# Semester wise Structure and Curriculum for

# UG Course in Bachelor in Computer Applications(BCA)

# Gurugram University, Gurugram

## GENERAL COURSE STRUCTURE AND CREDIT DISTRIBUTION

## CREDIT DISTRIBUTION

## UNDERGRADUATE PROGRAMME

**Scheme of Bachelor of Computer Applications Programme**

**(Scheme UG A4: Undergraduate Programmes (Interdisciplinary))**

**Semester 1**

| Course Code | Course Title | CourseID | L | T | P | L | T | P | Total Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| **Core Course(s)** | | | | | | | | | | | | | | |
| CC-ID1 | Fundamentals of Computers & Programming in C | 240/BCA/CC101 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| CC-ID2 | PC Software | 240/BCA/CC102 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| CC-ID3 | Logical Organization of Computers | 240/BCA/CC103 | 3 | 1 | 0 | 3 | 1 | 0 | 4 | 30 | 70 | -- | -- | 100 |
| **Minor/ Vocational Course(s)** | | | | | | | | | | | | | | |
| MIC-1 | One from the pool | | | | | | | | 2 | | | | | 50 |
| **Multidisciplinary Course(s)** | | | | | | | | | | | | | | |
| MDC-1 | One from the pool | | | | | | | | 3 | | | | | 75 |
| **Ability Enhancement Course(s)** | | | | | | | | | | | | | | |
| AEC-1 | One from the pool | | | | | | | | 2 | | | | | 50 |
| **Skill Enhancement Course(s)** | | | | | | | | | | | | | | |
| SEC-1 | One from the pool | | | | | | | | 3 | | | | | 75 |
| **Value-added Course(s)** | | | | | | | | | | | | | | |
| VAC-1 | One from the pool | | | | | | | | 2 | | | | | 50 |
| **Total Credits** | | | | | | | | | **24** | | | | | **600** |

## Semester 2

| Course Code | Course Title | CourseID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| **Core Course(s)** | | | | | | | | | | | | | | |
| CC-ID4 | Data Structures | 240/BCA/CC201 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| CC-ID5 | Mathematical foundations of Computer Systems | 240/BCA/CC202 | 3 | 1 | - | 3 | 1 | - | 4 | 30 | 70 | -- | -- | 100 |
| CC-ID6 | Database Management Systems | 240/BCA/CC203 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| **Minor/ Vocational Course(s)** | | | | | | | | | | | | | | |
| MIC-2 | One from the pool | | | | | | | | 2 | | | | | 50 |
| **Multidisciplinary Course(s)** | | | | | | | | | | | | | | |
| MDC-2 | One from the pool | | | | | | | | 3 | | | | | 75 |
| **Ability Enhancement Course(s)** | | | | | | | | | | | | | | |
| AEC-2 | One from the pool | | | | | | | | 2 | | | | | 50 |
| **Skill Enhancement Course(s)** | | | | | | | | | | | | | | |
| SEC-2 | One from the pool | | | | | | | | 3 | | | | | 75 |
| **Value-added Course(s)** | | | | | | | | | | | | | | |
| VAC-2 | One from the pool | | | | | | | | 2 | | | | | 50 |
| **Total Credits** | | | | | | | | | **24** | | | | | **600** |

## Semester 3

| Course Code | Course Title | CourseID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| **Core Course(s)** | | | | | | | | | | | | | | |
| CC-ID7 | Operating Systems | 240/BCA/CC301 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| CC-ID8 | Object oriented Programming using C++ | 240/BCA/CC302 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| CC-ID9 | Web Designing | 240/BCA/CC303 | 2 | - | 2 | 2 | - | 1 | 3 | 15 | 35 | 05 | 20 | 75 |
| **Minor/ Vocational Course(s)** | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MIC-3 | One from the pool | | | | | | | | 4 | | | | | 100 |
| **Multidisciplinary Course(s)** | | | | | | | | | | | | | | |
| MDC-3 | One from the pool | | | | | | | | 3 | | | | | 75 |
| **Ability Enhancement Course(s)** | | | | | | | | | | | | | | |
| AEC-3 | One from the pool | | | | | | | | 2 | | | | | 50 |
| **Total Credits** | | | | | | | | | **20** | | | | | **500** |

## Semester 4

| **Course Code** | **Course Title** | **CourseID** | **L** | **T** | **P** | **L** | **T** | **P** | **Credits** | **MARKS** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **(Hrs)** | | | **Credits** | | | | **TI** | **TE** | **PI** | **PE** | **Total** |
| **Core Course(s)** | | | | | | | | | | | | | | |
| CC-ID10 | Computer Networks | 240/BCA/CC401 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| CC-ID11 | Software Engineering | 240/BCA/CC402 | 3 | 1 | - | 3 | 1 | - | 4 | 30 | 70 | -- | -- | 100 |
| CC-ID12 | Java Programming | 240/BCA/CC403 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| **Minor/ Vocational Course(s)** | | | | | | | | | | | | | | |
| MIC-4 | One from the pool | | | | | | | | 4 | | | | | 100 |
| **Ability Enhancement Course(s)** | | | | | | | | | | | | | | |
| AEC-4 | One from the pool | | | | | | | | 2 | | | | | 50 |
| **Value-added Course(s)** | | | | | | | | | | | | | | |
| VAC-3 | One from the pool | | | | | | | | 2 | | | | | 50 |
| **Total Credits** | | | | | | | | | **20** | | | | | **500** |

## Semester 5

| **Course Code** | **Course Title** | **Course ID** | **L** | **T** | **P** | **L** | **T** | **P** | **Credits** | **MARKS** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **(Hrs)** | | | **Credits** | | | | **TI** | **TE** | **PI** | **PE** | **Total** |
| **Core Course(s)** | | | | | | | | | | | | | | |
| CC-ID13 | Computer Graphics | 240/BCA/CC501 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| CC-ID14 | Python Programming | 240/BCA/CC502 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CC-ID15 | Analysis and design of algorithm | 240/BCA/CC503 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| **Minor/ Vocational Course(s)** | | | | | | | | | | | | | | |
| VOC-1 | One from the pool | | | | | | | | 4 | | | | | 100 |
| **Skill Enhancement Course(s)** | | | | | | | | | | | | | | |
| Internship | | 240/BCA/INT501 | | | | | | | 4 | | | | | 100 |
| **Total Credits** | | | | | | | | | **20** | | | | | **500** |

