web Addresses and Web Pages, Home Page, Search Engines. HTTP and FTP. **Web Services:** E-mail, Video Conferencing, Chatting, Social Networking. Information Retrieval, DownLoading and UpLoading. Need, Benefits, Importance and Applications of Internet. Social Effects of Internet.

UNIT-II Principles of Web Design: Key issues to be considered in Web Site Design.

Structure of a Web Page. Static and Dynamic Web Pages. What is A Markup Language.

HTML: Introduction to HTML, Elements of HTML. HTML Documents: Structure and Features. Inserting Text, Images, Hyperlinks etc. **HTML Tags:** Use of different HTML Tags in Web Pages. **HTML Editors & Tools:** Use of different HTML Editors and Tool **Microsoft Front Page.**

UNIT-III Effective Web Design: XML (eXtensible Markup Language) and CSS (Cascading Style Sheet).

XML: Introduction to XML, What is XML, XML vs. HTML, Advantages of XML, Features of XML, Working with XML, XML Structure, Components of XML-file, Logical Structure of a XML Document, Naming Rules in XML, XML Document

Categories: Well-formed Documents and Valid Documents. Validating XML Documents. XML Parser. Viewing the XML document in a Web Browser.

XML Elements: Defining Your Own TAGS in XML, Root Element, Child Elements and their Attributes. Comments in XML, White Space and New Line in XML.

CSS: Introduction to CSS, What is CSS , Advantages of CSS, Features of CSS, Working with CSS. Style Rules, Selectors, Properties, Values. Grouping. Creating a CSS file.

Using a StyleSheet with HTML file.

Using a StyleSheet with XML file.

UNIT-IV Computer Ethics, Netiquette, and Web Security: Overview of Security:

Definition, Breaches of Security, Intrusion Detection and Protection. **Major Issues and Common Threats:** Spamming, Computer Viruses, Worms, Trojan Horses, Malware, Spyware, Adware, Virtual Theft, Predators, Phishing, Sweepers, Denial of Services etc. Attackers, Hackers and Crackers. Uses and Misuses of Social Networking Sites.

General Measures: Passwords, Authentication and Encryption. Cryptography: Role of Cryptography. Public/Private Key Encryption, Digital Signatures, Digital Certificates etc.

Firewalls- Advantages and Disadvantages of Firewalls. Awareness of Terms: Intellectual Property, Copyright, CyberCrime, CyberLaws etc.

BOOKS:

1. Raj Kamal, Internet and Web Technology, TMH, New Delhi, 3rd Edition, PHI
2. A.S Godbole & A. Kahate, Web Technologies, TMH, New Delhi
3. Burdman, Collaborative Web Development, Addison Wesley.
4. Sharma & Sharma, Developing E-Commerce Sites, Addison Wesley.
5. Ivan Bayross, Web Technologies Part II, BPB Publications.
6. Shishir Gundavarma, CGI Programming on the World Wide Web, O' Reilly & Associate.
7. Don Box, Essential COM, Addison Wesley.
8. Greg Buczek, ASP Developer's Guide, TMH

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SYLLABUS

B.Sc. (Hons.) (Computer Application) VI Semester

Course CCB - 662: Programming Language Theory & Concept

OBJECTIVE OF THE COURSE

1. To introduce the theory and concepts of Programming Languages.

**Credits : 04
Sessional Marks : 30
Exam Marks : 70**

- UNIT-I** Reasons for studying concepts of programming languages, Programming Domains, Language Evaluation Criteria, Programming Environment, Language Categories, Implementation Methods, Comparative Study of Important Programming Languages.
- UNIT-II** Evaluation of the major programming languages: FORTRON, LISP, COBOL, BASIC, PROLOG, SMALLTALK, C++, JAVA, **PHP**, C# and Markup/Programming Hybrid Languages, Describing Syntax and Semantics of Programming language.
- UNIT-III** Names, Bindings and Scopes, Data types, Expressions and Assignments, Fundamentals of Subprograms, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Overloaded Subprograms, Design Issues for Functions.
- UNIT-IV** Concept of Object Oriented Paradigm, Comparative study of different OOP Languages, Class, Object, Method, Constructor, Abstraction, Encapsulation, Inheritance, Polymorphism, Exception Handling.

BOOKS:

1. Terrance W Pratt, Programming Languages: Design and Implementation, PHI.
2. Sethi, Programming Language, Addison Wesley.
3. E Horowitz, Fundamental of Programming Languages, Galgotia.
4. Pratt, Zolkowitz, Programming Languages Design Implementation, Pearson Edition.
5. Tucker Nooman, Programming Languages: Principal and Paradigms, TMH
6. D.A. Watt, Programming Languages and Paradigms, PHI
7. J. Lloyd, Foundation of Logic Programming, Springer verlag

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SYLLABUS

B.Sc. (Hons.) Computer Applications - VI Semester

Course CCB-6P1: Practical Lab – 6

OBJECTIVES OF THE COURSE

- To give students hands-on practice on establishment and administration of LAN
- To apply the concepts of SSAD in analyzing and designing/modeling real life systems
- To learn using various tools for modeling the system
- To learn to develop and implement software application using PHP.

Credits: 02

Cont. Assessment: 40

Exam Marks: 60

Course Content

LAB:

1. To learn establishment and administration of LAN.
2. To apply the concepts of SSAD in analyzing and modeling the real life software systems using various tools (like, Lucidchart/Visual Paradigm, ERDPlus/SmartDraw, StarUML/BOUML, etc).
3. To implement a real life software system using PHP.

NOTE:

For detail Problems/Assignments related to LAB, students are advised to consult the LAB MANUAL for CCB-6P1.

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SYLLABUS

B.Sc. (Hons.) Computer Applications - VI Semester

**Course Title: Viva-Voce
Course Number: CCB – 6S1**

**Credit: 02
Cont. Assessment : 40
Exam Marks : 60**

Course Content

Seminar Presentation: Students are required to give seminar presentations on various topics related to IS, IT and/or recent developments in the field of IS&IT. The topics for seminar presentation needs to be approved by the Teacher in-charge/Lab Teachers.

NOTE:

- Students are advised to consult the *LAB MANUAL* of CCB-6S1 for details related to Seminar Presentations.

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SYLLABUS

B. Sc. (Hons.) Computer Applications – VI Semester

**Course Title: Project
Course Number: CCB – 6S2**

**Credits : 08
Cont. Assessment : 40
Exam Marks : 60**

Course Content

Project: Topics to be decided in consultation with the teacher In-charge/Teacher concerned