# SCHEME & SYLLABUS
# BCA Course-3yrs


## Department of Computer Science and Applications
## UICAIS
## Sant Baba Bhag Singh University
## Batch: 2022-2025

# SCHEME & SYLLABUS

## (3 **YEARS BCA PROGRAMME**)

Session: 2022-25

**ABOUT THE BCA**

Computer Application has been evolving as an important branch of science and technology in last few years and it has carved out a space for itself like computer science and engineering. Computer application spans theory and more application and it requires thinking both in abstract terms and in concrete terms. Computer science has a wide range of specialties. These includes computer architecture, software systems, Graphics, Artificial Intelligence, Mathematical and Statistical Analysis, Data science, Computational Science and Software Engineering.

**SALIENT FEATURES OF THE DEPARTMENT**

- Research oriented curriculum designed to enable students to acquire all the skills needed to collect and analyze the data.
- The Institute drawing upon its strength of highly qualified well-trained faculty, state of art infrastructure and innovative teaching methodology.
- Elective courses that brides the gap between industry requirements and academia.
- Hands on experience in most of the courses of computer applications so as to impart practical knowledge in the relevant field.
- To keep the students at par with the emerging technologies prevailing in the market, the institute is furnished with various specialized research labs and software labs.

**BCA (BACHELOR IN COMPUTER APPLICATION)**

- The Program outcomes in BCA are aimed at allowing flexibility and innovation in design and development of course content, in method of imparting training, in teaching learning process and in assessment procedures of the learning outcomes. The emphasis in BCA courses, in outcome-based curriculum

framework, help students learn solving problems, accomplishing IT tasks, and expressing creativity, both individually and collaboratively. The proposed framework will help Students learn programming techniques and the syntax of one or more programming languages.

**VISION**

- To prepare technically proficient and skillful computer professionals thereby contributing towards building a strong and developed nation.

**MISSION**

- To provides innovative and quality knowledge to students for global competence and excellence. Also, to prepare high quality Professionals for catering the needs of industry.

**ELIGIBILITY CRITERIA**

- 10+2 or its equivalent examination in any stream conducted by a recognized Board/ University/Council

**DURATION**

- 3 Years

**The present Curriculum Framework for BCA degrees is intended to facilitate the students to achieve the following:**

- To develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation
- To develop the ability to use this knowledge to analyze new situations in the application domain.
- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.
- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems

- To learn skills and tools like mathematics, statistics and electronics to find the solution, interpret the results and make predictions for the future developments
- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate.

**The objectives of the Programme are:**

- The primary objective of this program is to provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software.
- It helps students analyze the requirements for system development and exposes students to business software and information systems.
- This course provides students with options to specialize in legacy application software, system software or mobile applications.
- To produce outstanding IT professionals who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves.
- To provide opportunity for the study of modern methods of information processing and its applications.
- To develop among students the programming techniques and the problem-solving skills through programming.
- To prepare students who wish to go on to further studies in computer science and related subjects.
- To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications.

## Program Outcomes:

**PO1: Discipline knowledge:** Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity.

**PO2: Problem Solving:** Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.

**PO3: Design and Development of Solutions:** Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.

**PO4: Programming a computer:** Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.

**PO5: Application Systems Knowledge:** Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.

**PO6: Modern Tool Usage:** Identify, select and use a modern scientific and IT tool or technique for modeling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.

**PO7: Communication:** Must have a reasonably good communication knowledge both in oral and writing.

**PO8: Project Management:** Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.

**PO9: Ethics on Profession, Environment and Society:** Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.

**PO10: Lifelong Learning:** Should become an independent learner. So, learn to learn ability.

**PO11: Motivation to take up Higher Studies:** Inspiration to continue educations towards advanced studies on Computer Science.

## PROGRAMME SPECIFIC OUTCOMES (PSO)

**PSO1:** Apply standard Software Engineering practices and strategies in real -time software project development

**PSO2**: Design and develop computer programs/computer -based systems in the areas related to AI, algorithms, networking, web design, cloud computing, IoT and data analytics

**PSO3:** Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems

**PSO4**: The ability to apply the knowledge and understanding noted above to the analysis of a given information handling problem.

**PSO5**: The ability to work independently on a substantial software project and as an effective team member

### CHOICE BASED CREDIT SYSTEM (CBCS)

The choice-based credit system provides flexibility in designing curriculum and assigning credits based on the course content and hour of teaching. The choice-based credit system provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective and open elective courses. The CBCS provides a cafeteria type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquired more than the required credits, and adopt an interdisciplinary approach to learning. The courses shall be evaluated on the grading system, which is considered to be better than the conventional marks system. It is necessary to introduce the grading system to make the uniformity among all technical institutions of India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the AICTE has formulated the guidelines to be followed.

**Curriculum Structure:** BCA degree programme will have a curriculum with Syllabi consisting of following type of courses:

A. **Core Courses**: A course, which should be studied compulsorily by a candidate as a necessary requirement is termed as a core course.

- **Major: Compulsory Course**
- **Minor: Use their minor course to focus or specialized certain area**
- **Skill/ Vocational: Skill Enhancement**
- **Interdisciplinary Course: Introduce for outer department**

B. **Elective Course:** Generally, a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

- **Discipline Specific Elective (DSE) Course:** Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).
- **Project:** An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project.

C. **Major Specific Elective courses (MSE)**: Elective courses offered under the major: Management/ Economics/History/Sociology/Political science/Philosophy/Public administration shall be referred to as major specific electives.

D. **Open Elective Courses (OE)**: Open electives courses offered under the related stream/disciplines (Languages/Performing and visual arts) and those under the unrelated streams/disciplines (Physical and chemical sciences/Mathematical,

Management and computational sciences) to seek exposure beyond main discipline of choice shall be referred to as open elective courses.

**As per UGC Guidelines:**

Outline of Choice Based Credit System:

1. Core Course: A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

2. Elective Course: Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

2.1 Discipline Specific Elective (DSE) Course : Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).

2.2 Project: An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called project.

2.3 Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/subject, with an intent ion to seek exposure is called a Generic Elective.

P.S.: A core course offered in a discipline /subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

3. Ability Enhancement Courses (AEC): The Ability Enhancement (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement;

i. Environmental Science and

ii. English/MIL Communication

These are mandatory for all disciplines.

SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

3.1 Ability Enhancement Compulsory Courses (AECC): Environmental Science, English Communication/ MIL Communication.

3.2 Skill Enhancement Courses (SEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

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**Course Scheme (BCA Program)**
**Semester 1**

**I. Theory Subjects**

| S No. | Course Type | Course Code | Subject Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA101 | Fundamentals of IT and C Programming | 3:0:0 | 3:0:0 | 3 | 3 |
| 2 | Major | CSA103 | Introduction to Data Communication and Networks | 4:0:0 | 4:0:0 | 4 | 4 |
| 3 | Major | CSA105 | Discrete Mathematics | 3:1:0 | 3:1:0 | 4 | 4 |
| 4 | Major | CSA107 | Basics of Electronics | 3:1:0 | 3:1:0 | 4 | 4 |
| 5 | Minor | ENG121 | Communication Skills I | 2:0:0 | 2:0:0 | 2 | 2 |
| 6 | Minor | SSC105 | Punjab and its Culture: An Historical Overview | 3:0:0 | 3:0:0 | 3 | 3 |
| 7 | Minor | PT101/PT103/PT105 | Physical Training (NSO/NCC/NSS) | 0:0:2 | NC | 2 | NC |

**II. Practical Subjects**

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA109 | Fundamentals of IT and C Programming (Lab) | 0:0:4 | 0:0:2 | 4 | 2 |
| 2 | Minor | ENG123 | Communication Skills-1 (Practical) | 0:0:2 | 0:0:1 | 2 | 1 |

**Total Credits: 23**
**Total Contact Hours: 28**

**Semester 2**

**I. Theory Subjects**

| S. No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA102 | Object Oriented Programming with C++ | 4:0:0 | 4:0:0 | 4 | 4 |
| 2 | Major | CSA104 | Fundamentals of Computer Networks | 3:0:0 | 3:0:0 | 3 | 3 |
| 3 | Major | CSA106 | Operating System Principles | 3:0:0 | 3:0:0 | 3 | 3 |
| 5 | Major | CSA108 | Essentials of Software Engineering | 3:0:0 | 3:0:0 | 3 | 3 |
| 6 | Minor | COM004 | Principles and Practices of Management | 3:0:0 | 3:0:0 | 3 | 3 |
| 7 | Minor | CSA110 | Numerical methods | 3:0:0 | 3:0:0 | 3 | 3 |
| 8 | Minor | PT102/ PT104/ PT106 | Physical Training (NSO/NCC/NSS) | 0:0:2 | NC | 2 | NC |

**II. Practical Subjects**

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA112 | Object Oriented Programming with C++ (Lab) | 0:0:4 | 0:0:2 | 4 | 2 |
| 2 | Major | CSA114 | Operating System Principles (LAB) | 0:0:4 | 0:0:2 | 4 | 2 |

**Total Credits: 23**
**Total Contact Hours: 29**

## Semester 3

### I. Theory Subjects

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA201 | Simplified Approach to Data Structure | 3:1:0 | 3:1:0 | 4 | 4 |
| 2 | Major | CSA203 | Introduction to Database Management System | 3:0:0 | 3:0:0 | 3 | 3 |
| 3 | Major | CSA205 | Introduction to Web Technology | 3:0:0 | 3:0:0 | 3 | 3 |
| 4 | Minor (ID) | SSC005 | Human Values and Professional Skills | 3:0:0 | 3:0:0 | 3 | 3 |
| 5 | MSE | CSA207 | Fundamentals of Microprocessor | 3:0:0 | 3:0:0 | 3 | 3 |
| 6 | OE | Open Elective | | 4:0:0 | 4:0:0 | 4 | 4 |
| 7 | Minor | PT201/PT203/PT205 | Physical Training (NSO/NCC/NSS) | 0:0:2 | NC | 2 | NC |

### II. Practical Subjects

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA209 | Simplified Approach to Data Structure Lab | 0:0:4 | 0:0:2 | 4 | 2 |
| 2 | Major | CSA211 | Introduction to Web Technology | 0:0:4 | 0:0:2 | 4 | 2 |

**Total Credits: 24**
**Total Contact Hours: 30**

**Open Elective Course ( 4 Credits)**

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1. | OE | CSA213 | Basics of Cyber security and laws | 4:0:0 | 4:0:0 | 4 | 4 |
| 2. | OE | CSA215 | Basic approach to Compiler Design | 4:0:0 | 4:0:0 | 4 | 4 |
| 3. | OE | CSA217 | Fundamentals of Digital Marketing | 4:0:0 | 4:0:0 | 4 | 4 |
| 4. | OE | CSA219 | Introduction to System Analysis and Design | 4:0:0 | 4:0:0 | 4 | 4 |

## Semester 4

### I. Theory Subjects

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA202 | Concepts of Computer Architecture | 3:1:0 | 3:1:0 | 4 | 4 |
| 2 | Major | CSA204 | Wireless Communication with Ethical Hacking | 3:1:0 | 3:1:0 | 4 | 4 |
| 3 | Major | CSA206 | Basics of Java programming | 3:0:0 | 3:0:0 | 3 | 3 |
| 4 | Minor (ID) | EVS001 | Environmental Science | 3:0:0 | 3:0:0 | 3 | 3 |
| 5 | Major | CSA208 | Marketing Management in IT Sector | 3:0:0 | 3:0:0 | 3 | 3 |
| 6 | OE | Open Elective | | 3:0:0 | 3:0:0 | 3 | 3 |

### II. Practical Subjects

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA210 | Basics of Java programming (Lab) | 0:0:4 | 0:0:2 | 4 | 2 |
| 2 | Major | CSA212 | Wireless Communication with Ethical Hacking Lab | 0:0:4 | 0:0:2 | 4 | 2 |
| 3 | Major | CSA214 | Six Week Industrial/ Institutional Training | NA | NA | NA | 2 |

**Open Elective Course (3 Credits)**

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1. | OE | CSA216 | Basics of Statistical Methods | 3:0:0 | 3:0:0 | 3 | 3 |
| 2. | OE | CSA218 | Management of Banking operations | 3:0:0 | 3:0:0 | 3 | 3 |
| 3. | OE | CSA220 | Cyber Crime and Cyber laws | 3:0:0 | 3:0:0 | 3 | 3 |
| 4. | OE | CSA222 | Fundamentals of IoT | 3:0:0 | 3:0:0 | 3 | 3 |

**Total Credits: 26**
**Total Contact Hours: 28**

## Semester 5

### I. Theory Subjects

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA301 | Development of Applications using Android programming | 4:0:0 | 4:0:0 | 4 | 4 |
| 2 | Major | CSA303 | Basics of Computer Graphics | 3:1:0 | 3:1:0 | 4 | 4 |
| 3 | Major | CSA305 | Introduction to Internet Application | 4:0:0 | 4:0:0 | 4 | 4 |
| 4 | Major | CSA307 | IT Management | 3:0:0 | 3:0:0 | 3 | 3 |
| 5 | OE | Open Elective | | 3:0:0 | 3:0:0 | 3 | 3 |

### II. Practical Subjects

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA309 | Development of Applications using Android programming (Lab) | 0:0:4 | 0:0:2 | 4 | 2 |
| 2 | Major | CSA311 | Basics of Computer Graphics Lab | 0:0:4 | 0:0:2 | 4 | 2 |

**Total Credits: 22**
**Total Contact Hours: 26**

**Open Elective Course (3 Credits)**

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1. | OE | CSA313 | Programming with Ruby on Rail | 3:0:0 | 3:0:0 | 3 | 3 |
| 2. | OE | CSA315 | Introduction to PL/SQL | 3:0:0 | 3:0:0 | 3 | 3 |
| 3. | OE | CSA317 | Fundamentals of Software Testing | 3:0:0 | 3:0:0 | 3 | 3 |
| 4. | OE | CSA319 | Mobile Architecture & Security | 3:0:0 | 3:0:0 | 3 | 3 |

## Semester 6

### I. Theory Subjects

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA302 | Concepts of Network Security and Cryptography | 3:1:0 | 3:1:0 | 4 | 4 |
| 2 | Major | CSA304 | Programming with Python | 4:0:0 | 4:0:0 | 4 | 4 |
| 3 | Major | CSA306 | Analysis and Design of Algorithm | 4:0:0 | 4:0:0 | 4 | 4 |
| 4 | Major | CSA308 | E-Governance | 3:0:0 | 3:0:0 | 3 | 3 |
| 5 | OE | Open Elective | | 3:0:0 | 3:0:0 | 3 | 3 |

### II. Practical Subjects

| S. No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1 | Major | CSA310 | Python Programming (Lab) | 0:0:4 | 0:0:2 | 4 | 2 |
| 2 | Major | CSA312 | Design and Analysis of Algorithm (Lab) | 0:0:4 | 0:0:2 | 4 | 2 |

**Open Elective Course (3 Credits)**

| S No. | Course Type | Course Code | Course Name | Contact Hours (L:T:P) | Credits (L:T:P) | Total Contact Hours | Total Credit Hours |
|---|---|---|---|---|---|---|---|
| 1. | OE | CSA314 | Introduction to Parallel Computing | 3:0:0 | 3:0:0 | 3 | 3 |
| 2. | OE | CSA316 | Basic of Banking | 3:0:0 | 3:0:0 | 3 | 3 |
| 3. | OE | CSA318 | Introduction to Linux Administration | 3:0:0 | 3:0:0 | 3 | 3 |
| 4. | OE | CSA320 | Simplified Approach to Distributed DBMS | 3:0:0 | 3:0:0 | 3 | 3 |

**Total Credits: 22**
**Total Contact Hours: 26**

## Summary of Scheme

| Sem | L | T | P | Contact hrs per week | Credits |
|---|---|---|---|---|---|
| 1 | 18 | 2 | 8 | 28 | 23 |
| 2 | 19 | 0 | 10 | 29 | 23 |
| 3 | 19 | 1 | 10 | 30 | 24 |
| 4 | 18 | 2 | 8 | 28 | 26 |
| 5 | 17 | 1 | 8 | 26 | 22 |
| 6 | 17 | 1 | 8 | 26 | 22 |
| **Total** | **108** | **7** | **52** | **167** | **140** |

# First Semester

| | |
|---|---|
| **Course Code** | **CSA101** |
| **Course Title** | **Fundamentals of IT and C Programming** |
| **Type of Course** | Major |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Basic Knowledge about Computers |
| **Course Objective(s)** | To gain experience about structured programming.<br>To help students to understand the implementation of Programming language.<br>To understand various features in Programming Language. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Illustrate the flowchart and to develop C programs.<br>2. Develop conditional and iterative statements to write C programs and exercise user defined functions to solve real time problems<br>3. Inscribe C programs that use Pointers to access arrays, strings and functions.<br>4. Exercise user defined data types including structures and unions to solve problems**.** |

## SYLLABUS

**UNIT I:**

**Fundamentals of computer:** Computer generations, History of languages, high- level, Low level, Assembly languages etc. Definition and properties. Principles of flowcharts. Flowcharting symbols, Algorithms.