## Semester 6

| **Course Code** | **Course Title** | **Course ID** | **L** | **T** | **P** | **L** | **T** | **P** | **Credits** | **MARKS** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **(Hrs)** | | | **Credits** | | | | **TI** | **TE** | **PI** | **PE** | **Total** |
| **Core Course(s)** | | | | | | | | | | | | | | |
| CC-ID16 | Management Information Systems | 240/BCA/CC601 | 3 | 1 | - | 3 | 1 | - | 4 | 30 | 70 | -- | -- | 100 |
| CC-ID17 | Compiler Design | 240/BCA/CC602 | 3 | - | - | 3 | - | - | 3 | 25 | 50 | -- | -- | 75 |
| CC-ID18 | Artificial Intelligence | 240/BCA/CC603 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| **Minor/ Vocational Course(s)** | | | | | | | | | | | | | | |
| VOC-2 | One from the pool | 240/BCA/VO601 | | | | | | | 4 | | | | | 100 |
| VOC-3 | One from the pool | 240/BCA/VO602 | | | | | | | 4 | | | | | 100 |
| **Skill Enhancement Course(s)** | | | | | | | | | | | | | | |
| SEC-3 | One from the pool | | | | | | | | 3 | | | | | 75 |
| **Total Credits** | | | | | | | | | **22** | | | | | **550** |

***Note:*** *The curriculum of semester 7 and 8 will is provided in due course of time.*

## Multidisciplinary Course from the department for pool of the Courses in the University

## (These courses are to be offered to students of different discipline/Subject)

### Semester 1

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| MDC-1 | Mathematics | 240/BCA/MD101 | 3 | - | - | 3 | - | - | 3 | 25 | 50 | -- | -- | 75 |

### Semester 2

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| MDC-2 | Digital Electronics | 240/BCA/MD201 | 3 | - | - | 3 | - | - | 3 | 25 | 50 | -- | -- | 75 |

### Semester 3

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| MDC-3 | Probability and Statistics | 240/BCA/MD301 | 3 | - | - | 3 | - | - | 3 | 25 | 50 | -- | -- | 75 |

## Minor Course from the department for pool of the Courses in the University

**(These courses are offered by each department for students of other departments/same department to gain a broader understanding beyond the major discipline)**

### Semester 1

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| MIC-1 | Front Desk Management | 240/BCA/MI101 | 1 | - | 2 | 1 | - | 1 | 2 | 05 | 20 | 05 | 20 | 50 |

### Semester 2

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| MIC-2 | Animation and graphics design | 240/BCA/MI201 | 1 | - | 2 | 1 | - | 1 | 2 | 05 | 20 | 05 | 20 | 50 |

### Semester 3

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| MIC-3 | Computer Hardware and maintenance | 240/BCA/MI301 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| | Information Security | 240/BCA/MI302 | 3 | 1 | - | 3 | 1 | - | 4 | 25 | 75 | - | - | 100 |
| | Cyber Security | 240/BCA/MI303 | 3 | 1 | - | 3 | 1 | - | 4 | 25 | 75 | - | - | 100 |

### Semester 4

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| MIC-4 | Mobile Application Development | 240/BCA/MI401 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |
| | Computer Vision | 240/BCA/MI402 | 3 | 1 | - | 3 | 1 | - | 4 | 25 | 75 | - | - | 100 |
| | Programming in Java script | 240/BCA/MI403 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |

## Vocation Course from the department for pool of the Courses in the University

**(These courses are offered by each department for students of other departments/same department and is focused on practical work, preparing students for a particular skilled profession.**

**Semester 5**

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| VOC-1 | Digital Marketing | 240/BCA/VO501 | 3 | 1 | - | 3 | 1 | - | 4 | 30 | 70 | -- | -- | 100 |

**Semester 6**

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| VOC-2 | Data Handling and Visualization | 240/BCA/VO601 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| VOC-3 | Programming using R | 240/BCA/VO602 | 3 | - | 2 | 3 | - | 1 | 4 | 25 | 50 | 05 | 20 | 100 |

## Skill Enhancement Course from the department for pool of the Courses in the University

**(These courses are offered by each department for students of other departments/same department and is designed to provide value-based and/or skill-based knowledge and should contain both theory and lab/hands-on/training/field work.)**

### Semester 1

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| SEC-1 | Numerical Ability and enhancement skills | 240/BCA/SE101 | 3 | - | - | 3 | - | - | 3 | 25 | 50 | -- | -- | 75 |

### Semester 2

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| SEC-2 | Basic Statistical Tools | 240/BCA/SE201 | 3 | - | - | 3 | - | - | 3 | 25 | 50 | -- | -- | 75 |

### Semester 6

| Course Code | Course Title | Course ID | L | T | P | L | T | P | Credits | MARKS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (Hrs) | | | Credits | | | | TI | TE | PI | PE | Total |
| SEC-3 | Presentation Skills and Personality Development | 240/BCA/SE601 | 2 | 1 | - | 2 | 1 | | 3 | 25 | 50 | -- | -- | 75 |

| Nature of Work | Course Credits | Contact hours per week | Contact hours per semester (15 weeks) |
|---|---|---|---|
| Lecture | 01 | 01 | 15 |
| Tutorial per paper | 01 | 01 | 15 |
| Practical, Seminar, Internship, field practice/project, or community engagement, etc. | 01 | 02 | 30 |

Note: Tutorial batch size (UG programme: 20-25, PG Programme: 12-15)

The distribution of credits among the lectures/tutorial/practicum will be as follows:

| Courses | Total Credits | L (Credits) | T (Credits) | P (Credits) | MARKS | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | TI | TE | PI | PE |
| Only Theory | 4 | 3 (3 hrs) | 1 | - | 30 | 70 | - | - |
| | 3 | 2 (2 hrs) | 1 | - | 25 | 50 | - | - |
| | 2 | 1 | 1 | - | 15 | 35 | - | - |
| Theory and Practicum | 4 | 3 (3 hrs) | - | 1 (2 hrs) | 25 | 50 | 5 | 20 |
| | 4 (Where pract. is dominant) | 2 (2 hrs) | - | 2 (4 hrs) | 15 | 35 | 15 | 35 |
| | 3 | 2 (2 hrs) | - | 1 (2 hrs) | 15 | 35 | 5 | 20 |
| | 2 | 1 | - | 1 (2 hrs) | 5 | 20 | 5 | 20 |
| When Practicum is separate course | 2 | - | - | 2 (4 hrs) | - | - | 15 | 35 |
| | 3 | - | - | 3 (6 hrs) | - | - | 25 | 50 |
| | 4 | - | - | 4 (8 hrs) | - | - | 30 | 70 |
| AEC/VAC | 2 | 2 (2 hrs) | | | 15 | 35 | - | - |
| SEC | 3 | 2 (2 hrs) | | 1 (2 hrs) | 15 | 35 | 5 | 20 |
| | 2 | 1 | | 1 (2 hrs) | 5 | 20 | 5 | 20 |
| DSEC | 4 | 3 (3 hrs) | | 1 (2 hrs) | 25 | 50 | 5 | 20 |
| Minor/VOC | 4 | 2 (2 hrs) | | 2 (4 hrs) | 15 | 35 | 15 | 35 |
| Internship | 4 | -- | -- | 4 (8 hrs) | | | 30 | 70 |