**Introduction To Programming Language:** character Set, Constants, Types of constants, Variables and Keywords, data types. Instructions: Type Declaration Instruction, Arithmetic Instructions.

**UNIT II:**

**Control structures**: Decision making structures: If, If-else, Nested If –else, Switch.

Loop Control structures: While, Do-while, for, Nested for loop. Other statements : Break, Continue, goto, Exit

**Arrays and Pointers:** Arrays Initialization, Types of Array. Initializing Two Dimensional & Multidimensional Arrays, Introduction to Pointers. Pointers and Functions.

**UNIT III:**

**Storage Classes and Character Strings**: Automatic, Register, Static, External (Local and Global), Strings, Standard library String Functions: strlen (), strcpy (), strcat(),strcmp()

**Functions:** Definition, Passing values between functions, call by value, call by reference, Recursion

**UNIT IV:**

**Structures And Unions:** Declaring structure and its variables,

Arrays of structures. Introduction to Unions.

**Input/Output:**Getchar (), putchar (), printf (), scanf (), puts (), gets () Introduction to files and its operations.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Programming in C | Byron Gottfried,JitenderChhabra | Schuam out line series |
| 2. | Let us C | Yaswant Kanetkar | BPB Publication |
| 3. | A structured Programming approach using C | Behrouz Forouzan | Thomas learning |
| | | | |

| | |
|---|---|
| **Course Code** | **CSA103** |
| **Course Title** | **Introduction to Data Communication and Networks** |
| **Type of Course** | Major |
| **L T P** | 4:0:0 |
| **Credits** | 4 |
| **Course Prerequisites** | +2 in any stream |
| **Course Objective(s)** | The objective of this course includes learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Familiar with the different Network Models.<br>2. Understand different protocols working at Medium Access Sublayer.<br>3. Learn the concept of network routing through algorithms.<br>4. Learn and understand Internet protocols and network security. |

## SYLLABUS

**UNIT I:**

**Computer Networks:** Uses of computer Networks, Goals and applications of networks, Computer Network Structure and Architecture, Reference models: OSI model, TCP/IP model, Comparison of TCP/IP and OSI models.

**Medium Access Sub layer**: Static and dynamic channel allocation for LAN and MAN ALOHA Protocols, LAN Protocols: CSMA, CSMA/CD, Collision Free protocol.

**UNIT II:**

**Networking and Internetworking devices:** Repeater, bridges, routers, gateways, switches.

**High speed LAN:** FDDI, Fast Ethernet, HIPPI, Fiber channel. LAN IEEE 802.x standards.

**UNIT III:**

**Routing**: Static vs. Dynamic Routing, various Routing Algorithms. Congestion Control: Causes of Congestion, Various Congestion Control Strategies and Algorithms.

**UNIT IV:**

**Internet Protocols:** Principles of Internetworking, connectionless internetworking, Internet protocols, IPv6.

**Network Security:** Security requirements and attacks, Encryption Public key encryption and digital Signatures. Distributed applications: SNMP, SMTP, and HTTP.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Computer Networks, 3rd Edition, | Andrew S. Tanenbaum | Prentice Hall |

| | | | |
|---|---|---|---|
| 2. | Data Communication & Networking, 4th Edition, | Behrouz A. Forouzan | Tata McGraw Hills. |
| 3. | Computer Networks and Internet, 2nd Edition | D.E. Cormer | Addison Wesley Publications |

| | |
|---|---|
| **Course Code** | **CSA105** |
| **Course Title** | **Discrete Mathematics** |
| **Type of Course** | Major |
| **L T P** | 3:1:0 |
| **Credits** | 4 |
| **Course Prerequisites** | +2 in any stream |
| **Course objective(s)** | To provide students with an overview of discrete mathematics. Students will learn about topics such as logic and proofs, sets and functions, probability, recursion, graph theory, matrices, Boolean algebra and other important discrete math concepts. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Use logical notation.<br>2. Perform logical proofs.<br>3. Apply recursive functions and solve recurrence relations.<br>4. Determine equivalent logic expressions. |

## SYLLABUS

**UNIT I:**

**Sets and Sequences:** Finite Sets, Power Set, Cardinality of finite sets, Cartesian Product, Properties of Sets, Vector Implementations of Sets.

**Describing Sets**: Introduction to Logic. Propositional Logic, Truth tables, Deduction, Resolution, Predicates and Quantifiers, Mathematical Proofs. Infinite sets, well-ordering. Countable and Uncountable sets, Cantor's diagonalization. Mathematical Induction - weak and strong induction.

**UNIT II:**

**Relational Structures on Sets**: Relations, Equivalence Relations. Functions, Bijections. Binary relations and Graphs. Trees (Basics). Posets and Lattices, Hasse Diagrams. Boolean Algebra.

**UNIT III:**

**Sizes of Sets**: Counting, Sum and product rule, Principle of Inclusion Exclusion. Pigeon Hole Principle, Counting by Bijections. Double Counting. Linear Recurrence relations - methods of solutions. Generating Functions. Permutations and counting.

**UNIT IV:**

**Structured Sets**: Structured sets with respect to binary operations. Groups, Semigroups, Monoids. Rings, and Fields. Vector Spaces, Basis.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Discrete Mathematics and its Applications | Kenneth H. | 7th Edition -Tata McGraw Hill Publishers - 2007 |
| 2. | Elements of Discrete Mathematics | C.L. Liu | McGraw-Hill Inc, 1985 |

| | |
|---|---|
| **Course Code** | **CSA107** |
| **Course Title** | **Basic of Electronics** |
| **Type of Course** | Major |
| **L T P** | 3:1:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Students should know about the various electronics components and physics concepts |
| **Course objective(s)** | Demonstrate the operation of simple digital gates, identify the symbols, truth table for gates; change binary, hexadecimal, octal numbers to their decimal equivalent and vice versa, demonstrate the operation of a flip-flop. Convert digital into analog and vice versa. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Develop a digital logic<br>2. Get knowledge about flip flops.<br>3. Understand, analyze and design various combinational and sequential circuits.<br>4. Understand how to convert signals. |

**SYLLABUS**

**UNIT I:**

**Fundamental concepts**: Introduction, Digital Signals, Basic Gates and derived Gates: AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR, Boolean Algebra

**Number System and codes**: Introduction to number systems, Decimal, Binary, Octal, Hexadecimal, And Conversation from one number system to another number system. Binary Arithmetic: Addition, Subtraction, Multiplication, Division, Half adder, full adder.1's and 2's compliment of Binary Number. Codes : BCD Code, Excess-3 Code, Gray Code Error detecting and correcting codes

**UNIT II:**

**Combinational Logic Design**: Standard Representation of logical functions, SOP, POS Forms, K-map Representation of logical functions, and Simplification of logical functions using K-map. Multiplexer, De-multiplexer. Encoder, Decoder

**UNIT III:**

**Flip Flops**: 1-Bit Memory Cell, Clocked S-R Flip Flop, J-K Flip Flop, Master Slave Flip Flop, D-type Flip Flop, T-type Flip Flop

**Sequential Logic Design:** Registers, Shift Register, Counter, Synchronous and asynchronous Counter, examples of each

**UNIT IV:**

**Timing Circuits and Converters**: 555 Timer, Digital To Analog Converter, Analog To Digital Converter

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Modern Digital Electronics | R.P. Jain | McGraw-Hill Science/Engineering/Math |
| 2. | Microprocessor | B.RAM | DhanpatRai |
| 3. | Digital Electronics and Logic Design | B. Somanathan Nair | PHI Learning Pvt. Ltd. |

| **Course Code** | **ENG121** |
|---|---|
| Course Title | **Communication Skills-I** |
| Type of course | OE Minor |
| L T P | 2:0:0 |
| Credits | 2 |
| Course prerequisite | +2 in any stream |
| Course Objective (CO) | Objectives of the course is to:<br>1. Equip the learner with proficiency in reading comprehension..<br>2. Enable the learner with improved writing skills and command over official/ corporate communication.<br>3. Enhance the learners' range of vocabulary and knowledge of the essentials of grammar. |
| Course Outcomes | At the conclusion of the course the learner will be able to:<br>1. Have fairly good proficiency in reading comprehension.<br>2. Have enhanced writing skills and command in official/ corporate communication.<br>3. Develop confidence in making presentation: oral or documentary.<br>4. Develop speaking skills. |

**SYLLABUS**

**UNIT-I**

**Basics of Communication Skills:** Communication, Process of Communication, Types of Communication-Verbal and Non verbal communication, Channels of Communication-Upward, Downward, Horizontal, Barriers to Communication, Role of Communication in society.

**UNIT-II**

**Listening Skills:** Listening Process, Hearing and Listening, Types of Listening, Effective Listening, Barriers of Effective Listening, Note Taking **Reading Skills:** Purpose of reading, Process of reading, reading skills Models and strategies, scanning, skimming, SQ3R, Approaches of Reading, Comprehension passages for practice.

**UNIT III**

**Writing Skills:** Purpose of writing, Effective writing, Types of writing, Business Correspondence, Precise writing, Memo writing, minutes of meeting.

**UNIT-IV**

**Speaking Skills:** Speech process, Skills of effective speaking, Role of audience, Feedback Skill, Oral Presentation.

**Recommended Books:**

| **Sr No** | **Author(s)** | **Title** | **Publisher** |
|---|---|---|---|
| 1. | Bhupender Kour | Effectual Communication Skills | S.K. Kataria and Sons |
| 2. | R. Datta Roy and K.K. Dheer | Communications Skills | Vishal Publishing Company |
| 3 | The Essence of Effective Communication | Ludlow and Panton | Prentice Hall of India |
| 4 | Essentials of Business Communication | Pal and Korlahalli | S. Chand and Sons. New Delhi |

| | |
|---|---|
| **Course code** | **SSC105** |
| **Course title** | **Punjab and its Culture: An Historical Overview** |
| **Type of course** | Theory |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course prerequisite** | +2 |
| **Course objectives (CO)** | 1. The student will acquire the knowledge about Punjab and its historical resources.<br>2. The student will understand the Harppan Culture and different Vedic periods.<br>3. The students will get to know about foreign invaders. |
| **Course Outcomes** | 1. The students are able to acquire the knowledge about ancient Punjab and its historical resources.<br>2. The students shall be able to understand the Harppan culture and different Vedic Periods.<br>3. The students are able to analyse Alexander's invasions.<br>4. The students will understand the teachings of Mahatma Buddha and Mahavira. |

**SYLLABUS**

**Unit I**

Ancient Punjab: Physical features, Political, Social, Economic, Geographical, Religious impact on History, Historical Sources: Literacy, Archaeological, Harappan Culture: Extent and Town Planning.

**Unit II**

Harppan Culture: Social, Economic and Religious life; Causes and Disappearance, Rig Vedic Age: Early Vedic Age: Political, Economic, Social, and religious life of Early Vedic Aryans., Later Vedic Age: Political, Economic, Social, and religious life of Later Vedic Aryans.

**Unit III**

The Epics: Tale of Ramayan and Mahabharat, Early life and Teachings of Mahatma Budha, Legacy of Budhism,Early life and Teachings of Mahavira, Legacy of Jainism.

**Unit IV**

Occupation of Punjab by Chandragupta, Ashoka's Conquest of the Punjab, Social, Religious and Economic condition of the Punjab under the Mauryas.

Important Historical places if Punjab: Mohenjodaro, Harappa, Kotla Nihang Khan, Sanghol, Banawali, Taxila, Hastinapur, Indraprastha, Srinagar, Sakala, Purusapura.

**Text and Reference Books:**

| S.No. | Author's | Title | Publisher |
|---|---|---|---|
| 1 | Sukhdev Sharma | History And Culture of Punjab | New Academic Publisher |
| 2 | Romila Thapar | A History of India, Vol. I | Penguin Books |

| | |
|---|---|
| **Course Code** | **CSA109** |
| **Course Title** | **Fundamentals of IT and C Programming Lab** |
| **Type of Course** | Major |
| **L T P** | 0:0:4 |
| **Credits** | 2 |
| **Course Prerequisites** | Basic Knowledge about Computers |
| **Course Objective(s)** | To help students to understand the implementation of language. This Programming language helps in solving a problem. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Illustrate the flowchart and to develop C programs.<br>2. Develop conditional and iterative statements to write C programs and exercise user defined functions to solve real time problems<br>3. Inscribe C programs that use Pointers to access arrays, strings and functions.<br>**4.** Exercise user defined data types including structures and unions to solve problems. |

**SYLLABUS**

1. Introduction of Office & Internet usage
2. Introduction to MS Word.
3. Prepare time-table in Word.
4. Introduction of PowerPoint.
5. Prepare Presentation in PowerPoint by applying Formatting Tools.
6. Introduction of Excel
7. Prepare Mark sheet in Excel
8. Write and execute program to show the working of input/output statements.
9. Write and execute programs to show the use of different types of operators (arithmetic, relational, logical, and conditional).
10. Write and execute programs based on conditional control statements (if, if-else)
11. Write and execute programs based on switch-case statements.
12. Write and execute programs based on for loops
13. Write and execute programs based on while loops.
14. Write and execute programs based on jumping control statements (break, continue).
15. Write and execute programs to implement one dimensional arrays.

16. Write and execute programs to implement two dimensional arrays.
17. Write and execute programs to show the use of pointers.
18. Write and execute programs to perform various functions on strings.
19. Write and execute programs based on use of functions (call by value)
20. Write and execute programs based on use of functions (call by reference)
21. Write and execute programs using recursive functions.

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|---|---|
| **Course Code** | **ENG123** |
| **Course Title** | **Communication Skills-I Practical** |
| **Type of course** | Minor |
| **L T P** | 0:0:2 |
| **Credits** | 1 |
| **Course prerequisite** | +2 in any stream |
| **Course Objective (CO)** | To help students to develop their communicative competence and facilitate them to hone their soft skills. Also equip students with employ-ability skills to enhance their prospect of placements. |
| **Course Outcomes** | At the conclusion of the course the learner will be able to:<br>1. Have fairly good proficiency in reading comprehension.<br>2. Have enhanced writing skills and command in official/ corporate communication.<br>3. Develop confidence in making presentation: oral or documentary.<br>4. Develop speaking skills. |

## SYLLABUS

**1. Activities on Fundamentals of Inter-personal Communication and Building Vocabulary -**

Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

**2. Activities on Reading Comprehension –**

General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.

**3. Activities on Writing Skills –**

Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.

**4. Activities on Presentation Skills –**

Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/ assignments etc.

**5. Activities on Group Discussion and Interview Skills –**

Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

**4. MINIMUM REQUIREMENT:**

The Advanced English Communication Skills (AECS) LABoratory shall have the following infrastructural facilities to accommodate at least 35 students in the LAB:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

**5. SUGGESTED SOFTWARE:**

The software consisting of the prescribed topics eLABorated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

**TEXT BOOKS:**

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition

2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

**REFERENCES:**

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007

2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.

3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.

4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.

5. English Vocabulary in Use series, Cambridge University Press 2008.

6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.