**L= Lecture; T= Tutorial, P= Practicum; TI= Theory Internal Assessment; TE= Theory End Semester Examination; PI= Practicum Internal; PE= Practicum End Semester examination**

# Chapter 3: Detailed Syllabus

# SEMESTER 3

| Course code | CC-ID7 | | | |
|---|---|---|---|---|
| Category | Core Course | | | |
| Course title | **Operating System** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 0 | 2 | 4 |
| Theory Internal | 25 | | | |
| Theory External | 50 | | | |
| Practical Internal | 05 | | | |
| Practical External | 20 | | | |
| Total | 100 | | | |
| Duration of Exam | 3 hrs | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**COURSE OUTCOMES:**

CO1: understand the basic concepts of operating systems and its services.

CO2: understand concept of process management and scheduling.

CO3: acquire knowledge of process synchronization along with deadlock handling.

CO4: learn about memory management and distributed operating system.

## UNIT – I

**Introductory Concepts:** Operating System Functions and Characteristics, Historical Evolution of Operating Systems, Operating System Structure and Operations; Types of Operating System: Real time, Multiprogramming, Multiprocessing, Batch processing; Operating System Services, Operating System Interface, Methodologies for Implementation of Operating System, Service System Calls, System Programs.

## UNIT – II

**Process Management:** Process Concepts, Operations on Processes, Process States and Process Control Block. InterProcess Communication; Multithreaded Programming: Multithreading Models, Threading Issues; CPU Scheduling: Scheduling Criteria, Levels of Scheduling, Scheduling Algorithms, Multiple Processor Scheduling; Algorithm Evaluation.

## UNIT – III

**Synchronization:** Critical Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classical Problem of Synchronization, Monitors, Atomic Transactions; Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock 20 Avoidance, Deadlock Detection and Recovery.

## UNIT – IV

**Memory Management Strategies:** Memory Management of Single-User and Multiuser Operating System, Partitioning, Swapping, Contiguous Memory Allocation, Paging and Segmentation; Virtual Memory Management: Demand Paging, Page Replacement Algorithms, Thrashing, Memory Mapped Files. Distributed Operating Systems: Types of Network based Operating Systems, Network Structure, Design Issues.

**Textbooks & Reference Books:**


1. Silberschatz A., Galvin P.B.,and Gagne G., Operating System Concepts, John Wiley & Sons.
2. Godbole, A.S., Operating Systems, Tata McGraw-Hill Publishing Company, New Delhi.
3. Deitel, H.M., Operating Systems, Addison-Wesley Publishing Company, New York.
4. Tanenbaum, A.S., Operating System-Design and Implementation, Prentice Hall of India, New Delhi.


### Operating System Lab

### List of Experiments

1. Implementation of FCFS and SJF CPU scheduling algorithms
2. Implementation of Round Robin and Priority CPU Scheduling
3. Implementation of Producer-Consumer problem using semaphores
4. Implementation of Dining Philosphers Problem
5. Implementation of FIFO Page Replacement Algorithms
6. Implementation of LRU Page Replacement Algorithms
7. Implementation of Sequential File Allocation Strategies
8. Implementation of Indexed File Allocation Strategies

| Course code | **CC-ID8** | | | |
|---|---|---|---|---|
| Category | Core course | | | |
| Course title | **Object Oriented Programming Using C++** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 0 | 2 | 4 |
| Theory Internal | 25 | | | |
| Theory External | 50 | | | |
| Practical Internal | 05 | | | |
| Practical External | 20 | | | |
| Total | 100 | | | |
| Duration of Exam | 3 Hrs | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**COURSE OUTCOMES:**

CO1: Demonstrate proficiency in fundamental programming constructs and functions in C++, including console I/O, function overloading, default and const arguments, inline functions, arrays, manipulators, and enumerations.

CO2: Design and implement object-oriented solutions by defining classes and objects, understanding access specifiers, static members, inline functions, and working with arrays in classes and functions.

CO3: Utilize advanced OOP features—such as constructors/destructors, operator overloading, and various forms of inheritance—to build robust and reusable C++ programs.

CO4: Apply dynamic memory management with pointers, virtual and friend functions, file handling, exception handling, and command-line arguments to develop complete and secure C++ applications.

## UNIT-I

**Elements of Programming and Function Introduction:** Basic Elements of Programming, Console I/O Operations, Function: Function Prototyping, Call and Return By Reference, Inline Function, Default and Const Arguments, Function Overloading, Arrays, Manipulators and Enumeration.

## UNIT-II

**Classes and Object Oriented Methodology:** Basic Concepts/Characteristics of OOP. Advantages and Application of Oops, Procedural Programming Vs OOP. Classes and Objects: Specifying a Class, Creating Objects, Private & Public Data Members and Member Functions, Defining Inline Member Functions, Static Data Members and Member Functions. Arrays within Class, Arrays of Objects, Objects as Function Arguments, Returning Objects.

## UNIT-III

**Constructors, Destructors, Operators Overloading and Inheritance. Constructors and Destructors:** Introduction, Parameterized Constructors, Multiple Constructors in A Class, Constructors With Default Arguments, Dynamic Initialization of Objects, Copy Constructors, Dynamic Constructors, Const Objects, Destructors Operators Overloading: Definition, Unary and Binary Overloading, Rules for Operator Overloading. Inheritance: Defining Derived Classes, Types of Inheritance, Constructors and Destructors in Derived Classes.

## UNIT-IV

**Pointers Virtual & Friend functions and file handling Pointers:** Pointer to Objects, This Pointer, "New" and "Delete"Operators, Virtual Function, Friend Functions. Opening, Closing A File, File Modes, File Pointers and Their Manipulation, Sequential Input and Output Operations: Updating A File, Random Access, and Error Handling During File Operations, Command Line Arguments.

**Text and Reference Books:**


1. K.R.Venugopal, Rajkumar, T. Ravishankar, "Mastering C++", TMH ,ISBN:0-07- 463454-2.
2. Farrel,"Object-Oriented Programming using C++",Cenage Pub, ISBN: 9788131505175
3. Parimala N.," Object Orientation through C++", Macmillan India Ltd. Publication, ISBN:-0333 93202-1.
4. E Balagurusamy, "Object Oriented Programming with C++ ", Tata McGraw Hill Publishing Company Limited, New Delhi, ISBN:- 13- 978-07-066907-9.