# Second Semester

| | |
|---|---|
| **Course Code** | **CSA102** |
| **Course Title** | **Object Oriented Programming with C++** |
| **Type of Course** | Major |
| **L T P** | 4:0:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Basic Knowledge about Computers |
| **Course Objective(s)** | To gain experience about structured programming.<br>To help students to understand the implementation of Programming language.<br>To understand various features in Programming Language. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Understand how **C++** improves C with object-oriented features.<br>2. Learn how to write inline functions for efficiency and performance.<br>3. Learn the syntax and semantics of the **C++** programming language.<br>4. Learn how to design **C++** classes for code reuse. |

## SYLLABUS

**UNIT-I :**

**Basics:** Introduction to C++, Tokens, Identifiers, data types, control statements, functions, array, structure, union, pointers.

**Classes and Objects:** Classes, Structures and Classes, Unions and Classes are Related, Friend Functions, Friend Classes, Inline Functions, Constructors and its types, Static Class Members, When Constructors and Destructors are Executed, Scope Resolution Operator, Nested Classes, Local Classes, Passing and Returning Objects, Object Assignment

**Arrays, Pointers, References and the Dynamic Allocation**: Arrays of Objects, Pointers, References, Dynamic Allocation Operators, The Placement Forms of new and delete.

**UNIT-II :**

**Function Overloading and Default Arguments:** Function Overloading, Overloading Constructor Functions, Finding the Address of an Overloaded Function, Overload Anachronism, Default Arguments, Function Overloading and Ambiguity.

**Operator Overloading:** Creating Member Operator Function, Overloading Using a Friend Function, Overloading new delete, Overloading Special Operators & Comma Operator

**UNIT-III :**

**Inheritance:** Base-Class Access Control, Inheritance and protected members, Inheriting Multiple Base Classes, Constructors, Destructors and Inheritance, Granting Access, Virtual Base Classes.

**Virtual Functions & Polymorphism:** Virtual Functions, The Virtual Attribute is inherited, Virtual Functions are Hierarchical, Pure Virtual Functions, Using Virtual Functions, Early Vs Late Binding.

Templates: Generic Functions, Applying Generic Functions, Generic Classes, Typename and export Keywords, Power of Templates.

**UNIT – IV :**

**Exception Handling:** Fundamentals, Derived-Class Exceptions, Options, Terminate() and

unexpected(), uncaught_exception(), exception and bad_exception Classes, Applying Exception Handling.

**The C++ I/O System Basics:** Old Vs. Modern C++ I/O, Streams, Stream Classes, Formatted I/O, Overloading << and >>, Creating Manipulators.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Object Oriented Programming with C++ | E. Balaguruswamy | Tata Mc. Graw Hill |
| 2. | Object Oriented Programming using C++ | R.Lafore | Galgotia Publications |
| 3. | Mastering C++ | A.R.Venugopal, Rajkumar, T. Ravishanker | TMH |

| | |
|---|---|
| **Course Code** | **CSA104** |
| **Course Title** | **Fundamentals of Computer Networks** |
| **Type of Course** | Major |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | +2 in any stream |
| **Course Objective(s)** | The objective of this course includes learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Familiar with the different Network Models.<br>2. Understand different protocols working at Medium Access Sublayer.<br>3. Learn the concept of network routing through algorithms.<br>4. Learn and understand Internet protocols and network security. |

**SYLLABUS**

**UNIT I:**

Introduction to networks, internet, protocols and standards, the OSI model, layers in OSI model, TCP/IP suite, Addressing, Analog and digital signals.

**Physical Layer:** digital transmission, multiplexing, transmission media, circuit switched networks, Datagram networks, virtual circuit networks, switch and Telephone network.

**UNIT II:**

**Data link layer:** Introduction, Block coding, cyclic codes, checksum, framing, flow and error control, Noiseless channels, noisy channels, HDLC, point to point protocols.

**Medium Access sub layer:** Random access, controlled access, channelization, IEEE standards, Ethernet, Fast Ethernet, Giga-Bit Ethernet, wireless LANs.

**High speed LAN:** FDDI, Fast Ethernet, HIPPI, Fiber channel. LAN IEEE 802.x standards.

**UNIT III:**

**Connecting LANs:** backbone networks and virtual LANs, Wireless WANs, SONET, frame relay and ATM.

**Network Layer:** Logical addressing, internetworking, tunneling, address mapping, ICMP, IGMP, forwarding, uni-cast routing protocols, multicast routing protocols.

**UNIT IV:**

**Transport Layer:** Process to process delivery, UDP and TCP protocols, SCTP, data traffic, congestion, congestion control, QoS, integrated services, differentiated services, QoS in switched networks.

**Application Layer –** Domain name space, DNS in internet, electronic mail, FTP, WWW, HTTP, SNMP, multi-media, network security.

**RECOMMENDED BOOKS**

| Sr. no. | Name | AUTHOR(S) | PUBLISHER |
|---|---|---|---|
| 1. | Computer Networks, 3rd Edition, | Andrew S. Tanenbaum | Prentice Hall |
| 2. | Data Communication & Networking, 4th Edition, | Behrouz A. Forouzan | Tata McGraw Hills. |
| 3. | Computer Networks and Internet, 2nd Edition | D.E. Cormer | Addison Wesley Publications |

| | |
|---|---|
| **Course Code** | **CSA106** |
| **Course Title** | **Operating System Principles** |
| **Type of Course** | Major |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Basic computer knowledge and OS DOS Windows |
| **Course Objective(s)** | The objective of this course is to help students become familiar with the fundamental concepts of operating systems and provide students with sufficient understanding of operating system design. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Describe the importance of computer system resources and the role of operating system in their management policies and algorithms<br>2. Understand the process management policies and scheduling of processes by CPU<br>3. Evaluate the requirement for process synchronization and coordination handled by operating system<br>4. Describe and analyze the memory management and its allocation policies. |

**SYLLABUS**

**UNIT I:**

**Introduction:** Importance of Operating system. Basic concepts and terminology, An Operating system Resource manager, Operating Systems functions, Services provided by operating system, Types of operating systems, An Operating system- Process and system calls, Operating system architecture, Processor and user modes, Virtual Machine.

**UNIT II:**

**Memory management:** Physical and virtual address space, Single Contiguous Allocation, Partitioned Allocation, Fragmentation, Paging, Segmentation, Virtual memory and Demand paging, Page replacement algorithms.

**Processor Management**: Process, Process control block, State Model, Non-pre-emptive and pre-emptive scheduling, Process Scheduling Algorithms, Deadlocks- detection and prevention.

**UNIT III:**

**Information Management**: Directory structure, File operations, A Simple File System, General Model of a File System, File allocation methods.

**UNIT IV:**

**OS and Security:** Security breaches, types of attacks, attack prevention methods, security policy and access control, OS design considerations for security, access, policy and access control, OS design considerations for security, access control lists and OS support, internet and network security, Policy mechanism, Program, network and system threats, Authentication.

**RECOMMENDED BOOKS**

| Sr. no. | Name | AUTHOR(S) | PUBLISHER |
|---|---|---|---|
| 1. | Operating System | William Stallings | Prentice Hall |
| 2. | Operating System Concepts | A. Silberschatz, P.B. Galvin, G. Gagne | John Wiley Publication |

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|---|---|
| **Course Code** | **CSA108** |
| **Course Title** | **Essentials of Software Engineering** |
| **Type of Course** | Major |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Basic knowledge of computer system. |
| **Course objective(s)** | This course will provide knowledge about testing and maintenance of software. |
| **Course Outcomes (CO)** | The students will able to:<br>1. Learn basics of software engineering.<br>2. Understand the software testing techniques<br>3. Learn various SDLC models<br>4. Understand various technical metrics for performance evaluation. |

## SYLLABUS

**UNIT I: Software Engineering introduction**, software development models. Testing and its concepts: significance and potentials Testability and features of test cases.

**UNIT II: Software Testing Techniques:** Definition of Software Testing, Need for software Testing, various approaches to Software Testing, defect distribution, Software Testing Fundamentals. General characteristics of testing, seven principles of testing.
**Software testing strategies:** Testing strategies in software testing, basic concept of verification and validation, criteria for completion of testing and debugging process.

**UNIT III: Comparative Evaluation of Techniques:** Testing tools, dynamic analysis tools, test data generators, debugger and test drivers. Water fall model, V-model, Spiral model, agile model, Life cycle testing concepts, testing methods, testing levels. Static Testing, static analysis tools, dynamic testing, White box testing, block box testing, Regression testing, dynamic testing tools. Functional testing concepts, Equivalence class partitioning, Boundary value analysis, Decision tables, Random testing, Error guessing. Test planning, cost-benefit analysis of testing, Test organization, Test strategies, Test progress monitoring and control- test reporting, test control, Specialized testing.

**UNIT IV: Technical Metrics for Software:** Quality factors, framework, metrics for analysis, design, testing source code, Software maintenance and Reengineering.
**Access Project Management** Development Estimate and status, Requirement Phase Testing, Design Phase Testing program Phase Testing, Execute Test and record results, Acceptance Test Report Test results, Testing Software Installation, Test Software Change, Evaluate Test Effectiveness. Testing calculating model (TCM).

**Client/Server Systems**, RAD, System Documentation, Web based systems, Off-the self software, Multi platform environment, Security, Data Warehouse.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Learning Software Testing with Test Studio | RawaneMadi | Shroff and Pactt |
| 2. | Exploratory Software Testing: Tips, Tricks, Tours and Techniques to guide Test Design | James A. Whittaker | Addison Wesley |
| 3. | Mobile Software Testing | Narayanan Palani | Wiley |

| | |
|---|---|
| **Course Code** | **COM004** |
| **Course Title** | **Principles and Practices of Management** |
| **Type of Course** | Minor (ID) |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | NA |
| **Course objective(s)** | To make students able to know the concept of management & to understand its application to the various sphere of corporate world. |
| **Course Outcome (CO)** | The students will be able:<br>**1.** To make students able to know the concept of management & to understand the its application to the various sphere of corporate world.<br>**2.** To apply management concepts and approaches including planning, organizing, and controlling organizational resources, preparing for and managing organizational change and managing people.<br>**3.** To make the students able to describe the different ways in which organizations may be structured |

## SYLLABUS

**UNIT-I**

**Introduction:** Concept, nature, process, and significance of management; An overview of functional areas of management; Development of management thought; Classical and neoclassical systems. Communication: nature, process, networks and barriers, Effective communication.

**UNIT-II**

**Planning:** Concept, process, and types

**Decision making:** concept and process. Management by objectives; corporate planning; Environment analysis and diagnosis; strategy formulation.

**UNIT-III**

**Organizing:** Concept, nature, process, and significance; Authority and responsibility relationship; Centralization and decentralization.

**UNIT-IV**

Management Informatiom system(MIS), Time management and stress management: meaning, causes and techniques.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Management Challenges for the Century | L.M. Prasad | Butterworth Heinemann, Oxford |

| | | | |
|---|---|---|---|
| 2. | Essentials of Management | Koontz H. & Weihrich H. | Tata McGraw Hill Publishers |
| 3. | Organizational Behaviour | Fred Luthans | McGraw Hill, New York. |
| 4. | Motivation and Personality | Maslow Abraham | Harper & Row, New York, 1954. |

| | |
|---|---|
| **Course Code** | **CSA110** |
| **Course Title** | **Numerical Methods** |
| **Type of Course** | Minor |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Algebra/ Discrete Mathematics |
| **Course Objective(s)** | The objective of this course is to introduce the numerical techniques of interpolation in various intervals in real life situations and to acquaint the student with understanding of numerical techniques of differentiation and integration which plays an important role in technical disciplines. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Apply various interpolation methods and finite difference concepts<br>2. Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.<br>3. Work numerically on the ordinary differential equations using different methods through the theory of finite differences.<br>4. Work numerically on the partial differential equations using different methods through the theory of finite differences. |

## SYLLABUS

**Unit I**

**Solution of Transcendental Equations and Eigenvalue Problems:** Solution of equations – iteration method – Newton-Raphson Method – solution of linear system by Gaussian elimination and Gauss-Jordan method – iterative methods – Gauss-Jacobi and Gauss-Seidel methods – inverse of a matrix by Gauss-Jordon method –finding the eigen values of a matrix by power method.

**Unit II**

**Interpolation:** Lagrangian interpolating polynomials – interpolation with equal intervals – Newton's forward and backward difference formulae – central difference formulae – interpolation with unequal intervals – divided differences – Newton's divided difference formula.

**Unit III**

**Numerical Differentiation and Integration:** Differentiation using interpolation formulae – numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – two and three point Gaussian quadrature formulae – double integrals using trapezoidal and Simpson's rules.

**Unit IV**

**Numerical Solutions of Ordinary Differential Equations**: Single-step methods – Taylor series method – Euler method for first order equation – Fourth order Runge-Kutta method for solving first and second order equations – multi-step methods – Milne's and Adam's predictor and corrector methods.

**Numerical Solutions of Partial Differential Equations:** Classification of second order PDE - finite-difference approximations to partial derivatives – solution of Laplace and Poisson equations – solution of one-dimensional heat equation – solution of two-dimensional heat equation - solution of wave equation

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Introductory methods of Numerical Analysis | S.S. Sastry | PHI Learning Private Limited |
| 2. | Numerical Methods in Engineering and Science, 6th Edition. | B.S. Grewal and J.S. Grewal | Khanna Publishers |
| 3. | Applied Numerical Analysis, 6th edition | C.F. Gerald and P.O. Wheatley | Pearson Education |

| | |
|---|---|
| **Course Code** | **CSA112** |
| **Course Title** | **Object Oriented Programming with C++ (Lab)** |
| **Type of Course** | Major |
| **L T P** | 0:0:4 |
| **Credits** | 2 |
| **Course Prerequisites** | Basic Knowledge about Computers |
| **Course Objective(s)** | Acquire knowledge about the basic concept of writing a program. To understand the practical use of functions, classes, objects, inheritance and polymorphism. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Understand how **C++** improves C with object-oriented features.<br>2. Learn how to write inline functions for efficiency and performance.<br>3. Learn the syntax and semantics of the **C++** programming language.<br>4. Learn how to design **C++** classes for code reuse. |

**SYLLABUS**

1. Write and execute simple program to show the working of input/output statements.
2. Write and execute programs to show the use of different types of operators.
3. Write and execute programs based on use of functions.
4. Write and execute programs to demonstrate function call by value and call by reference.
5. Write and execute programs to demonstrate inline functions.
6. Write and execute programs to demonstrate function overloading.
7. Write and execute programs to show concept of classes using public, private, protected members.
8. Write and execute programs to demonstrate use of constructor (parameterized and un parameterized constructor, copy constructor, multiple constructors in a class, and constructors with default parameters).
9. Write and execute programs to demonstrate use of destructor.
10. Write and execute programs to demonstrate use of static variables and static functions.
11. Write and execute programs to illustrate different types of inheritance.
12. Write and execute programs to illustrate different access specifiers in inheritance (public, private, protected).
13. Write and execute programs to show the use of pointers to classes.
14. Write and execute programs to show the use of this pointer.
15. Write and execute programs to show the use of friend function.
16. Write and execute programs to show the concept of friend class.
17. Write and execute programs to demonstrate method overloading in classes using different parameters and different return types.
18. Write and execute programs to show the use of virtual function and pure virtual function.
19. Write and execute programs to demonstrate operator overloading in classes with different operators.
20. Write and execute programs using concept of dynamic memory allocation.

| | |
|---|---|
| **Course Code** | **CSA114** |
| **Course Title** | **Operating System Principles Lab** |
| **Type of Course** | Major |
| **L T P** | 0:0:4 |
| **Credits** | 2 |
| **Course Prerequisites** | Basic computer knowledge and OS DOS Windows |
| **Course Objective(s)** | The goal of this course is to have students understand and appreciate the principles in the design and implementation of operating systems software. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Describe the importance of computer system resources and the role of operating system in their management policies and algorithms<br>2. Understand the process management policies and scheduling of processes by CPU<br>3. Evaluate the requirement for process synchronization and coordination handled by operating system<br>4. Describe and analyze the memory management and its allocation policies. |

**SYLLABUS**

1. Simulate the following CPU scheduling algorithms.
   a) FCFS b) SJF c) Round Robin d) Priority.
2. Write a C program to simulate producer-consumer problem using Semaphores.
3. Write a C program to simulate the concept of Dining-philosophers problem.
4. Simulate MVT and MFT.
5. Write a C program to simulate the following contiguous memory allocation Techniques
   a) Worst fit b) Best fit c) First fit
6. Simulate all page replacement algorithms
   a)FIFO b) LRU c) OPTIMAL.
7. Simulate all File Organization Techniques
   a) Single level directory b) Two level directory
8. Simulate all file allocation strategies
   a) Sequential b) Indexed c) Linked.
9. Simulate Bankers Algorithm for Dead Lock Avoidance.
10. Simulate Bankers Algorithm for Dead Lock Prevention.
11. Write a C program to simulate disk scheduling algorithms.
    a) FCFS b) SCAN c) C-SCAN

# *Third Semester*

| | |
|---|---|
| **Course Code** | **CSA201** |
| **Course Title** | **Simplified Approach to Data Structure** |
| **Type of Course** | Major |
| **L T P** | 3:1:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Knowledge of Programming Language |
| **Course Objectives (CO)** | This course is intended as an introduction to data structures, algorithms, and more advanced programming techniques. Students will be able to solve real-world problems by reasoning about data structure choices, choose appropriate implementations, and analyze the costs associated with those choices. Students will learn to write, debug, and test large programs systematically. |
| **Course Outcome (CO)** | The students will able to:<br>1. Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory<br>2. Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs<br>3. Demonstrate different methods for traversing trees.<br>4. Learn various sorting and searching techniques. |

## SYLLABUS

**UNIT I:**

**Introduction to Data Structure and its Characteristics**

Data Structure and its terminology, types of data structure, operations on data structure, Time & Space Complexity, big Oh Notation.