## Object Oriented Programming Using C++ LAB

### List of Experiments

1. C ++ program to find first 10 prime numbers

2. C++ program to implement Constructor Overloading
3. C++ program Invocation order of Constructor and Destructor in Inheritance
4. C++ program to find area of Triangle, Circle and Rectangle
5. C++ program to implement Static Variable and Function
6. C++ program to implement Inheritance
7. C++ program to implement Multiple Inheritance
8. C++ program to implement Function Overloading
9. C++ program to implement Operator Overloading
10. C++ program to implement constructor, destructor and scope resolution operator

| Course code | **CC-ID9** | | | |
|---|---|---|---|---|
| Category | Core Course | | | |
| Course title | **Web Designing** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 2 | 0 | 2 | 3 |
| Theory Internal | 15 | | | |
| Theory External | 35 | | | |
| Practical Internal | 05 | | | |
| Practical External | 20 | | | |
| Total | 75 | | | |
| Duration of Exam | 3 Hrs | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**COURSE OUTCOMES:**

CO1: outline the idea of web and its components.

CO2: understand the theoretical steps for developing a website.

CO3: learn the skills that will enable him/her to design simple web pages.

CO4: learn CSS to specify style to web pages.

## UNIT – I

Introduction to Internet and World Wide Web (WWW); Evolution and History of World Wide Web, Web Pages and Contents, Web Clients, Web Servers, Web Browsers; Hypertext Transfer Protocol, URLs; Searching and WebCasting Techniques, Search Engines and Search Tools, Scripting Languages.

## UNIT – II

Web Publishing: Hosting website; Internet Service Provider; Planning and designing website; Web Content Authoring, Web Graphics Design, Web Programming, Steps For Developing website, Choosing the Contents, Home Page, Domain Names, Creating a Website and Introduction to Mark up Languages (HTML and DHTML).

## UNIT – III

Web Development: HTML Document Features, Fundamentals HTML Elements, Creating Links; Headers; Text styles; Text Structuring; Text colour and Background; Formatting text; Page layouts, Images; Ordered and Unordered lists; Inserting Graphics; Table Creation and Layouts; Frame Creation and Layouts; Working with Forms and Menus; Working with Radio Buttons; Check Boxes; Text Boxes.

## UNIT – IV

Introduction to CSS (Cascading Style Sheets): Features, Core Syntax, Types, Style Sheets and HTML, Style Rule Cascading and Inheritance, Text Properties, CSS Box Model, Normal Flow Box Layout, Positioning and other useful Style Properties; Features of CSS3.

**Text and Reference Books:**


1. Raj Kamal, Internet and Web Technologies, Tata McGraw-Hill.
2. Ramesh Bangia, Multimedia and Web Technology, Firewall Media.
3. Thomas A. Powell, Web Design: The Complete Reference, Tata McGraw-Hill
4. Wendy Willard, HTML Beginners Guide, Tata McGraw-Hill.
5. Deitel and Goldberg, Internet and World Wide Web, How to Program, PHI


## WEB DESIGNING LAB

### List of Experiments

1. Write a HTML program to create a webpage about the different art forms of India, with appropriate title on the title bar. Use different heading tags for the headings, and list them using ordered list.
2. Write a HTML program to create sections in the document using appropriate tags and apply different color as background to them. Use internal hyperlinks to move to different points within the page.
3. Write a HTML program to insert a picture on the webpage, giving description for the picture in a paragraph. Use properties of height, width, hspace, vspace and align, with different values.
4. Write a HTML Program, to create a profile of, the First page containing the applicant's picture with personal details using unordered lists, and the second containing Educational details using tables. Use hyperlinks to move to the next page.
5. Using Frames create an Indian Flag and insert the image of chakra in the center.

6. Create a frame like structure based on the given diagram, such that When the first link is clicked, the contents of the first frame is filled with the corresponding information and when the second link is clicked the second frame is filled.
7. Write a program in HTML to demonstrate the concept of Image map, for India map. Map for areas rectangle, Circle and polygon.

| Course code | MDC-3 | | | |
|---|---|---|---|---|
| Category | Multidisciplinary Course | | | |
| Course title | **Probability and Statistics** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 0 | 0 | 3 |
| Theory Internal | 25 | | | |
| Theory External | 50 | | | |
| Total | 75 | | | |
| Duration of Exam | 3 hrs | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**COURSE OUTCOMES:**

CO1: Elucidate the basic principles of statistics

CO2: Apply the correlation and regression analysis to engineering problem

CO3: Apply the principles of probability to thermodynamic problems

CO4: Explain probability distribution and solve problems

**Unit –I**

Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: Quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio.

Measures of Central Tendency: Mean, Median, Mode. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, skewness and kurtosis.

**Unit – II**

Statistical Methods: correlation and regression –Karl Pearson's coefficient of correlation and rank correlation problems, regression analysis-lines of regression, problems.

Curve fitting: curve fitting by the method of least square-fitting the curves of the form

**Unit –III**

Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.

**Unit –IV**

Probability Distributions: Random variables (discrete and continuous), probability mass/density function, Binomial, Poisson, Exponential and normal distributions

**Textbooks & References:**


1. Gupta, S. C., & Kapoor, V. K. Fundamentals of Mathematical Statistics. Sultan Chand & Sons.
2. Hogg, R. V., Tanis, E. A., & Rao, J. M. Probability and Statistical Inference (7th ed.). Pearson Education, New Delhi.
3. Goon, A. M., Gupta, M. K., &Dasgupta, B. Fundamentals of Statistics, Vol. I & II. The World Press, Kolkata.
4. Ross, S. M. Introduction to Probability and Statistics for Engineers and Scientists. Academic Press.

| Course code | MIC-3 | | | |
|---|---|---|---|---|
| Category | Minor Course | | | |
| Course title | **Computer Hardware and Maintenance** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 0 | 2 | 4 |
| Theory Internal | 25 | | | |
| Theory External | 50 | | | |
| Practical Internal | 05 | | | |
| Practical External | 20 | | | |
| Total | 100 | | | |
| Duration of Exam | 3 hrs. | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**Course outcomes:**

CO1. Students must understand the basics of computer systems along with peripherals.

CO2. Students will be able to do troubleshooting of different computer related issues.

CO3. Students will learn to determine and installing appropriate security measures.

CO4. Students will be able provide the technical support on-site

## UNIT-I

**INTRODUCTION TO PERIPHERAL DEVICES:** General block diagram of a peripheral device, different types of peripheral devices used in modern computers and their purpose.

**INPUT DEVICES:** Block diagram of keyboard, different types of keyboards, operation and working principle of mouse and different mouse.