**Array:** Introduction. Linear array. Representation of linear array in memory. Traversing linear array. Inserting and Deleting

**UNIT II:**

**Stacks and Queues**

Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues, D- queues and priority queues

**Linked List**: Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, Two way lists and Use of headers

**UNIT III:**

**Tree:** Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree, Heap, AVL Tree, B- Tree, $B^+$ Tree.

**Graph:** Introduction, Traversal of Graph- Breadth First Search, Depth First Search.

**UNIT IV:**

**Sorting & Searching**

Sorting Techniques: Bubble sort, Insertion sort, selection sort, merge sort, heap sort, radix sort, Searching Techniques: linear search, binary search and hashing.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Fundamentals of Data structures | E.Horowiz and S.Sahani | Galgotia Book source Pvt. Ltd. |
| 2. | Data Structures & Algorithms | R.S.Salaria | Khanna Book Publishing Co. (P) Ltd. |
| 3. | Data Structures using C and C++ | Y.Langsam et. Al., | PHI |

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|---|---|
| **Course Code** | **CSA203** |
| **Course Title** | **Introduction to Database Management System** |
| **Type of Course** | Major |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Computer fundamentals and record keeping |
| **Course Objective(s)** | This course covers fundamentals of database architecture, database management systems, and database systems. Principles and methodologies of database design, and techniques for database application development. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Explain the features of database management systems and Relational database.<br>2. Design conceptual models of a database using ER modeling and also construct queries in Relational Algebra.<br>3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.<br>4. Formulate query, using SQL, solutions to a broad range of query and data update problems. |

## SYLLABUS

**UNIT I: Database Management System Concepts**: Introduction, Significance of Database, Database System Applications; Data Independence; Data Modeling for a Database; Entities and their Attributes, Entities, Attributes, Relationships and Relationships Types, Advantages and Disadvantages of Database Management System, DBMS Vs RDBMS.

**UNIT II: Database System Architecture:** Three Level Architecture of DBMS, The External Level or Subschema, The Conceptual Level or Conceptual Schema, The Internal Level or Physical Schema, Mapping; MySQL Architecture; SQL Server 2000 Architecture; Oracle Architecture; Database Management System Facilities, Data Definition Language, Data Manipulation Language; Database Management System Structure, Database Manager, Database Administrator, Data Dictionary; Distributed Processing, Information and Communications Technology System (ICT), Client / Server Architecture.

**UNIT III: Database Models and Implementation:** Data Model and Types of Data Model, Relational Data Model, Hierarchical Model, Network Data Model, Object/Relational Model, Object-Oriented Model; Entity-Relationship Model, Modeling using E-R Diagrams, Notation used in E-R Model, Relationships and Relationship Types; Associative Database Model.

**File Organization for Conventional DBMS:** Storage Devices and its Characteristics, Magnetic Disks, Physical Characteristics of Disks, Performance Measures of Disks, Optimization of Disk-Block Access; File Organization, Fixed-Length Records, Variable-Length Records, Organization of records in files; Sequential file Organization; Indexed Sequential Access Method (ISAM); Virtual Storage Access Method (VSAM).

**UNIT IV: Transaction Management**: ACID properties, Serializability, Two-phase commit protocol, Concurrency Control, Lock Management, Lost update problem, inconsistent read

problem, Deadlock Handling, Recovery and Security.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Database System Concepts | Henry Korth and A. Silberschatz | McGraw-Hill |
| 2. | File Structure | Michael J. Folk, Greg, Riccardi | Pearson Education |
| 3. | An Introduction to Database System | Bipin Desai | West Publishing Company |

| | |
|---|---|
| **Course Code** | **CSA205** |
| **Course Title** | **Introduction to Web Technology** |
| **Type of Course** | Major |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Student must have the basic knowledge of any text editor like Notepad, Notepad++ and Edit plus etc. Also student must know the background of Markup Language. |
| **Course Objective(s)** | This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Understand the basics of Internet and Web Services.<br>2. Describe and differentiate Programming Language and Markup Language.<br>3. Connect various web pages and web sites together.<br>4. Capture user input from the remote users.<br>5. Learn connectivity concepts of Front End and Back End. |

**SYLLABUS**

**UNIT I:**

**Web Essentials:** Markup languages, CSS Basics of Client side programming, Java script language, java script objects, host objects, Browsers and DOM.

**UNIT II:**
**Basics of Server side programming:** Java servlets ASP/JSP, Basics of ASP/JSP objects, simple ASP and JSP pages

**UNIT III:**
**Representing Web data:** Data base connectivity, JDBC

**Introduction to PHP**: basics, PHP File handling, file upload, cookies, error handling, PHP MySQL introduction

**UNIT IV:**
**Middleware Technologies:** Ecommerce architecture and technologies, Ajax, Advanced web technologies and tools

**Case Studies**: PHP and MySQL case studies.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| . 1. | Web Technology- A Computer Science Perspective | Jeffery C Jackson | Pearson Education, 2007. |
| . 2. | Web Programming- Building Internet Applications | Chris Bates | Wiley India, 2006. |
| . 3. | Web Technologies | Achyut S Godbole and Atul Kahate | Tata McGraw Hill. |

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|---|---|
| **Course Code** | **SSC005** |
| **Course Title** | **Human values & Professional Skills** |
| **Type of Course** | Minor |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | None |
| **Course Objectives (CO)** | To help the students to discriminate between valuable and superficial in the life. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. This Course will encourage the students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the superficial in real situations in their life. This course is an effort to fulfill our responsibility to provide our students significant input about understanding |
| **Course Outcomes (CO)** | The students will able to:<br>1. Behave ethically and promote human values in society.<br>2. Understand harmony in the Human Being.<br>3. Behave professionally.<br>4. Learn strategies for transition from present state to Universal Human Order. |

**SYLLABUS**

**UNIT I**

**Introduction:** Need, Basic Guidelines, Content and Process for Value Education Understanding the need, basic guidelines, content and process for Value, Education. Self Exploration- its content and process; Natural Acceptance and Experiential Validation- as the mechanism for self exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding.

**UNIT II**

**Understanding Harmony in the Human Being:** Harmony in Myself!Understanding human being as a co-existence of the sentient,I and the material "Body" Understanding the needs of Self ("I") and "Body"–Sukh and Suvidha,Understanding the Body as an instrument of Understanding the characteristics and activities of "I" and harmony in "I" .

**UNIT III**

**Understanding Harmony in the Family and Society:** Harmony in Human, Human Relationship Understanding harmony in the Family- the basic unit of human interaction, Understanding values in human-human relationship, Trust (Vishwas) and Respect (Samman) as the foundational values of relationship Understanding the meaning of Vishwas; Difference between intention and competence Understanding the meaning of Samman, Difference between respect and differentiation.

**Understanding Harmony in the Nature and Existence:** Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature.

**UNIT IV**

**Professional Ethics:** Implications of the above Holistic Understanding of Harmony on Professional Ethics Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic,

Universal Order Competence in professional ethics: Ability to utilize the professional competence for augmenting universal human order,Ability to identify the scope and characteristics of people friendly and ecofriendly production systems.

**Recommended Books:**

| S. No. | Author(S) | Year | Publisher |
|---|---|---|---|
| 1 | Small is Beautiful: a study of economics as if people mattered | E.F. Schumacher | Blond & Briggs, Britain. |
| 2 | Science and Humanism | PL Dhar, RR Gaur | Commonwealth Purblishers |
| 3 | Human Values | A.N. Tripathy | New Age International Publishers |
| 4 | Jeevan VidyaekParichay. | A Nagraj | Divya Path Sansthan,Amarkantak. |

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|---|---|
| **Course Code** | **CSA207** |
| **Course Title** | **Fundamentals of Microprocessor** |
| **Type of Course** | MSE |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | **Basic Electronics** |
| **Course Objective(s)** | The objective of this course is to teach students how to design, build and program embedded systems. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Distinguish and analyze the properties of Microprocessors & Microcontrollers.<br>2. Analyze the data transfer information through serial & parallel ports.<br>3. Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system.<br>4. Learn interfacing of I/O with microprocessor. |

**SYLLABUS**

**UNIT I:**

**Introduction:** Introduction to Microprocessor, General Architecture of Microcomputer System. Microprocessor Units, Input unit, Output unit, Memory unit and auxiliary storage unit.

**UNIT II:**

**Architecture of 8086/8088 Microprocessor**: Description of various pins, configuring the 8086/8088 microprocessor for minimum and maximum mode systems, Internal architecture of the 8086/8088 microprocessor, system clock, Bus cycle, Instruction execution sequence.

**UNIT III:**

**Memory Interface of 8086/8088 Microprocessor:** Address space and data organization, generating memory addresses hardware organization of memory address space, memory bus status code, memory control signals, read/write bus cycles, program and data

**UNIT IV:**

**Input/ Output Interface of the 8086/8088 Microprocessor:** I/O interface, I/O address space and data transfer, I/O instructions, I/O bus cycles, Output ports, 8255A Programmable Peripheral Interface (PPI), Serial communication interface (USART and UART) – the RS- 232 C interface.

Interrupt Interface of 8086/8088 Microprocessor, Types of Interrupt, Interrupt Vector Table

**RECOMMENDED BOOKS**

| Sr. no. | Name | AUTHOR(S) | PUBLISHER |
|---|---|---|---|
| 1. | The 8086 Microprocessor – Architecture, Software and Interfacing Techniques | Walter Triebel | PHI, Delhi |
| 2. | Microprocessors and Interfacing | Douglas V. Hall | Tata McGraw Hill |

| | |
|---|---|
| **Course Code** | **CSA209** |
| **Course Title** | **Simplified Approach to Data Structure Lab** |
| **Type of Course** | Major |
| **L T P** | 0:0:4 |
| **Credits** | 2 |
| **Course Prerequisites** | Knowledge of Programming Language |
| **Course Objectives (CO)** | The objective of this course is to teach students various data structures and to explain them algorithms for performing various operations on these data structures. It demonstrates familiarity with major algorithms and data structures. It helps in choosing the appropriate data structure and algorithm design method for a specified application. |
| **Course Outcome (CO)** | The students will able to:<br>1. Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory<br>2. Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs<br>3. Demonstrate different methods for traversing trees.<br>4. Learn various sorting and searching techniques. |

**SYLLABUS**

1. Implementation of 1D Array
2. Implementation of Matrix using 2D Array
3. Implementation of singly linked lists
4. Practicing types of Linked list (double, circular)
5. Implementation of linked list operations
6. Implementation of Stack using Array
7. Implementation of Stack using Linked List
8. Implementation of stack operations
9. Implementation of Queue (Circular queue) using Array
10. Implementation of Queue (Circular queue) using Linked List
11. Implementation of queue operations
12. Implementation of Binary Tree
13. Implementation of Pre-order, Post-order and in-order traversal of tree.
14. Implementation of BFS and DFS.

| | |
|---|---|
| **Course Code** | **CSA211** |
| **Course Title** | **Introduction to Web Technology Lab** |
| **Type of Course** | Major |
| **L T P** | 0:0:4 |
| **Credits** | 2 |
| **Course Prerequisites** | Student must have the basic knowledge of any text editor like Notepad, Notepad++ and Edit plus etc. Also student must know the background of Markup Language. |
| **Course Objective(s)** | To develop an ability to design and implement static and dynamic website. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Understand the basics of Internet and Web Services.<br>2. Describe and differentiate Programming Language and Markup Language.<br>3. Connect various web pages and web sites together.<br>4. Capture user input from the remote users.<br>5. Learn connectivity concepts of Front End and Back End. |

**SYLLABUS**

1. Design the following static web pages required for an online book store web site.
   1) HOME PAGE: The static home page must contain three frames.
   2) LOGIN PAGE
   3) CATOLOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table.
   4) REGISTRATION PAGE
2. Write JavaScript to validate the following fields of the Registration page.
   1. First Name (Name should contains alphabets and the length should not be less than 6 characters).
   2. Password (Password should not be less than 6 characters length).
   3. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
   4. Mobile Number (Phone number should contain 10 digits only).
   5. Last Name and Address (should not be Empty).
3. Develop and demonstrate the usage of inline, internal and external style sheet using CSS.

4. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next in the list. Add CSS to customize the properties of the font of the capital (color,bold and font size).
5. Develop and demonstrate PHP Script for the following problems:
   a) Write a PHP Script to find out the Sum of the Individual Digits.
   b) Write a PHP Script to check whether the given number is Palindrome or not.

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|---|---|
| **Course Code** | **CSA213** |
| **Course Title** | **Basics of Cyber security and laws** |
| **Type of Course** | OE |
| **L T P** | 4 0 0 |
| **Credits** | 4 |
| **Course Prerequisites** | Basic knowledge of computer system |
| **Course Objective (CO)** | The main aim of this course is to provide knowledge about how to secure our data on the Internet. |
| **Course Outcome (CO)** | The students will able to:<br>1. Implement cyber security best practices and risk management<br>2. Integrate network monitoring and present real-time solutions<br>3. Impact cyber security risk in an ethical, social, and professional manner.<br>4. Learn basics of cyber laws and cyber forensic |

## SYLLABUS

**UNIT I:**

**Introduction to Cyber Security:** Overview of Cyber Security, Cyber Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage

**Cyber Security Vulnerabilities and Cyber Security Safeguards:** Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management.

**UNIT II:**

**Securing Web Application, Services and Servers:** Introduction, Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges.

**Intrusion Detection and Prevention:** Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques, Anti-Malware software, Network based Intrusion detection Systems, Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation.

**UNIT III:**

**Cryptography and Network Security:** Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec.

**UNIT IV:**

**Cyberspace and the Law:** Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013.

**Cyber Forensics:** Introduction to Cyber Forensics, Handling Preliminary Investigations, Controlling an Investigation, Conducting disk-based analysis, Investigating Information-hiding, Scrutinizing E-mail, Validating E-mail header information, Tracing Internet access, Tracing memory in real-time

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Cybersecurity and Cyberwar: What Everyone Needs to Know® | Allan Friedman and P. W. Singer | Oxford University Press |
| 2. | Cybersecurity for Beginners | Raef Meeuwisse | Cyber Simplicity Limited |
| 3. | Cybersecurity Essentials | Charles J. Brooks, Christopher Grow, Donald Short, and Philip Craig | Sybex |

| | |
|---|---|
| **Course Code** | **CSA215** |
| **Course Title** | **Basic approach to Compiler Design** |
| **Type of Course** | OE |
| **L T P** | 4:0:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Basic knowledge of computer system |
| **Course Objective (CO)** | The main aim of this course is to provide knowledge about how to compiler work. |
| **Course Outcome (CO)** | The students will able to:<br>1. To teach concepts of language translation and phases of compiler design.<br>2. Analyze different representations of intermediate code.<br>3. Participate in GATE, PGECET and other competitive examinations.<br>4. Use compiler construction tools and describes the Functionality of each stage of compilation process. |

## SYLLABUS

**UNIT I:**

**INTRODUCTION TO COMPILERS:** Definition of compiler, interpreter and its differences, the phases of a compiler, role of lexical analyzer, regular expressions, finite automata, from regular expressions to finite automata, pass and phases of translation, bootstrapping, LEX-lexical analyzer generator.

**PARSING**: Parsing, role of parser, context free grammar, derivations, parse trees, ambiguity, elimination of left recursion, left factoring, eliminating ambiguity from dangling-else grammar, classes of parsing, top down parsing – backtracking, recursive descent parsing, predictive parsers, LL(1) grammars.

**UNIT II:**

**BOTTOM UP PARSING**: Definition of bottom up parsing, handles, handle pruning, stack implementation of shift-reduce parsing, conflicts during shift-reduce parsing, LR grammars, LR parsers-simple LR, canonical LR(CLR) and Look Ahead LR (LALR) parsers, error recovery in parsing, parsing ambiguous grammars, YACC-automatic parser generator.

**UNIT III:**

**SYNTAX DIRECTED TRANSLATION**: Syntax directed definition, construction of syntax trees, Sattributed and L-attributed definitions, translation schemes, emitting a translation.

**INTERMEDIATE CODE GENERATION:** intermediate forms of source programs– abstract syntax tree, polish notation and three address code, types of three address statements and its implementation, syntax directed translation into three-address code, translation of simple statements, Boolean expressions and flow-of-control statements.

**UNIT IV:**

**TYPE CHECKING**: Definition of type checking, type expressions, type systems, static and dynamic checking of types, specification of a simple type checker, equivalence of type expressions, type conversions, overloading of functions and operators.

**RUN TIME ENVIRONMENTS**: Source language issues, Storage organization, storage-allocation strategies, access to non-local names, parameter passing, symbol tables and language facilities for dynamic storage allocation.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Compilers Principles | Alfred V Aho | Pearson Education 2002 |

| | |
|---|---|
| **Course Code** | **CSA217** |
| **Course Title** | **Fundamentals of Digital Marketing** |
| **Type of Course** | OE |
| **L T P** | 4:0:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Basic knowledge of Digital Marketing |
| **Course Objective(s)** | This course will provide knowledge about functional and operational details of various peripheral devices. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Demonstrate cognitive knowledge of the skills required in conducting online research and research on online markets, as well as in identifying, assessing and selecting digital market opportunities.<br>2. Explain emerging trends in digital marketing and critically assess the use of digital marketing tools by applying relevant marketing theories and frameworks.<br>3. Investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked.<br>4. Interpret the traditional marketing mix within the context of a changing and extended range of digital strategies and tactics. |

## SYLLABUS

**UNIT I:**

**Introduction:** Marketing and its definition, Digital Marketing, How we do Marketing, Benefits of Digital marketing ,Digital marketing platforms and Strategies , Defining Marketing Goals, Latest Digital marketing trends, introduction to traditional and new methods of marketing

**Requirement:** Requirements for digital marketing, its uses .

**UNIT II:**

**Search Engine Optimization:** Introduction to Search Engines, How the search engine works, Components of Search Engines.

**Keyword Research and Competition:** Introduction to Keyword Research, Types of Keywords, Keyword Research Methodology, Business Analysis & Categorization, Google Keyword Planner, Market Research and Analysis, New Keyword Ideas, Competition Analysis, Finalizing the Keywords List.

**UNIT III:**

**Onpage Optimization:** Introduction to Onpage ,What is Webmaster Tools, Selecting Target Location, Onpage Analysis Methodology, Fundamental On-page Factors , Website Speed , Domain name in SEO, URL Optimization , Title Tag Optimization , Meta Tags Optimization , Content Optimization , Sitemaps Generation , Using Robot.txt in Site URL , Redirecting Techniques , Canonical Links , Rich Snippets.

**UNIT IV:**

**Offpage Optimization** : What is Link Building , Types of Linking Methods , DoFollow Vs. NoFollow Link building Guidelines , Linking Building Methodology , Links Analysis Tools ,

Directory Submissions , Local Business Directories , Social Bookmarking , Using Classifieds for Inbound traffic ,Question and Answers , Blogging & Commenting , Guest Blogging.

**Local SEO:** What is Local SEO, Importance of Local SEO , Submission to Google My Business , Completing the Profile , Local SEO Ranking Signals , Local SEO Negative Signals , Citations and Local Submissions.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Digital world | Hall Man | PHI,New delhi |

| | |
|---|---|
| **Course Code** | **CSA219** |
| **Course Title** | **Introduction to System Analysis and Design** |
| **Type of Course** | OE |
| **L T P** | 4:0:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Knowledge of Data collection |
| **Course Objectives (CO)** | Perform object-oriented programming to develop solutions to problems. Demonstrate adeptness of object-oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Gather data to analyze and specify the requirements of a system.<br>2. Design system components and environments.<br>3. Design models that assist programmers in implementing a system.<br>4. Build general and detailed design a database for storing data, a user interface for data input and output, and controls to protect the system and its data. |

## SYLLABUS

**UNIT-I:**

**System Development Life Cycle**: System Definition, characteristics, elements & types of system, Phases of SDLC, Informa
tion gathering tools, Structured Analysis tools, Role o System Analyst.

**UNIT-II:**

**System Design:** Process and stages of systems design, Input / Output and file design, Documentation (User Manual, Design Documentation, Training Manual), Case Study techniques in system design.

**UNIT-III:**

**System testing:** Unit Testing, System Testing, Integration Testing, Alpha & Beta Testing, Acceptance Testing, Regression Testing.

**UNIT-IV:**

**System Implementation**: System implementation Process, Implementation methods, System maintenance, Post implementation maintenance.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | System Analysis &Design | BARBARA HALEY WIXOM | John Wiley & Sons, Inc. |
| 2. | System Analysis &Design | Alan Dennis | Pearson Education |
| 3. | System Analysis &Design | Bipin Desai | West Publishing Company |

# Fourth Semester

| | |
|---|---|
| **Course Code** | **CSA202** |
| **Course Title** | **Concepts of Computer Architecture** |
| **Type of Course** | Major |
| **L T P** | 3:1:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Knowledge of Computer hardware |
| **Course Objective(s)** | The main objective of computer organization course is to introduce the main concepts and components of computer organization and architecture. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Understand the theory and architecture of central processing unit.<br>2. Analyze some of the design issues in terms of speed, technology, cost, performance.<br>3. Learn the concepts of parallel processing, pipelining and inter-processor communication<br>4. Understand the basics of hardwired and micro-programmed control of the CPU |

## SYLLABUS

**UNIT I:**
Basic computer organization and design, Instructions and instruction codes, Timing and control/ instruction cycle, Register/ Types of register/ general purpose & special purpose registers/ index registers, Register transfer and micro-operations/ register transfer instructions, Memory and memory function, Bus/ Data transfer instructions, Arithmetic logic micro-operations/ shift micro-operations, Input/ Output and interrupts, Memory reference instructions, Memory interfacing memory/ Cache memory.

**UNIT II:**
**Central Processing Unit**: General Register Organization/ stacks organizations instruction formats, addressing modes, Data transfer and manipulation. Program control reduced computer, pipeline/ RISC/ CISC pipeline vector processing/ array processing.
Arithmetic Algorithms: Integer multiplication using shift and add, Booth's algorithm, Integer division, Floating-point representations.
**Computer Arithmetic**: Addition, subtraction and multiplication algorithms, divisor algorithms. Floating point, arithmetic operations, decimal arithmetic operations, and decimal arithmetic operations.

**UNIT III:**
**Input – Output Organization**: Peripheral devices, Input/output interface, ALU, Asynchronous mode of data transfer, priority interrupts, Direct memory Address (DMA), Input/ Output processor, serial communication.

**UNIT IV:**
**Evaluation of Microprocessor**: Overview of Intel 8085 to Intel Pentium processors Basic microprocessors, architecture and interface, internal architecture, external architecture memory and input/ output interface.
Assembly language, Assembler, Assembly level instructions, macro, use of macros in I/C instructions, program loops, programming arithmetic and logic subroutines, Input-Output

programming.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Computer System architecture | Morris Mano | Pearson Education |
| 2. | Computer Organization & Architecture | William Stallings | PHI |

| | |
|---|---|
| **Course Code** | **CSA204** |
| **Course Title** | **Wireless Communication and Ethical Hacking** |
| **Type of Course** | Major |
| **L T P** | 3:1:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Basic knowledge of computer system |
| **Course Objective(s)** | This course will provide knowledge about wireless communication network and introduces the concepts of Ethical Hacking. Gives the students the opportunity to learn about different tools and techniques in Ethical hacking and security. |
| **Course Outcome(CO)** | The students will be able to:<br>1. Understand fundamentals of wireless communications.<br>2. Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.<br>3. Understand the core concepts related to vulnerabilities and their causes.<br>4. Understand ethics behind hacking and vulnerability disclosure. |

## SYLLABUS

**UNIT I:**

**The Cellular Concept:**-System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference , Power Control for Reducing interference, Trucking and Grade of Service, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring.

**UNIT II:**

**Wireless Transceivers**: Structure of a wireless communication link, Modulation and demodulation – Quadrature Phase Shift Keying, Differential Quadrature Phase Shift Keying, Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels.

**UNIT III:**

**Ethical Hacking process:** Hackers behaviour & mindset, Maintaining Anonymity, Hacking Methodology, Information Gathering, Active and Passive Sniffing, Physical security vulnerabilities and countermeasures. Internal and External testing. Preparation of Ethical Hacking and Penetration Test Reports and Documents.

**UNIT IV:**

DoS attacks. Web server and application vulnerabilities, SQL injection attacks, Vulnerability Analysis and Reverse Engineering, Buffer overflow attacks. Client-side browser exploits, Exploiting Windows Access Control Model for Local Elevation Privilege. Exploiting vulnerabilities in Mobile Application.

**Case study** of vulnerability of cloud platforms and mobile platforms & devices.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Wireless Communications | Andreas.F. Molisch | John Wiley |
| 2. | Modern Wireless Communications | Simon Haykin& Michael Moher | Pearson Education |
| 3. | Ethical Hacking and Penetration Testing Guide | Baloch, R | CRC Press, 2015 |
| 4 | Hacking for Dummies | Beaver, K. | John Wiley & sons |

| | |
|---|---|
| **Course Code** | **CSA206** |
| **Course Title** | **Basics of Java programming** |
| **Type of Course** | Major |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Java |
| **Course Objective(s)** | This course will help students to learn about advance topics of java like swing, Servlet, Java Beans, JSP. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Know the structure and model of the Java programming language, (knowledge)<br>2. Use the Java programming language for various programming technologies (understanding)<br>3. Develop software in the Java programming language, (application)<br>4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis) |

## SYLLABUS

**UNIT I:**

**Fundamentals of Object-Oriented Programming: -** Introduction; Object-Oriented Paradigm; Basic Concepts of Object-Oriented Programming Benefits of OOP; Applications of OOP.

**Java Evolution: -** Java History; Java Features; How Java Differs from C and C++; Java and Internet, Java and World Wide Web, Web Browsers; Hardware and Software Requirements.

**Overview of Java language: -** Introduction; Simple Java Program; Comments in java; An application with Two Classes; Java Program Structure; Java Tokens; Java Statements; Implementing a Java Program; Java Virtual Machine; Command Line Arguments; Programming Style.

**UNIT II:**

**Constants, Variables and Data Types: -** Introduction; Constants; Variables; Data Types; Variables, Constants, Standard Default Values.

**Operators and Expressions: -** Introduction to Operators, Expressions; Operator Precedence; Mathematical Functions. DECISION MAKING, BRANCHING AND LOOPING: - Decision making and Branching Statements, Looping Statements, LABeled loops, Jumping Statements.

**Classes, Objects And Methods: -** Introduction, Defining a Class; Adding Variables; Adding Variables; Adding Methods; Creating Objects; Accessing Class Members; Constructors; Methods Overloading; Static Members; Nesting of Methods; Inheritance, Extending a class, Visibility Control, Wrapper Classes.

**UNIT III:**

**Packages and Interfaces:** Introduction, System Packages, Using System Packages, Creating and using Packages, Defining Interfaces; Extending and Implementing Interfaces.

Inheritance and Polymorphism: Introduction, Types of inheritance, Polymorphism: run time and compile time polymorphism, implementation of polymorphism.

**Arrays, Strings and Vectors: -** Arrays; Zagged Arrays:; Strings; String functions: Vectors; Wrapper Classes.

**Interfaces:** Introduction; Defining Interfaces; Extending Interfaces; Implementing Interfaces; Accessing Interface Variables, Implementing Multiple Inheritence using Interfaces.

**Packages:** Introduction; System Packages; Using System Packages; Naming Conventions; Creating Packages; Accessing a Package; Using a Package; Adding a Class to a Package; Hiding Classes.

**UNIT IV:**

**Managing Errors and Exceptions: -** Introduction; Types of Errors; Exceptions; Exception Handling using Try, Catch and finally block: Throwing Our Own Exceptions; Using Exceptions for Debugging.

**Applet Programming : -** Introduction; How Applets Differ from Applications; Applet Life Cycle; Creating an Executable Applet; Passing Parameters to Applets; Aligning the Display; More about HTML Tags; Displaying Numerical Values; Getting Input from the User.

**Graphics Programming: -** Introduction; The Graphics Class; Lines and Rectangles; Circles and Ellipses; Drawing Arcs; Drawing Polygons; Line Graphs; Using Control Loops in Applets; Drawing Bar Charts

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Java-2 The Complete Reference | Patrick Naughton and HerbertzSchildt | TMH |
| 2. | Dynamic Web Publishing | Shelley Powers | Techmedia |
| 3. | Beginning Java-2 | Ivor Horton | SPD Publication |

| | |
|---|---|
| **Course Code** | **EVS001** |
| **Course Title** | **Environmental Science** |
| **Type of course** | Minor |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course prerequisite** | NA |
| **Course objective** | To connect and sensitize the students towards the environment and prevailing environmental issues (natural, physical, social and cultural). |
| **Course Outcomes** | The students will able to:<br>1. Understand about environment, natural resources and ecosystems.<br>2. Learn about causes, effects and control measures of various types of environmental pollution.<br>3. Understand about sustainable development and resettlement and rehabilitation of people.<br>4. Learn about role of Information technology on environment and human health. |

**UNIT I**

**Introduction:** Definition and scope and importance of multidisciplinary nature of environment. Need for public awareness.

**Natural Resources:** Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources.

**Ecosystems:** Concept of Ecosystem, Structure, interrelationship, producers, consumers and decomposers, ecological pyramids-biodiversity and importance. Hot spots of biodiversity

**UNIT II**

**Environmental Pollution:** Definition, Causes, effects and control measures of air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measure of urban and industrial wastes. Role of an individual in prevention of pollution, Pollution case studies, Disaster Management: Floods, earthquake, cyclone and landslides.

**UNIT III**

**Social Issues and the Environment**: From Unsustainable to Sustainable development, urban problems related to energy, Water conservation, rain water harvesting, and watershed management.

**Resettlement and rehabilitation of people:** Its problems and concerns, Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies. Waste land reclamation. Consumerism and waste products, Environment Protection Act Air (Prevention and Control of Pollution), Water Protection Act (Prevention and control). Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation Public awareness

**UNIT IV**

**Human Population and the Environment:** Population growth, variation among nations. Population explosion and family welfare programme. Environment and human health,

Human Rights, Value Education. HIV/AIDS. Women and child Welfare. Role of Information Technology in Environment and human health.