**OUTPUT DEVICES:** Construction of CRT Monitor. Impact and non impact printers, operation of LaserJet printer with a block diagram.

## UNIT-II

**Motherboard:** Components, Layout, Connections, Enhancing features of motherboard: Adding and or replacing components.

**Processor:** Common Features, Types of Processor, Basic Structure of CPU, Different levels of cache.

**BIOS:** Basic Input Output System, Bios Interaction, date and time, Boot device priority, boot setting configuration

## UNIT-III

Hard Disk Drive, Hard Disk Interfaces: EIDE, Serial ATA, Disk interface. SCSI, USB, RAID, Solid State Drive.

Disk structure: Heads, Tracks, Sectors, Cylinders, Cluster, Landing zone, MBR.

Disk performance parameters: Seeks and Latency, Data Transfer Rate

File system: FAT16, FAT32, NTFS, Unix file system, EXT2/EXT3

## UNIT-IV

BASIC TROUBLE SHOOTING: Various test equipments used for PC servicing, reasons for failure of components like resistors, capacitors etc. Troubleshooting of a motherboard, Troubleshooting of a disk drive, Troubleshooting for the keyboard failure, Troubleshooting problems of printer, power supply failure, safety precautions to be taken during trouble shooting.

**Textbooks & References:**


1. James K. L. Wang, "Computer Hardware: Installation, Interfacing, Troubleshooting and Maintenance", PHI Learning (PHI India).
2. Scott M. Mueller, "Upgrading and Repairing PCs", Que Publishing / Macmillan (Pearson).
3. B. Govindarajalu, "Computer Organization and Maintenance", McGraw Hill Education.
4. Jean Andrews, "A+ Guide to Hardware: Managing, Maintaining and Troubleshooting" (9th Edition), Cengage Learning.


## Computer Hardware and Maintenance Lab

## LIST OF PROGRAMS

1. Front panel indicators & switches and Front side & rear side Connectors.
2. Familiarize the computer system Layout: Marking positions of SMPS, Motherboard, FDD, HDD, CD, DVD and add on cards.
3. Configure BIOS setup program and troubleshoot the typical problems using BIOS utility.
4. Install Hard Disk and configure to the Pc's
5. Printer Installation and Servicing and troubleshoot
6. Install and configure Scanner, Web cam etc. with system and troubleshoot the problems
7. Assemble a system with add on cards and check the working condition of the system and

install OS.

8. Install and Configure Dual OS Installation
9. Assembling and Disassembling of Laptop to identify the parts and to install OS and configure it.

| Course code | MIC-3 | | | |
|---|---|---|---|---|
| Category | Minor Course | | | |
| Course title | **Information Security** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 1 | 0 | 4 |
| Theory Internal | 25 | | | |
| Theory External | 75 | | | |
| Practical Internal | - | | | |
| Practical External | - | | | |
| Total | 100 | | | |
| Duration of Exam | 3 hrs. | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**Course outcomes:**

CO1: Understand the fundamental concepts of Information Security, including its history, models, and development life cycle.

CO2: Identify and analyze various threats, attacks, and legal/ethical issues related to information and computer systems.

CO3: Apply risk management techniques, including risk assessment and control strategies, to secure computing environments.

CO4: Develop and implement information security plans, policies, and awareness programs, ensuring organizational security governance.

## UNIT-I

**Introduction:** History of Information Security, CNSS Security Model, Components of Information Security, Approaches to Information Security and Implementation, Security Systems Development Life Cycle, Security Professionals and the Organization.

## UNIT-II

**The Need for Security:** Introduction, Business Needs First: Threats and Attacks, Legal, Ethical, and Professional Issues in Information Security, Law and Ethics in Information Security: Relevant Laws, International Laws and Legal Bodies.

## UNIT-III

**Risk Management:** An Overview of Risk Management, Risk Identification, Risk Assessment, Risk Control Strategies: Selecting a Risk Control Strategy, Quantitative versus Qualitative Risk Control Practices.

## UNIT-IV

**Planning for Security** – Introduction to Information Security Planning and Governance, Information Security Policy, Standards, and Practices, Security Education, Training, and Awareness Program.

**Textbooks & References:**


1. Michael E. Whitman & Herbert J. Mattord, Principles of Information Security, Course Technology, Cengage Learning.
2. Steve G Watkins, An Introduction to Information Security and ISO 27001:2013 – A Pocket Guide.

| Course code | MIC-3 | | | |
|---|---|---|---|---|
| Category | Minor Course | | | |
| Course title | **Cyber Security** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 1 | 0 | 4 |
| Theory Internal | 25 | | | |
| Theory External | 75 | | | |
| Practical Internal | - | | | |
| Practical External | - | | | |
| Total | 100 | | | |
| Duration of Exam | 3 hrs. | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**Course outcomes:**

CO1: Describe the nature, classification, and organizational impact of cyber crimes—including mobile and wireless threats—and explain fundamental cryptographic concepts.

CO2: Identify and analyze diverse cybersecurity vulnerabilities and attack vectors—such as phishing, malware, DoS/DDoS, SQL injection, buffer overflow, and biometric-related threats.

CO3: Explain the principles and processes of digital forensics—including email and network investigations, digital evidence handling, and forensic lab setup—to support cybercrime investigations.

CO4: Evaluate organizational and legal frameworks for cybersecurity—including cost considerations, IPR, cyber terrorism, privacy protection, forensic best practices, and compliance with the Indian IT Act.

## UNIT-I

Introduction to Cyber Security and Cyber crime; Classification of Cyber Crimes; Cyber Offences and Planning; Mobile & Wireless devices and the related security challenges; Trends in Mobility; Authentication Service Security; Attacks on Mobile/Cell phones; Mobile Devices and Security Implications for Organizations; Organizational measures for handling mobile devices; Basic Cryptography Concepts

## UNIT-II

Cyber Security Vulnerability; Data Integrity and Authentication; Tools and Methods used in Cyber Crime; Proxy Servers and Anonymizers; Phishing; Password Attacks & Cracking; Keyloggers and Spywares; Virus and Worms; Types of Viruses; Trojan Horses and Backdoors; Protection against Trojan Horses and Backdoors; Steganography; DoS and DDoS Attacks; SQL Injection; Buffer overflow; Attacks on Wireless Networks; Phishing and Identity Theft; Biometrics.

## UNIT-III

Introduction to Computer Forensics; Historical background of Cyber Forensic; Digital Forensics Science; Need for Computer Forensics; Cyber Forensics and Digital Evidence; Forensic analysis of E-Mail; Digital Forensics Life Cycle; The Digital Forensics Process ; Network Forensics; Approaching a Computer Forensics Investigation; Setting up a Computer Forensics Laboratory; Computer Forensics and Steganography; Forensics and Social Networking Sites.

## UNIT-IV

Cyber Security and Organizational implications; cost of cybercrimes and IPR issues; Web threats for organizations; Social media marketing; Forensic best practices for organizations; Cyber Crime and Cyber terrorism;

Cybercrimes and Cyber security: The Legal Perspectives; The Indian IT Act; Challenges to Indian Law and Cybercrime Scenario in India; Cybercrime and Punishment; Cyberlaw, Technology and Students: Indian Scenario.

**Textbooks & References:**


1. Nina Godbole, Sunit Belapure, Cyber Security, Wiley.
2. Gaurav K. Roy, Cyber Security and Digital Privacy: A Universal Approach, Highbrow Scribes Publication.
3. Thomas J. Mowbray ,Cybersecurity: Managing Systems, Conducting Testing, and Investigating Intrusions, Wiley.

# SEMESTER 4

| Course code | **CC-ID10** | | | |
|---|---|---|---|---|
| Category | Core Course | | | |
| Course title | **Computer Networks** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 0 | 2 | 4 |
| Theory Internal | 25 | | | |
| Theory External | 50 | | | |
| Practical Internal | 05 | | | |
| Practical External | 20 | | | |
| Total | 100 | | | |
| Duration of Exam | 3 Hrs | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**COURSE OUTCOMES:**

At the end of this course, students will demonstrate the ability to

CO1: Explain the functions of the different layers of the OSI Protocol.

CO2: Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs), and Wireless LANs (WLANs) and describe the function of each.

CO3: Identify and connect various connecting components of a computer network.

CO4: Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, and Firewalls using open-source available software and tools.

CO5: outline various models, topologies and devices of Computer Networks.

## UNIT - I

Introduction: Data communication, Components, Data Representation, Simplex, Half Duplex, and Full Duplex Transmission, Modulation, Multiplexing, Computer networks, distributed processing, Internet, Topologies, Packet and circuit switching, connectionless and connection- oriented services. Network Models: OSI model and TCP/IP Model Physical Layer – LAN: Ethernet.

## UNIT – II

Data Link Layer and Medium Access Sub Layer: MAC Addressing, Framing, Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window Protocol. Medium Access Control: Random access, Controlled Access, and channelization protocols. Network Layer: Logical

addressing, classful and classless addressing, subnetting, Ipv4, ICMPv4, ARP, RARP and BOOTP, Ipv6, Ipv6 addressing.

## UNIT - III

Network Devices: Repeater, hub, switch, router, and gateway. Routing Algorithms: introduction to routing, Shortest Path Algorithm, Flooding, Hierarchical Routing, Link State, and Distance Vector Routing Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), TCP connection management.

## UNIT - IV

Congestion Control, Quality of Service, QoS Improving techniques. Application Layer: Domain Name Space (DNS), EMAIL, File Transfer Protocol (FTP), HTTP, SNMP Network Security: Firewalls, security goals, types of attack, symmetric and asymmetric key ciphers.

## TEXT AND REFERENCE BOOKS:


1. Essentials of Computer And Network Technology, Nasib Singh Gill, Khanna Book Publishing Co.(P) Ltd, New Delhi.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.
3. Computer Networks, latest Edition, Andrew S. Tanenbaum, Pearson New International Edition.
4. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
5. Internetworking with TCP/IP, Volume 1, latest Edition Douglas Comer, Prentice Hall of India.
6. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.


## Computer Networks lab

### List of Experiments

1. To construct a simple network topology on Packet Tracer.

2. To verify and configure VLAN and VLAN trunk in packet tracer.

3. To construct RJ45 cable.

4. a) To configure simple static routing.

b) To implement Security on interconnecting devices.

5. To configure a Network Topology constitutes Routers and Switches using Packet Tracer.

6 Working with complex network topologies.

7. Mid Term Evaluation 8. To monitor network traffic using Wire Shark

9. To get the MAC or Physical Address of the system Using Address Resolution Protocol.

10. To Configure network using Routing Information Protocol (RIP)

11. To configure network state routing protocol (OSPF).

12. To configure Border Gateway Protocol.

13. To configure Application Layer protocols: DHCP and DNS.

| Course code | **CC-ID11** | | | |
|---|---|---|---|---|
| Category | Core Course | | | |
| Course title | **Software Engineering** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 1 | 0 | 4 |
| Theory Internal | 30 | | | |
| Theory External | 70 | | | |
| Total | 100 | | | |
| Duration of Exam | 3 Hrs | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**COURSE OUTCOMES:**

At the end of this unit, students will demonstrate the ability to:

CO1: Understand the fundamental principles and characteristics of software, including its evolution and the evolving role of software in modern systems.

CO2: Apply basic concepts of Software Design, including Architectural Design, Modularization, Design Structure Charts, Flow Charts, and measures of Coupling and Cohesion.

CO3: Define Software Quality attributes and understand Software Quality Assurance plans and activities, including Software Documentation

CO4: Understand the need for Software Maintenance and differentiate between categories such as Preventive, Corrective, and Perfective Maintenance.

**UNIT-I**

**Introduction:** Software and its Characteristics, Evolving Role of Software, Software Product. Software Processes. Software Crisis. Software Engineering Evolution. Principles of Software Engineering. Programming-in-the-small vs. Programming-in-the-large. Software Components. Software Engineering Processes.

**Software Life Cycle (SLC) Models:** Water-Fall Model. Prototype Model. Spiral Model. Evolutionary Development Models. Iterative Enhancement Models. Object Oriented Models and other latest Models.

## UNIT-II

**Software Requirements:** Functional and Non-Functional. User requirements. System requirements. Software Requirements Document - Requirement Engineering Process: Feasibility Studies, requirements validation, requirements management.

**Software Design:** Basic Concept of Software Design. Architectural Design. Low Level Design: Modularization. Coupling and Cohesion Measures; Design Strategies: Function Oriented Design. Object Oriented Design. Top• Down and Bottom-Up Design.

## UNIT-III

**Software Measurement and Metrics:** Process Metrics. Project metrics. Estimation-LOC, Halstead's Software Science. Function Point (FP). Cyclomatic Complexity Measures: Software Project Estimation Models- Empirical. Putnam. COCOMO I & II.

**Software Quality:** Attributes, Software Quality Assurance - plans & activities: Software Documentation.

**Software Testing:** Introduction. Verification vs. Validation. Software Reliability. Levels of Testing.Structural Testing, Functional Testing.

## UNIT-IV

**Software Maintenance:** Need for Maintenance. Categories of Maintenance: Preventive. Corrective and Perfective Maintenance. Cost of Maintenance: Software Re-Engineering. Reverse Engineering,Software Documentation.