**Text and Reference Books:**

| S. No | Name | Author(S) | Publisher |
|---|---|---|---|
| 1 | Environmental Biology | Agarwal, K.C. 2001 | Nidi Publ. Ltd. Bikaner. |
| 2 | Environmental Science | Miller T.G. Jr. | Wadsworth |
| 3 | Perspectives in Environmental Studies | Anubha Kaushik and Gaurav Garg | New Age International Publishers |

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|---|---|
| **Course Code** | **CSA208** |
| **Course Title** | **Marketing Management in IT Sector** |
| **Type of Course** | Major |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | +2 in any stream |
| **Course Objective(s)** | Marketing is one of the foremost functions of Management in present day corporate world, its understanding results in developing best products in terms of goods and services that brings consumer satisfaction. This course will imbibe the basic understanding among the students to become successful marketers. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Explain the basics of marketing, selling, marketing mix and its core concepts.<br>2. Describe the intricacies of the marketing environment and marketing information systems for effective marketing planning and strategies.<br>3. Develop necessary skills for effective market segmentation, targeting and positioning.<br>4. Illustrate various component |

**SYLLABUS**

**UNIT I:**

**Marketing:** Concepts, Philosophies and Importance, Scope of Marketing, the selling concept, the Marketing concept, Components of a modern marketing information system, Marketing Intelligence. Analyzing the Microenvironment; Needs and Trends, The Demographic Environment, Economic, Social-Cultural and Natural, Technological, Political-Legal Environment.

**UNIT II:**

**The Buying Decision Process:** The Five Stage Model. Levels of Marketing Segmentation, Bases for segmenting consumer markets: Market Targeting, Bases for segmenting business markets. Product Life Cycle Marketing Strategies: - Introduction stage and the Pioneer advantage, Growth, Maturity and Declining Stage

**UNIT-III**

**Directing: Leadership -** Concept, Traits, Styles, Communication: Concept, Types, process, barriers, making Communication effective.

**Controlling:** Concept, process, Requirement for Adequate control, Budgetory Control , Non-Budgetory Control .

**UNIT-IV**

**Business Process Re-engineering -** Concept, Process, Redesign, BPR experiences in Indian Industry**.**

**Total Quality Management(TQM) -** Concept , Systems model of Quality, Deming's approach,

TQM as a business Strategy. Knowledge Management (KM)- What , why, how, of Knowledge Management , KM process, approach, strategies, tools.

**E-commerce-** Ideology, methodology, classification by application /nature of transactions, Driving Forces of EC, Impact of EC, Scope.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Marketing Management: Global Perspective, Indian Context | Ramaswamy, V.S. and Namakumari, S. | MacMillan |
| 2. | Principles of Marketing, Thomson South-Western | Kurtz, David L. and Boone, Louis E | McGraw Hill |
| 3. | Marketing Management | Saxena, Rajan | Tata McGraw-Hill, New Delhi. |

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|---|---|
| **Course Code** | **CSA210** |
| **Course Title** | **Basics of Java programming Lab** |
| **Type of Course** | Major |
| **L T P** | 0:0:4 |
| **Credits** | 2 |
| **Course Prerequisites** | C++ Programming Language |
| **Course Objective(s)** | This course will help students to learn about various topics of java like control statements, swing, Servlet, Java Beans, JSP. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Know the structure and model of the Java programming language, (knowledge)<br>2. Use the Java programming language for various programming technologies (understanding)<br>3. Develop software in the Java programming language, (application)<br>4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis) |

**SYLLABUS**

**Objectives:** This subject aims to introduce students to the Java programming language. Upon successful completion of this subject, the students should be able to create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism; use data types, arrays and other data collections; implement error-handling techniques using exception handling.

1. Implementation of Operators and Mathematical Functions
2. Implementation of Decision making, Branching and Looping Statements
3. Implementation of classes.
4. Implementation of Arrays, Strings and Vectors.
5. Implementation of inheritance.
6. Implementation of packages and interfaces.
7. Implementation of threads.
8. Using exception handling mechanisms.
9. Implementation of Applets.
10. Implementation of mouse events, and keyboard events.
11. Implementing basic file reading and writing methods.
12. Connecting to Database using JDBC.

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|---|---|
| **Course Code** | **CSA212** |
| **Course Title** | **Wireless Communication and Ethical Hacking Lab** |
| **Type of Course** | Major |
| **L T P** | 0:0:4 |
| **Credits** | 2 |
| **Course Prerequisites** | Basic knowledge of computer system |
| **Course Objective(s)** | The students will able to learn hacking tools. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Understand fundamentals of wireless communications.<br>2. Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.<br>3. Understand the core concepts related to vulnerabilities and their causes.<br>4. Understand ethics behind hacking and vulnerability disclosure. |

**SYLLABUS**

1. To learn about hacking tools and skills.
2. To study about Footprinting and Reconnaissance.
3. To study about Fingerprinting.
4. To study about system Hacking.
5. To study about Wireless Hacking.
6. To learn & study about Sniffing & their tools.

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|---|---|
| **Course Code** | **CSA214** |
| **Course Title** | **Six Weeks Industrial/Institutional Training** |
| **Type of Course** | Major |
| **L T P** | 0:0:0 |
| **Credits** | NA |
| **Course Prerequisites** | NA |
| **Course Objective (CO)** | The objective of this course is to understand how task is performed in Industries. |

## GUIDELINES

The 6-week industrial training must be undertaken in reputed industry. The student must submit a mid-term report after one month. The student will submit Training Report along with training certification from industry. A presentation will be given by the student in front of Faculty of concerned department.

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|---|---|
| **Course Code** | **CSA216** |
| **Course Title** | **Basics of Statistical Methods** |
| **Type of Course** | OE |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Basic knowledge of mathematics and statistics |
| **Course Outcome (CO)** | After completion of this course students will be able to:<br>1. Recognize the error in the number generated by the solution.<br>2. Compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method<br>3. Apply method of interpolation and extrapolation for prediction<br>4. Calculate mean, median and mode for individual series. |

**SYLLABUS**

**UNIT 1:**

**Introduction of Statistics:** Definitions of Statistics, Importance of statistic, Advantages and Limitations. Scope of Statistics: Computer Science, Industry, Economy, Social Science.

**UNIT II:**

**Data Condensation and Graphical Methods:** Collection of Data, Types of Data Attributes and variables, Construction of Frequency, Cumulative and Relative, Frequency distributions. Graphical representation of Frequency distribution: Histogram, Frequency Polygon, Frequency Curve and Cumulative Frequency curves (Ogive curves)

**UNIT III:**

**Measures of Central Tendency**: Concept of central tendency. Arithmetic Mean, Median, Mode. Merits and Demerits, Measures of Dispersion, Concept of Dispersion: Range: Definition, Formulae and Computation for ungrouped and grouped data Standard Deviation: Definition, Formulae and Computation for ungrouped and grouped data Variance: Definition, Formulae and Computation for ungrouped and grouped data, Coefficient of variance: Definition, Formulae and Computation for ungrouped and grouped data.

**UNIT IV:**

**Probability**: Permutation and combination, Sample space, Events and Types of events. Classical definition of probability and axioms of probability, Theorems on Probability, Definition of Correlation, Types of Correlation, Karl Pearson's coefficient of correlations for ungrouped data and problems. Definition of Regression, Regression equations and problems, Analysis of Time Series: Definition and components of time series, Measures of trends Moving average method and least square method and problems.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Fundamentals of Statistics | A.M. Gun, M.K.Gupta, B. Dasgupta | The World Press Private Limited. |
| 2. | Statistical Methods | S.P. Gupta | McGraw Hill Education. |
| 3. | Business Statistics | S. Shaha | B. S. Shah Prakashan |

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|---|---|
| **Course Code** | **CSA218** |
| **Course Title** | **Management of Banking operations** |
| **Type of Course** | OE |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | NA |
| **Course Objectives CO)** | The main objectives of this course is to introduce the students to the basic concept of banking as a financial intermediation service and bank as a financial institution |
| **Course Outcomes (CO)** | • After this course the students would have the fundamental knowledge of banking as service and bank as an institution.<br>• To make them aware of various banking innovations after nationalization.<br>• After this course the students would have the knowledge of Banking lending policies and procedures.<br>• After this course students will able to know about financial Inclusion and procedure about loans. |

## SYLLABUS

**UNIT I**

**Introduction:** Banking meaning and functions, Overview of the Financial System: structure: Financial Institutions, financial markets and financial services.

**UNIT II**

RBI, Function of RBI, Banking Regulation Act 1949,Opening of accounts for various types of customers - minors – joint account holders - HUF - firms - companies - trusts - societies - Govt. and public bodies. Know your Customer (KYC) guidelines.

**UNIT III**

Policy Rates, Types of Accounts, negotiable instruments act 1881, priority sector lending, money market instruments, Capital Market Instruments.

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**UNIT IV**

Financial Inclusion, SHGs Credit Cards / Home Loans / Personal Loans / Consumer Loans- Brief outline of procedures and practices.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Management of Banking and Financial Services | Paul and Suresh | Pearson Education |
| 2. | Banking Theory Law and Practices | Sunderam and Varshney | Sultan Chand and Sons Publisher |

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|---|---|
| **Course Code** | **CSA220** |
| **Course Title** | **Cyber Crime and Cyber laws** |
| **Type of Course** | Open Elective |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Basic knowledge about computer and internet |
| **Course Objectives (CO)** | Cyberspace is a rapidly growing industry, and anybody looking to join this industry should be wary of the fact that the industry changes quickly. Anybody who is looking to join the cyber law industry must have a constantly learning attitude as new kinds of cybercrimes will be popping up, new malware keeps getting developed every day. |
| **Course Outcome (CO)** | The students will able to:<br>1. Introduction to the Cyber World and Cyber Law<br>2. The internet and online resources<br>3. Know Security of information, Digital signature.<br>4. Understand laws and policies of cyber in India. |

## SYLLABUS

**UNIT I: Introduction to Cyber Law**, Legislative Framework, Judicial Framework, Quasi-judicial Framework, Investigative Framework, International Framework, Basic legal terms and concepts, Cyber Law & Your World, Introduction to Cyber Law, Computer Software & Copyright Law.

Copyright, Domain Names & Law, Trademark Issues in Cyberspace, Understanding Computer Software, Semiconductor Layout & Design Law.

Software Licenses, Computer Databases & Law, Violation of Privacy, Cyber Frauds, Computer Source Code, Cyber Pornography, Cyber Security,Cyber Terrorism, Data Privacy & Confidentiality, Digital Signature, Freedom of Speech, Information & Traffic Data, Intermediaries, Malware,

Other Computer Related Offences, Unauthorized Access, Electronic Contracts, Digital Signatures – Technical Issues, Electronic & Digital Signatures – Legal Issues

**UNIT II: Basics of Computer and Cyber Security**: Information Technology Law (Cyber Law)
Cyber Crimes and Investigation Procedures.

**UNIT III**: **Criminology and Criminal Justice** Administration, Forms of Cyber Crimes & Frauds, Fundamentals of Information Security, Cyber Laws, Intellectual Property Rights

**Introduction to IT Law**, Electronics Contract and Digital Signature, Cyber Crimes, Privacy & Data Security, E-Commerce & the Law, Software-As-A-Service & Licensing, Technology Outsourcing, Online Reputation Management

**UNIT IV**: **Law and Policy in 'Indian' Cyberspace**: Jurisdiction in Cyberspace, Designing On-Line Agreements: Contractual Closure and Indian Contract Law Electronic Signatures & Digital Signatures, Regulation of Certifying Authorities, Electronic Evidence, Data Protection, Privacy and Corporate Compliance, Intellectual Property, The Internet and Electronic Commerce, Managing Legal Risks when promoting a business online, Insurance and the Internet, The Legal Challenges to Internet Banking, Privacy Bill, 2011: Critical Analysis, The E-Policy Handbook, Intermediary Liability, Internet Law Regulation.

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| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Cyber law Technology Act2000 | Talat Fahim | PHI |

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|---|---|
| **Course Code** | **CSA222** |
| **Course Title** | **Fundamentals of IoT** |
| **Type of Course** | Open Elective |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Basic knowledge about computer and internet |
| **Course Objectives (CO)** | To implement IOT use cases using various IOT platforms |
| **Course Outcome (CO)** | The students will able to:<br>1. Comprehend the essentials of IoT and its applications<br>2. Understand the concepts of IoT Architecture Reference model and IoT reference architecture<br>3. Analyze various IoT Application layer Protocols.<br>4. Apply IP based protocols and Authentication Protocols for IoT |

## SYLLABUS

**UNIT I: Introduction:** IoT-An Architectural Overview, building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals, Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management.

**UNIT II: IOT Architecture & Protocols: I**oT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

**UNIT III: Reference Architecture:** IOT architecture-state of the art, Reference model & architecture, IOT reference model-IOT reference architecture-Introduction, functional view, Deployment and operational view, other relevant architectural views.

PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART,ZWave,Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP.

**UNIT IV: Transport Layer** (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) ,Session Layer HTTP, CoAP, XMPP, AMQP, MQTT

**Performance and security in IOT:** Security considerations, firmware updates, cryptography basics and cryptography in IOT, privacy considerations and design guidelines.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Learning Internet of Things | Peter Waher | PACKT Publishing |
| 2. | Building the Internet of Things | MaciejKranz | Wiley Publishing |
| 3. | Internet of things and architects | Perry Lea | PACKT Publishing |

# *Fifth Semester*

| | |
|---|---|
| **Course Code** | **CSA301** |
| **Course Title** | **Development of Applications using Android programming** |
| **Type of Course** | Major |
| **L T P** | 4:0:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Basic knowledge of computer system |
| **Course Objective(s)** | This course will provide knowledge about android and core java. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Experiment on Integrated Development Environment for Android Application Development.<br>2. Design and Implement User Interfaces and Layouts of Android App.<br>3. Use Intents for activity and broadcasting data in Android App and Design and Implement Database Application and Content Providers<br>4. Experiment with Camera and Location Based service and Develop Android App with Security features. |

## SYLLABUS

**UNIT I:**

**Introduction to Android**: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

**Android Architecture and OOPS:** Building Blocks of Android, Java Classes and Objects, Class Methods and Instances, Inheritance and Polymorphism in Java, Interface and Abstract class

**UNIT II:**

**Android Application Design Essentials**: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

**Android User Interface Design Essentials:** User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

**UNIT III:**

**Testing Android applications**: Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

**UNIT IV:**

**Using Common Android APIs:** Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Learn Java for Android Development | Jeff Friesen | Apress |
| 2. | Android Essentials | Chris Haseman | Apress |

| | |
|---|---|
| **Course Code** | **CSA303** |
| **Course Title** | **Basics of Computer Graphics** |
| **Type of Course** | Major |
| **L T P** | 3:1:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Knowledge of C++ programming |
| **Course Objective(s)** | This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Understand the basics and different graphics systems and applications of computer graphics.<br>2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.<br>3. Use the geometric transformations on graphics objects.<br>4. Extract scene with different clipping methods. |

## SYLLABUS

**UNIT I:**

**Introduction to Computer Graphics**: Definition, Advantages of computer graphics, Applications of computer graphics, Graphics Hardware, Display devices, Raster Scan and Random Scan.

**UNIT II:**

**Raster Scan Graphics:** Points, Lines and Line segment, Line drawing algorithms, Digital Differential Algorithm, Bresenham's Line Drawing Algorithm, Midpoint Circle Generation Algorithm, Scan line Polygon Filling Algorithm.

**UNIT III:**

**Transformation**: Two Dimensional Transformation, Matrix Representation, Translation, Rotation, Scaling, Reflection, Shear

**Clipping & Windowing**: Viewing transformation, 2-D clipping, Simple Visibility Algorithm, End point codes, Midpoint Subdivision Algorithm, Cohen Sutherland Line Clipping Algorithm, Polygon Clipping Algorithm (Sutherland-Hodgman algorithm), Windowing Transformation

**UNIT IV:**

**Three Dimensional Viewing:** Viewing Coordinates, 3D Viewing Pipeline, Projections, Types of Projections- Perspective Projection-Transformation matrix, Applications, Anomalies and types of perspective projections, Parallel Projection-Transformation matrix, Applications and types of parallel projections, Comparison of perspective and parallel projections, 3D Clipping, Fractals and their classification

**RECOMMENDED BOOKS**

| Sr. no. | Name | AUTHOR(S) | PUBLISHER |
|---|---|---|---|
| 1. | Computer Graphics | Donald Hearn & M. Pauline Baker | PHI |
| 2. | Computer Graphics | Hill Jr | PrenticeHall |

| | |
|---|---|
| **Course Code** | **CSA305** |
| **Course Title** | **Introduction to Internet Application** |
| **Type of Course** | Major |
| **L T P** | 4:0:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Basic knowledge of computer system and Internet |
| **Course objective(s)** | This course will provide knowledge about Internet technology and its applications and protocols. |
| **Course Outcome(CO)** | The students will be able to:<br>1. Understand basic terminology related to computer networks.<br>2. Provide effective communication using emailing and instant messaging services to any part of the world.<br>3. Made research easier. Students can now opt for online courses using the internet.<br>4. Understand about the components, working of search engines. |

**SYLLABUS**

**UNIT I:**

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

**UNIT II:**

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

**UNIT III:**

**Internet Protocol:** Introduction, file transfer protocol (FTP), Gopher, Telnet, other protocols like HTTP and TCPIP. WWW: Introduction, working of WWW, Web browsing (opening, viewing, saving and printing a web page and bookmark), web designing using HTML, DHTML with programming techniques.