**Software Configuration Management:** SCM Activities. Change Control Process. Software VersionControl: Software Reuse.

**Textbooks & References:**


1. Software Engineering, Nasib Singh Gill, Khanna Book Publishing Co.(P) Ltd, New Delhi.
2. Software Engineering – A Practitioner's Approach, Roger S. Pressman, 1996, MGH.
3. Fundamentals of software Engineering, Rajib Mall, PHI
4. Software Engineering by Ian Summerville, Pearson Edu, 5th edition, 1999, AW,
5. Software Engineering – David Gustafson, 2002, T.M.H
6. Software Engineering Fundamentals Oxford University, Ali Behforooz and Frederick J. Hudson 1995 JW&S,
7. An Integrated Approach to software engineering by Pankaj jalote , 1991 Narosa

| Course code | **CC-ID12** | | | |
|---|---|---|---|---|
| Category | Core Course | | | |
| Course title | **Java Programming** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 0 | 2 | 4 |
| Theory Internal | 25 | | | |
| Theory External | 50 | | | |
| Practical Internal | 05 | | | |
| Practical External | 20 | | | |
| Total | 100 | | | |
| Duration of Exam | 3Hrs | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**COURSE OUTCOMES:**

At the end of this course, students will demonstrate the ability to

CO1: Identify classes, objects, members of a class and relationships among them for a specific problem.

CO2: Understand and demonstrate the concepts of garbage collection, polymorphism, inheritance etc.

CO3: Do numeric (algebraic) and string-based computation.

CO4: Understand and implement modularity as well as basic error-handling techniques.

CO5: Develop, design and implement small multithreaded programs using Java language.

**UNIT - I**

**Introduction to Java:** Evolution of Java, Object Oriented Programming Structure, Overview and characteristics of Java, Java program Compilation and Execution Process, Organization of the Java Virtual Machine, Client side Programming, Platform Independency & Portability, Security, Relation b/w JVM, JRE and JDK, Introduction to JAR format, Naming Conventions, Data types & Type casting, operators.

**UNIT - II**

**OOPS Implementation:** Classes, Objects, attributes, methods, data encapsulation, reference variables, Constructors, Anonymous block, Method Overloading, Static Data members.

**Argument Passing Mechanism:** Passing primitive arguments, passing objects, Wrapper Classes; This keyword: Referencing instance members, Intra class constructor chaining, Method chaining; Inheritance & code reusability: Extending classes for code reusability, Usage of super keyword, Method Overriding.

## UNIT - III

**Packages:** Defining Package, CLASSPATH, Package naming, Accessibility of Packages, using Package Members.

**Interfaces:** Implementing Interfaces, Interface and Abstract Classes, Extends and Implements together.

**Exceptions Handling:** Exception, Handling of Exception, Using try-catch, Catching Multiple Exceptions, Using finally clause, Types of Exceptions, Throwing Exceptions, Writing Exception Subclasses.

## UNIT - IV

**Multithreading:** Introduction, The Main Thread, Java Thread Model, Thread Priorities, Synchronization in Java, Inter thread Communication.

**I/O in Java:** I/O Basics, Streams and Stream Classes, The Predefined Streams, Reading from, and Writing to, Console, Reading and Writing File.

**Strings and Characters:** Fundamentals of Characters and Strings, The String Class, String Operations, String Buffer Class and Methods.

## TEXT AND REFERENCE BOOKS:


1. E. Balaguruswamy, "Programming with Java", TMH
2. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
3. Decker &Hirshfield, "Programming.Java", Vikas Publication.
4. Patrick Naughton and HerbertzSchidt, "Java-2 the complete Reference", TMH
5. Sierra & bates, "Head First Java", O'Reilly.

## Java Programming lab

### List of Experiments

1. Write a java program to find the Fibonacci series using recursive and non recursive functions
2. Write a java program to multiply two given matrices.
3. Write a java program for Method overloading and Constructor overloading .
4. Write a program to demonstrate execution of static blocks, static variables & static methods.
5. Write a program to display the employee details using Scanner class
6. Write a program for sorting a given list of names in ascending order
7. Write a program to implement single and Multi level inheritance
8. Write a program to implement Hierarchical Inheritance.
9. Write a program to implement method overriding.
10. Write a program to create an abstract class named Shape that contains two integers and an empty method named printArea (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea () that prints the area of the given shape.
11. Write a program to implement Interface.
12. Write a program to implement multiple and Hybrid Inheritance
13. Write a program to create inner classes
14. Write a program to create user defined package and demonstrate various access modifiers.
15. Write a program to demonstrate the use of super and final keywords.
16. Write a program if number is less than 10 and greater than 50 it generate the exception out of range. Else it displays the square of number.
17. Write a program with multiple catch Statements.
18. Write a Program to implement simple Thread by extending Thread class and implementing runnable interface.
19. Write a program that implements a multi-thread application that has three threads

| Course code | MIC-4 | | | |
|---|---|---|---|---|
| Category | Minor Course | | | |
| Course title | **Mobile Application Development** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 0 | 2 | 4 |
| Theory Internal | 25 | | | |
| Theory External | 50 | | | |
| Practical Internal | 05 | | | |
| Practical External | 20 | | | |
| Total | 100 | | | |
| Duration of Exam | 3 hrs. | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Understand the basic concepts and functions of Mobile Application and Android Studio.

CO2: Describe the working and architecture of Android Operating System.

CO3: Design Android UI Layout and Describe activities.

CO4: Design and develop an application using Database.

## UNIT I

Android Architecture: Introduction to Android, Features of Android, Android Architecture, Android and File Structure, Layouts – Linear, Relative, Grid and Table Layouts, Views and Resources, Activities and Intents, Activity Lifecycle and Saving State,

User Interface (UI) Components – Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers, List View, Spinner View.

## UNIT II

Event Handling – Handling clicks or changes of various UI components.

Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, using Intent to dial a number or to send SMS.

## UNIT III

Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions

Location and Mapping: Location based services, Mapping, Google Maps activity, Working with MapView and MapActivity; Playing and Recording of Audio and Video in application.

## UNIT IV

Persisting Data to files: Saving to Internal Storage, Saving to External Storage

Introduction to SQLite database: creating and opening a database, creating tables, inserting retrieving and deleting data.

Application Signing, API keys for Google Maps, Publishing application to the Android Market.

**Textbooks & References:**


1. Zigurd Mednieks, Laird Dornin, G,BlakeMeike and Masumi Nakamura, Programming Android, O'Reilly Publications.
2. Wei-Meng Lee, Beginning Android Application Development, Wiley India Ltd.
3. Burd, B. Android Application Development All-in-One for Dummies.
4. James C.S., Android Application development for Java Programmer, CENGAGE Learning.
5. Pradeep Kothari, Android Application Development: Black Book, Wiley India Ltd.


## Mobile Application Development Lab
## List of Experiment

1. Installation of Android studio.
2. Development Of Hello World Application
3. Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button
4. Create a screen that has input boxes for User Name, Password, Address, Gender(radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button (use any layout)
5. Design an android application Using different layouts
6. Design an android application to create page using Intent and one Button and pass the Values from one Activity to second Activity
7. Design an android application Send SMS using Intent
8. Create an android application using Fragments

9. Design an android application for menu.
10. Create a user registration application

| Course code | MIC-4 | | | |
|---|---|---|---|---|
| Category | Minor Course | | | |
| Course title | **Computer Vision** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 1 | 0 | 4 |
| Theory Internal | 25 | | | |
| Theory External | 75 | | | |
| Practical Internal | - | | | |
| Practical External | - | | | |
| Total | 100 | | | |
| Duration of Exam | 3 hrs. | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**Course outcomes:**

CO1: Understand Image Processing and Computer Vision concepts, and explore various applications like biometrics, object recognition, and virtual/augmented reality.

CO2: Learn image formation models, camera calibration, and techniques for constructing 3D models from images.

CO3: Gain skills in image preprocessing, edge detection, and motion estimation, including stereo vision and structure from motion.

CO4: Study shape representation and segmentation techniques, including deformable models, snakes, active contours, and multi-resolution analysis.

## UNIT-I

**Introduction:** Image Processing & Computer Vision, What is Computer Vision - Low-level, Mid-level, High-level.

**Diverse Computer Vision Applications:** Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Multimedia, Virtual Reality and Augmented Reality

## UNIT-II

**Image Formation Models:** Monocular imaging system, Orthographic & Perspective Projection,

Camera model and Camera calibration, Binocular imaging systems, Multiple views geometry, Structure determination, shape from shading, Depth from Defocus, Construction of 3D model from images.

## UNIT-III

**Image Processing and Feature Extraction:** Image preprocessing, Image representations (continuous and discrete), Edge detection. Motion Estimation: Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion.

## UNIT-IV

**Shape Representation and Segmentation**: Contour based representation, Region based representation, Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multi resolution analysis.

**Textbooks & References:**


1. R. C. Gonzalez, R. E. Woods, Digital Image Processing, Addison Wesley Longman, Inc.
2. D. H. Ballard, C. M. Brown, Computer Vision, Prentice-Hall.
3. Richard Szeliski, Computer Vision: Algorithms and Applications (CVAA), Springer.
4. Sonka, Hlavac, and Boyle. Thomson, Image Processing, Analysis, and Machine Vision.
5. D. Forsyth and J. Ponce, Computer Vision - A modern approach, Prentice Hall.
6. E. Trucco and A. Verri, Introductory Techniques for 3D Computer Visicn, Prentice Hall.

| Course code | MIC-4 | | | |
|---|---|---|---|---|
| Category | Minor Course | | | |
| Course title | **Programming in JavaScript** | | | |
| Scheme and Credits | L | T | P | Credits |
| | 3 | 0 | 2 | 4 |
| Theory Internal | 25 | | | |
| Theory External | 50 | | | |
| Practical Internal | 05 | | | |
| Practical External | 20 | | | |
| Total | 100 | | | |
| Duration of Exam | 3 hrs. | | | |

***Note:*** The examiner will set nine questions in total. Question one will have seven parts from all units and the marks of first question will be of 20% of total marks of Question Paper and the remaining eight questions to be set by taking two questions from each attempt FIVE questions in all, selecting one question from every unit apart from the Question Number 1.

**Course outcomes:**

CO1: Explain the evolution, syntax, and structure of JavaScript, differentiate it from Java and VBScript, and describe how it enhances HTML to create static and dynamic web pages.

CO2: Demonstrate proficiency with JavaScript fundamentals—using DOM to obtain user input, understanding variables, data types, operators, control structures, loops, and proper script usage.

CO3: Apply JavaScript's built-in types, methods, and event handling; and leverage core objects such as String, Date, Boolean, Window, and Document for dynamic interaction.

CO4: Implement advanced JavaScript features including arrays, scoped functions, recursion, cookies, form validation, and interacting with XML to build dynamic, client-side applications.

## UNIT-I

**The Nature of JavaScript:** Evolution of Scripting Languages, JavaScript-Definition, Programming for Non-Programmers, Introduction to Client–Side Programming, Comparison between Java, JavaScript & VB Script. Enhancing HTML Documents with JavaScript. Static and Dynamic web pages.

## UNIT-II

**Introduction to JavaScript:** Document Object Model (DOM), obtaining user inputs, memory

concepts, Character set, case sensitivity, comments, Literals, Expression & Operators, Control Structures, looping constructs, break, continue statements, variables, Data types, Keywords.

## UNIT-III

JavaScript types, merge multiple JavaScript into one, Running Scripts, Methods, and Events, Introduction to Objects: String, Date, Boolean, Window, document and various Object interaction.

## UNIT-IV

Array declaration and allocation, passing arrays to function, Scoping rules, Recursion and iteration, cookies, Form Validation. Introduction to XML.

**Textbooks & References:**


1. David Flanagan, JavaScript: The Definitive Guide: The Definitive Guide.
2. Chris Bates, Web Programming, Building Internet Applications, WILEY.
3. Kogent Learning, Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML, AJAX – Black Book, Wiley India Pvt. Ltd.


## Programming in JavaScript Lab
## List of Experiment

1. Write a program using JavaScript to add three numbers.
2. Write a program using JavaScript to toggle visibility of a .
3. Write a program using JavaScript to display user input.
4. Write a program using JavaScript to perform basic arithmetic operations.
5. Write a program using JavaScript to validate number input.
6. Write a program using JavaScript to check if a number is even or odd.
7. Write a program using JavaScript to evaluate grade based on score.
8. Write a program using JavaScript to calculate factorial of a number.
9. Write a program using JavaScript to change background color on button click.
10. Write a program using JavaScript to display a digital clock.
11. Write a program using JavaScript to create an object with properties and methods.
12. Write a program using JavaScript to validate form fields.
13. Write a program using JavaScript to manipulate arrays.
14. Write a program using JavaScript to check if a string is a palindrome.
15. Write a program using JavaScript to create a to-do list application.
16. Write a program using JavaScript to generate a random number.
17. Write a program using JavaScript to convert temperatures between Celsius and Fahrenheit.
18. Write a program using JavaScript to convert an amount from one currency to another.