**UNIT IV:**

**Search Engine:** About search engine, component of search engine, working of search engine, difference between search engine and web directory. Intranet and Extranet: Introduction, application of intranet, business value of intranet, working of intranet, role of extranet, working of extranet, difference between intranet and extranet.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Understanding The Internet | Kieth Sutherland, Butterworth-Heinemann | Butterworth-Heinemann Title |

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|---|---|
| **Course Code** | **CSA307** |
| **Course Title** | **IT Management** |
| **Type of Course** | Major |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Knowledge about basic computer/ System Analysis and Design |
| **Course Objective(s)** | To effectively apply technical concepts in information technology. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.<br>2. Design, implement and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.<br>3. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.<br>4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles. |

## SYLLABUS

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

**UNIT II:**
What are systems? Information Systems? Categories of Information Systems, Development Life Cycle of Information system. Technologies for Information System: Latest trends in Hardware and Software.

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

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

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Information Systems | Murdick & Ross | PHI |
| 2. | Business Information Systems | Muneesh Kumar | |
| 3. | Information Systems for Managers | Ashok Arora and Akshaya Bhatia. | |

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|---|---|
| **Course Code** | **CSA309** |
| **Course Title** | **Development of Applications using Android programming Lab** |
| **Type of Course** | Major |
| **L T P** | 0:0:4 |
| **Credits** | 2 |
| **Course Prerequisites** | Basic knowledge of computer system |
| **Course Objective(s)** | To become familiar with the operation of Android and Acquire knowledge about the basic concept of writing a program in Android. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Experiment on Integrated Development Environment for Android Application Development.<br>2. Design and Implement User Interfaces and Layouts of Android App.<br>3. Use Intents for activity and broadcasting data in Android App and Design and Implement Database Application and Content Providers<br>4. Experiment with Camera and Location Based service and Develop Android App with Security features. |

**SYLLABUS**

1. Introduction to android operating system and study of basic widgets.
2. Study of android life cycle and demonstration of it.
3. Study of intents and its types.
4. Study of list views and adapters.
5. Study of sensors in android.
6. Study of services in android.
7. Study of dialog interfaces in android.
8. Study of touch in android.
9. Study of android database (SQLite).

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|---|---|
| **Course Code** | **CSA311** |
| **Course Title** | **Basics of Computer Graphics Lab** |
| **Type of Course** | Major |
| **L T P** | 0:0:4 |
| **Credits** | 2 |
| **Course Prerequisites** | Knowledge of C++ programming |
| **Course Objective(s)** | This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Understand the basics and different graphics systems and applications of computer graphics.<br>2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.<br>3. Use the geometric transformations on graphics objects.<br>4. Extract scene with different clipping methods. |

**SYLLABUS**

1. Write a program for 2D line drawing using Breshenham's algorithm.
2. Write a program for 2D line drawing using DDA algorithm.
3. Write a program for circle drawing using Breshenham's algorithm.
4. Write a program for drawing ellipse using midpoint algorithm.
5. Write a program for Line Clipping.
6. Write a program for rotation of an object.
7. Write a program for scaling of an object to a desired scale.
8. Write a program for translation.
9. Write a program for reflection of an object.
10. Write a program for Polygon filling as Raster Graphics Display.
11. Write a program for Polygon Clipping.
12. To implement Cohen–Sutherland 2D clipping and window–viewport mapping.
13. Write a program to draw a complex object of your choice such as a hut using simple graphic functions.

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|---|---|
| **Course Code** | **CSA313** |
| **Course Title** | **Programming with Ruby on Rail** |
| **Type of Course** | OE |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Basic Knowledge of Ruby |
| **Course Objective(s)** | The objective of this course is to make students familiar with object Oriented Programming Language and Ruby for web Based Applications |
| **Course Outcome (CO)** | The students will be able to:<br>1. Develop and test programs using the Ruby programming language.<br>2. Develop, test, and deploy basic web applications with Ruby on Rails (RoR).<br>3. Develop, test, and deploy web layout and user models using RoR.<br>4. Create an advanced project using MySQL, Ruby and the Ruby on Rails framework. |

**SYLLABUS**

**UNIT I:**

**Introduction:** What is Ruby, Why ruby, General purpose of ruby, Brief History of Ruby, Where does ruby get its ideas, Ruby Installation with RVM, Installations of Software (RVM, Rails , GIT, Mysql, Ruby, Sublime Text Editior), Rvm Commands, Rvm Usage, Creating a basic script in ruby**,** Sample demo of ruby program.

**UNIT II:**

**Ruby Basics**: Hello, Matz, Interactive Ruby. Ruby Is Object-Oriented, Ruby's Reserved Words, Variables, Strings, Numbers and Operators. Conditional Love, The if Statement, The case Statement, The while Loop, The loop Method, The for loop. Strings , Creating Strings, Concatenating Strings, Accessing Strings, Comparing Strings, Manipulating Strings, Case Conversion, Managing Whitespace, Incrementing Strings, Converting Strings, Regular Expressions. Math, Class Hierarchy and Included Modules, Converting Numbers, Basic Math Operations, Math Methods, Math Functions

**UNIT III:**

**Rails Installation and Ruby Gems:** What is Rails, Full tack Framework, Rails Strength, COC(convention over configuration),Rails Installation, Ruby on Rails installation on linux, Ruby Gems, Working with Ruby Gems, Gem commands Framework Technology MVC Rails Components.

**UNIT IV:**

**Arrays:** Creating Arrays, Accessing Elements, Concatenation, Set Operations, Comparing Arrays, Changing Elements, Deleting Elements, Multidimensional Arrays. Hashes, Creating Hashes, Accessing Hashes, Iterating over Hashes, Changing Hashes. Classes ,Defining the Class, Instance Variables, Accessors, Class Variables, Class Methods, Inheritance, Modules, public, private, or protected.

**Programming Ruby:** Defining methods, conditionals ,if/elsif/else/unless, ternary operator, case statement, looping – for/in loop, while and until loops, blocks and iterators, exception handling, raising errors, objects and classes, defining and instantiating classes, attributes and accessor methods, methods visibility, single inheritance, monkey patching, singleton methods and eigenclasses. A Working Sample: Creating a New Rails Application, Creating Databases, Scaffolding and Migrations, Putting It All Together: Creating a Rails Application.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | **Learn Ruby on Rails** | Daniel Kehoe | Rails Apps |
| 2. | Ruby on rails tutorials | Micheal Hartl | Covers Rail |
| 3. | Beginning Ruby | Peter Cooper | Apress |

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|---|---|
| **Course Code** | **CSA315** |
| **Course Title** | **Introduction to PL/SQL** |
| **Type of Course** | OE |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Basic knowledge of computer system |
| **Course objective(s)** | This course will provide knowledge about database and SQL queries. |
| **Course Outcome(CO)** | The students will be able to:<br>1. Learn programming, management, and security issues of working with PL/SQL program units.<br>2. Implement the built-in packages that come with Oracle<br>3. Understand triggers and stored procedure features.<br>4. Enhance Programming and Software Engineering skills and techniques using SQL and PL/SQL. |

## SYLLABUS

**UNIT I:**

**Database Management System Concepts**: Introduction, Significance of Database, Database System Applications; Data Independence; Data Modeling for a Database; Entities and their Attributes, Entities, Attributes, Relationships and Relationships Types, Advantages and Disadvantages of Database Management System, DBMS Vs RDBMS.

**UNIT II:**

**Three Level Architecture of DBMS:** The External Level or Subschema, The Conceptual Level or Conceptual Schema, The Internal Level or Physical Schema, Mapping; MySQL Architecture; SQL Server 2000 Architecture; Oracle Architecture; Database Management System Facilities, Data Definition Language, Data Manipulation Language; Database Management System Structure, Database Manager, Database Administrator, Data Dictionary; Distributed Processing, Information and Communications Technology System (ICT), Client / Server Architecture.

**UNIT III:**

**An informal look at the relational model**; Relational Database Management System; RDBMS Properties, The Entity-Relationship Model; Overview of Relational Query Optimization; System Catalog in a Relational DBMS, Information Stored in the System Catalog, How Catalogs are Stored.

Basic Operations, Union (U), Difference (-), Intersection, Cartesian product (x); Additional Relational Algebraic Operations, Projection, Selection, JOIN, Division

PL/SQL Introduction, execution environment, syntax, Datatypes, block structure, Oracle transactions, Cursors implicit and explicit, stored procedures – syntax for creating procedure, an application using procedure, stored functions – syntax, applications, Triggers – row, statement before after combination, packages.

**UNIT IV:**

**PL/SQL cursors**: Records, exception, collections , index by table, nested tables, collection methods, collection exceptions, transaction, data and time, BBMS output, object oriented approach.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Oracle PL/SQL Programming | Bill Pribyl , Steven Feuerstein | Shroff |
| 2. | Oracle PL/SQL for DBAs | Steven Feuerstein, Arup Nanda | Shroff |
| 3. | Mastering Oracle SQL | Alan Beaulieu, Mishra Sanjay | O'Reilly media |

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|---|---|
| **Course Code** | **CSA317** |
| **Course Title** | **Fundamentals of Software Testing** |
| **Type of Course** | OE |
| **L T P** | 3 0 0 |
| **Credits** | 3 |
| **Course Prerequisites** | Concepts of Software Engineering |
| **Course Objectives (CO)** | Learning about testing techniques and how to attain the quality |
| **Course Outcomes (CO)** | The students will able to:<br>1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics<br>2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors<br>3. Communicate effectively with a range of audiences.<br>4. Learn the technical metrics of software. |

**SYLLABUS**

**UNIT I:**

**Software Engineering introduction**: software development models. Testing and its concepts: significance and potentials, Testability and features of test cases.

**UNIT II:**

**Software Testing Techniques:** White box testing, Black Box Testing, Static analysis, symbolic testing, program mutation testing, functional program testing, regression testing, data flow testing.

**Software Testing Stratgies:** Approach, issue, integration, incremental, system, alpha, beta testing.

**UNIT III:**

**Comparative evaluation of techniques:** testing tools, dynamic analysis tools, test data generators, debugger and test drivers.

**UNIT IV:**

**Technical Metrices for Software:** Quality factors, framework, metrices for analysis, design, testing source code.

**RECOMMENDED BOOKS**

| Sr. no. | Name | AUTHOR(S) | PUBLISHER |
|---|---|---|---|
| 1. | Learnig Software Testing with Test Studio | RawaneMadi | Shroff and Pactt |
| 2. | Exploratory Software Testing: Tips, Tricks, Tours and Techniques to guide Test Design | James A. Whittaker | Addison Wesley |
| 3. | Software Testing and Quality Assurance | Naik and Tripathi | Wiley |

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|---|---|
| **Course Code** | **CSA319** |
| **Course Title** | **Mobile Architecture & Security** |
| **Type of Course** | OE |
| **L T P** | 3 0 0 |
| **Credits** | 3 |
| **Course Prerequisites** | To understanding the basic Mobile Computing |
| **Course Objectives (CO)** | The main objective of this course is to provide conceptual as-well-as practical knowledge about basic Mobile architecture, Mobile Database and various security issues in Mobile computing. |
| **Course Outcomes (CO)** | The students will able to:<br>1. Understand fundamentals of wireless communications<br>2. Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.<br>3. Demonstrate basic skills for cellular networks design.<br>4. Learn security issues in Single Hop Wireless Networks. |

**SYLLABUS**

**UNIT I:**
Hardware Architecture, Symmetric Multiprocessing, Distributed and Shared Memory. Multicomputer. Software Architecture,Client server architecture, 3-tier architecture, N-tier architecture, Peer-to-peer. Cluster computing concepts, Grid computing, Virtualisation and Cloud Computing. Recent trends in processor technologies -Superscalar processors, Multi-core processors, Embedded processors.

**UNIT II:**
Introduction to conventional databases, distributed databases Mobile Data Access Systems: Mobility issues, On-demand services, Broadcast services, Transaction Processing, Security Moving Object Databases: Basic concepts and challenges, Accessing methods of moving object databases, Current Information Oriented Indexing, Historical Information Oriented Indexing, Mixed-type indexing, Indexing

**UNIT III:**
IP Layer Security, Link Layer Security, Network Security options. Security Issues in a Mobile IPV6 Network, Mobile Code Issues: Security Measures for Mobile Agents, Security Issues for Downloaded code in Mobile phones Secure Mobile Commerce: MCommerce and its security challenges, Security of the radio interface.

**UNIT IV:**
Security Issues in Single Hop Wireless Networks: Cellular Network Security, Access Control and Roaming Issues, Mobile IP Security Security Issues in Multihop Wireless Networks: Mobile Adhoc Network Security, Trust Management and Routing Issues, Wireless Sensor Network Security, Key Management, Sybil Attacks and Location Privacy, Vehicular Network Applications and Security, Wireless Metropolitan Area Networks (e.g. 802.11b)

**RECOMMENDED BOOKS**

| Sr. no. | Name | AUTHOR(S) | PUBLISHER |
|---|---|---|---|
| 1. | Wireless Security - Models, | Raymond Greenlaw and Ellen Hepp | TMH |

# Sixth Semester

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|---|---|
| **Course Code** | **CSA302** |
| **Course Title** | **Concepts of Network Security and Cryptography** |
| **Type of Course** | Major |
| **L T P** | 3:1:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Basic knowledge of Computer Networks |
| **Course Objective(s)** | This course will provide knowledge about basics of Cryptography and Network Security and various protocols for network security to protect against the threats in the networks. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Provide security of the data over the network.<br>2. Do research in the emerging areas of cryptography and network security.<br>3. Implement various networking protocols.<br>4. Protect any network from the threats in the world. |

## SYLLABUS

**UNIT I:**

**Introduction to Cryptography and Block Ciphers:** Introduction to security attacks - services and mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and blockciphers - Modern Block Ciphers: Block ciphers principals - Shannon's theory of confusion and diffusion - fiestal structure - data encryption standard(DES) - strength of DES - differential and linear crypt analysis of DES - block cipher modes of operations - triple DES – AES.

**UNIT II:**

**Confidentiality and Modular Arithmetic:** Confidentiality using conventional encryption - traffic confidentiality - key distribution - random number generation - Introduction to graph - ring and field - prime and relative prime numbers - modular arithmetic - Fermat's and Euler's theorem - primality testing - Euclid's Algorithm - Chinese Remainder theorem - discrete algorithms.

**UNIT III:**

**Public key cryptography and Authentication requirements**: Principles of public key crypto systems - RSA algorithm - security of RSA - key management – Diffle-Hellman key exchange algorithm - introductory idea of Elliptic curve cryptography – Elgamel encryption - Message Authentication and Hash Function: Authentication requirements - authentication functions - message authentication code - hash functions - birthday attacks – security of hash functions and MACS.

**UNIT IV:**

**Web and System Security:** Web Security: Secure socket layer and transport layer security - secure electronic transaction (SET) - System Security: Intruders - Viruses and related threads - firewall design principals – trusted systems.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Cryptography and Network security Principles and Practices | William Stallings | PHI |
| 2. | Introduction to Cryptography with coding theory | Wade Trappe, Lawrence C Washington | Pearson |
| 3. | Security in computing | Charles P. Pfleeger, Shari Lawrence Pfleeger | Prentice Hall of India. |

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|---|---|
| **Course Code** | **CSA304** |
| **Course Title** | **Programming with Python** |
| **Type of Course** | Major |
| **L T P** | 4:0:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Basic knowledge of Programming |
| **Course Objective(s)** | The objective of this course is to develop a basic understanding about the Python Concept. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.<br>2. Express proficiency in the handling of strings and functions.<br>3. Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.<br>4. Identify the commonly used operations involving file systems and regular expressions. |

## SYLLABUS

**UNIT I:**

**Introduction**: Algorithms, installing, python basic syntax, interactive shell, editing, saving, and running a script. The concept of data types, variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages; Conditions, Control statements.

**UNIT II:**

**Strings and Text Files:** manipulating files and directories, text files: reading/writing text and numbers, creating and reading a formatted file, String manipulations: subscript operator, indexing, slicing a string; strings and number system.

**UNIT III:**

**Lists, Tuples and Dictionaries:** basic list operators, replacing, inserting, removing an element, searching and sorting lists, dictionary literals, adding and removing keys, accessing and replacing values, Design with functions: hiding redundancy, complexity.

**UNIT IV:**

**Graphics and Image Processing**: turtle module, simple 2d drawing - colors, shapes, digital images, Simple image manipulations with 'image' module, Classes and OOP: classes, objects, attributes and methods, defining classes, design with classes, data modeling.

**RECOMMENDED BOOKS**

| Sr. no. | Name | AUTHOR(S) | PUBLISHER |
|---|---|---|---|
| 1. | Fundamentals of Python: | Kenneth Lambert | Course Technology, |
| 2. | Learning Python | O' Reilly | Mark Lutz |

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|---|---|
| **Course Code** | **CSA306** |
| **Course Title** | **Analysis and Design of Algorithm** |
| **Type of Course** | Major |
| **L T P** | 4:0:0 |
| **Credits** | 4 |
| **Course Prerequisites** | Data Structures |
| **Course Objective(s)** | The objective of the course is to teach techniques for effective problem solving in computing. |
| **Course Outcome (CO)** | The students will be able to:<br>1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms;<br>2. Explain when an algorithmic design situation calls for which design paradigm.<br>3. Explain model for a given engineering problem, using tree or graph, and write the corresponding algorithm to solve the problems;<br>4. Demonstrate the ways to analyze approximation/randomized algorithms |

## SYLLABUS

**UNIT I:**

**Introduction**: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

**UNIT II:**

**Fundamental Algorithmic Strategies:** Brute-Force, Greedy, Dynamic Programming, Branch-and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving: Bin Packing, Knap Sack, TSP.

Software testing strategies Testing strategies in software testing, basic concept of verification and validation, criteria for completion of testing and debugging process.

**UNIT III:**

**Graph and Tree Algorithms:** Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

**UNIT IV:**

**Tractable and Intractable Problems:** Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

**Advanced Topics:** Approximation algorithms, Randomized algorithms, Heuristics and their characteristics.

| RECOMMENDED BOOKS | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Algorithm Design, 1stEdition | Jon Kleinberg and ÉvaTardos | Pearson |
| 2. | Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition | Michael T Goodrich and Roberto Tamassia | Wiley |
| 3. | Algorithms -- A Creative Approach, 3RD Edition | UdiManber, Addison-Wesley | Pearson |

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|---|---|
| **Course Code** | **CSA358** |
| **Course Title** | **E-Governance** |
| **Type of Course** | Major |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | NA |
| **Course Objective(s)** | This course will help students of modern technological age, in digital India, to understand the growing needs of e-governance, its importance in reaching out to a larger section of society by use of IT and in improving transparency in the system of governance. The students will also be exposed to various schemes of government, already in place and the future needs and challenges on this important national issue of e-governance. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Understand the different models of E-governance.<br>2. Describe the e-governance projects at Union and State Govt. levels.<br>3. Understand the benefits and reasons for the introduction of e-governance at the local level.<br>4. Realize the issues and challenges of e-governance. |

## SYLLABUS

**Unit- I**

**E- governance:** Meaning, Scope and Importance of e- Governance (meanings, definitions, scope and importance of e- governance), domains, taxonomy, current status, Indian and Global Foundations, Four stages of e- governance.

**Unit-II**

**Models and Concepts in E- Governance:** Theories of e- governance (six perspectives and six theories), Models of e-governance (The general Information Dissemination Model, the Critical Information Dissemination model, the advocacy model, the Interactive model), National E-Governance plan.

**Unit-III**

**E- governance at local level:** E- Sewa (electronic citizen services) – E- Governance in Rural Local Bodies – Urban Bodies; E- management of development projects at rural and urban local bodies (JNNURM); Effective service delivery through E- governance – Transparency and Accountability at Grassroot level.

**Unit-IV**

**Issues and Challenges of E- Governance:** Cyber security – surveillance – cyber crimes; socio-economic issues – digital divide – capacity building – socio-political implications of e-governance – issues of L T P/ S SW/ FW TOTAL CREDIT UNITS 2 1 - - 3 integration; Networking of NGOs, CBOs – Government resource planning and process re-engineering; Government Process Re-engineering; Best practices and lessons from other E- governance re-engineering projects.

| **Recommended Books:** | | | |
|---|---|---|---|
| **Sr. No.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | E- Governance Techniques – Indian and Global Experiences | B Srinivas Raj | New Century Publications |
| 2. | Governance – Case studies, | Ashok Aggarwal | University Press India Pvt. Ltd. |
| 3. | Information Growth and economic Growth | G Desai | Rawat Publications |

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|---|---|
| **Course Code** | **CSA360** |
| **Course Title** | **Programming with Python Lab** |
| **Type of Course** | Major |
| **L T P** | 0:0:4 |
| **Credits** | 2 |
| **Course Prerequisites** | Basic knowledge of Programming |
| **Course Objective(s)** | To become familiar with the operation of Python and Acquire knowledge about the basic concept of writing a program in Python. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.<br>2. Express proficiency in the handling of strings and functions.<br>3. Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.<br>4. Identify the commonly used operations involving file systems and regular expressions. |

**SYLLABUS**

1. To write a python program that takes in command line arguments as input and print the number of arguments.
2. To write a python program to perform Matrix Multiplication.
3. To write a python program to compute the GCD of two numbers.
4. To write a python program to find the most frequent words in a text file.
5. To write a python program find the square root of a number (Newton's method).
6. To write a python program exponentiation (power of a number).
7. To write a python program find the maximum of a list of numbers.
8. To write a python program linear search.
9. To write a python program Binary search.
10. To write a python program selection sort.
11. To write a python program Insertion sort.
12. To write a python program merge sort.
13. To write a python program first n prime numbers.
14. To write a python program simulate bouncing ball in Pygame

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|---|---|
| **Course Code** | **CSA312** |
| **Course Title** | **Analysis and Design of Algorithm Lab** |
| **Type of Course** | Major |
| **L T P** | 4:0:0 |
| **Credits** | 2 |
| **Course Prerequisites** | Data Structures |
| **Course Objective(s)** | The objective of the course is to teach techniques for effective problem solving in computing. |
| **Course Outcome (CO)** | The students will be able to:<br>1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms;<br>2. Explain when an algorithmic design situation calls for which design paradigm.<br>3. Explain model for a given engineering problem, using tree or graph, and write the corresponding algorithm to solve the problems;<br>4. Demonstrate the ways to analyze approximation/randomized algorithms |

**SYLLABUS**

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems (Engineering knowledge).
2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences (Problem analysis).
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations (Design/development of solutions).
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions (Conduct investigations of complex problems).
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations (Modern tool usage).

6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice (The engineer and society).
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development (Environment and sustainability).
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice (Ethics).
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings (Individual and team work).
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions (Communication).
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments (Project management and finance).
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change (Life-long learning).

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|---|---|
| **Course Code** | **CSA314** |
| **Course Title** | **Introduction to Parallel Computing** |
| **Type of Course** | OE |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Basic knowledge of computer system |
| **Course Objective(s)** | This course will provide knowledge about parallel computing. |
| **Course Outcome (CO)** | The students will be able to:<br>1. Optimize sequential code for fastest possible execution.<br>2. Analyze sequential programs and determine if they are worthwhile to parallelize.<br>3. Develop, analyze, and implement algorithms for parallel computers.<br>4. Analyze and perform development work related to the use of parallel computers. |

**SYLLABUS**

**UNIT I:**

Scalability And Clustering: Evolution of Computer Architecture, Dimensions of ScaLABility, Parallel Computer Models, Basic Concepts of Clustering, ScaLABle Design Principles, Parallel Programming Overview: Processes, Tasks and Threads, Parallelism Issues, Interaction / Communication Issues, Semantic Issues In Parallel Programs.

**UNIT II:**

Enabling Technologies: System Development Trends, Principles of Processor Design, Microprocessor Architecture Families, Hierarchical Memory Technology, Cache Coherence Protocols, Shared Memory Consistency, Distributed Cache Memory Architecture, Latency Tolerance Techniques, Multithreaded Latency Hiding.

**UNIT III:**

System Interconnects: Basics of Interconnection Networks, Network Topologies and Properties, Buses, Crossbar and Multistage Switches, Software Multithreading, Synchronization Mechanisms.

**UNIT IV:**

Parallel Programming: Paradigms and Programmability, Parallel Programming Models, Shared Memory Programming.

Message Passing Programming: Message Passing Paradigm, Message Passing Interface, Parallel Virtual Machine.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Scalable Parallel Computing | Kai Hwang and Zhi.Wei Xu | Tata McGraw-Hill |
| 2. | Parallel Computing Architecture: A Hardware/Software Approach | David E. Culler & Jaswinder Pal Singh | Morgan Kaufman |
| 3. | Parallel Programming in C with MPI & Open | Michael J. Quinn | Tata McGraw-Hill |

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|---|---|
| **Course Code** | **CSA316** |
| **Course Title** | **Basic of Banking** |
| **Type of Course** | OE |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Basic knowledge about accountancy. |
| **Course Objectives (CO)** | To enlighten the students with the Introduction of Banking Concepts and dynamics of Financial Markets and Financial Services. |
| **Course Outcomes** | The students will able to:<br>1. Understand the products and services.<br>2. Understand the basic concepts of banking.<br>3. Learn about the financial system of India.<br>4. Learn the objectives and role of SEBI and capital Market reforms. |

## SYLLABUS

**UNIT I: Introduction:** Mutual introduction, understanding self and others Understanding what is banking history, types of banks in India, Appreciate role of banks in the economy and the importance of trust, Get an overview of banking functions Intermediary, payment mechanism and financial services, Identify the different types of products and services offered by banks. Understanding the trends and challenges in banking

**UNIT II: Basic Banking:** Understanding the types of Deposits and explain features, benefits, variants of Savings, Current, Fixed and recurring deposit Types of Loans- Retail lending, secured and unsecured, Understanding the rights, duties and responsibilities of bankers and banker- customer relationship Understanding the basic concepts of Business Mathematics interest on savings, FD, Loans and overdrafts, Understanding the basic accounting in banking transactions

**UNIT III: Financial System:** Structure, institution and operating mechanism and its role in Economic Development. Developed and Underdeveloped Markets, Money Market in India Importance, features instruments, Measures to strengthen money market in India, Recommendations of the working group on money market, Report of the task force on money market and mutual funds

**UNIT IV:** Objectives and role of SEBI, Capital Market Reforms.

**RECOMMENDED BOOKS**

| Sr. no. | Name | AUTHOR(S) | PUBLISHER |
|---|---|---|---|
| 1. | Banking System | Hitesh Kumar | Kalyani Publication |

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|---|---|
| **Course Code** | **CSA318** |
| **Course Title** | **Introduction to Linux Administration** |
| **Type of Course** | OE |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | NA |
| **Course Objective (CO)** | The main objective of this course is to provide knowledge about fundamentals of the Bourne again shell (bash), shell programming, pipes, input and output redirection Control structures, arithmetic in shell interrupt processing, functions, debugging shell scripts. |
| **Course Outcomes (CO)** | The students will able to:<br>1. Understand the technical details of DOS, Windows and UNIX, LINUX operating system.<br>2. Ability to use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator.<br>3. Ability to develop IPC-API's that can be used to control various processes for synchronization.<br>4. Know and configure the various internet services |

**SYLLABUS**

**UNIT I**

**Introduction: Introduction:** Basic OS functions, resource abstraction, types of operating systems–multiprogramming systems, batch systems, time sharing systems; operating systems for personal computers & workstations, process control & real time systems.

**Operating System Organization:** Processor and user modes, kernels, system calls and system programs.

**Linux:** The Operating System: Linux Distributions, Difference Between Linux and Windows, Separation of the GUI and the Kernel, Understanding Linux Kernel, Installing Linux in a Server Configuration, Booting and Shutting Down Process, Concept of Root, Basic commands, working with vi Editor, Understanding files and File System:

**UNIT II**

**Linux commands**: PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text Processing utilities and backup utilities , tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio.

**UNIT III**

**Introduction to Shells**: Linux Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization. Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, Comparing Files.

**Process and Signals:** Process, process identifiers, process structure: process table, viewing processes, system processes, process scheduling, starting new processes: waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets. File locking: creating lock files, locking regions, use of read and write with locking, competing locks, other lock commands, deadlocks

**UNIT IV**

**DNS:** Installing a DNS Server, Configuring a DNS Server, DNS Records Types, Setting Up BIND Database Files, The DNS Toolbox, Configuring DNS Clients.

**Web Server:** Understanding the HTTP Protocol, Installing the Apache HTTP Server, Starting Up and Shutting Down Apache, Configuring Apache E-Mail Server: Understanding SMTP, Installing the Postfix Server, Configuring the Postfix Server, Running the Server, POP and IMAP Basics, Installing the UW-IMAP and POP3 Server.

**Samba Server:** The Mechanics of SMB, Samba Administration, Using SWAT, Creating a Share, Mounting Remote Samba Shares, Creating Samba Users, Using Samba to Authenticate Against a Windows Server.

Introduction to Sockets: Socket, socket connections, socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **SR.NO** | **NAME** | **AUTHOR(S)** | **PUBLISHER** |
| 1 | Linux Administration: A Beginner's Guide | Wale Soyinka | McGrawHill |
| 2 | UNIX and Linux system administration Handbook | Evi Nemeth, Garth Snyder, et. al | Pearson Education |
| 3 | Linux All-In-One for Dummies, | Emmett Dulaney, | Wiley India |

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|---|---|
| **Course Code** | **CSA320** |
| **Course Title** | **Simplified Approach to Distributed DBMS** |
| **Type of Course** | OE |
| **L T P** | 3:0:0 |
| **Credits** | 3 |
| **Course Prerequisites** | Basic knowledge of computer system |
| **Course Objectives (CO)** | This course is intended to provide an understanding of the current theory and practice of distribute database management systems, a solid technical overview of database management systems, using a current database product as a case study. |
| **Course Outcomes (CO)** | The students will able to:<br>1. Identify the introductory distributed database concepts and its structures<br>2. Describe terms related to distributed object database design and management<br>3. Produce the transaction management and query processing techniques in DDBMS.<br>4. Learn various locking protocols and query processing and optimization. |

## SYLLABUS

**UNIT I:**

I**ntroduction:** Concepts, Advantages and Disadvantages of Distributed Database Management System (DDBMS), Homogenous and Heterogeneous DDBMS. Functions of a DDBMS.

**UNIT II:**

**Distributed Database Management System Architecture:** Architectural Models for DDBMS (Distributed Database Management System): Autonomy, Distribution, Heterogeneity factors; Client Server Systems, Peer-to-Peer Distributed Systems, Global Directory Issues.

**UNIT III:**

**Distributed Relational Database Design Fragmentation**: Reasons, Alternatives, Degree, Information requirement. Horizontal, Vertical, Hybrid Fragmentation. Allocation: Allocation Problem, Information Requirements for allocation.

**UNIT IV:**

Distributed Relational Database Query Processing & Optimization Query Decomposition, Localization of Distributed Data, Query Optimization, Introduction to Distributed Query Optimization Algorithms Distributed Concurrency Control, Objectives, Distributed Serializability, Centralized two-phase locking, Distributed two-phase locking.

| **RECOMMENDED BOOKS** | | | |
|---|---|---|---|
| **Sr. no.** | **Name** | **AUTHOR(S)** | **PUBLISHER** |
| 1. | Principles of Distributed Database Systems | M.Tamer Ozsu, Patrick Valdureiz | Prentice Hall |
| 2. | Fundamentals of Database Systems | Romez Elmasri, Shamkant B.Navathe | Pearson Education, |