

SEMESTER I

CODE	COURSE TITLE
18CSUC101 / 18CAUC101	C PROGRAMMING

Category	CIA	ESE	L	T	P	Credit
Core	25	75	70	5	-	4

Preamble

The objective of the course is to train the students to acquire problem-solving skills through structured programming

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the basic concepts of Algorithms to solve problems	K2
CO2	Define the fundamentals of C Programming	K1
CO3	Distinguish between branching and looping concept	K4
CO4	Develop C programs using Array Data structure, Functions, Structure, Union and Pointers to solve complex problems	K3
CO5	Apply File concepts to data storage and manipulation	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	M	S	S	M	M
CO3	M	S	S	S	S
CO4	S	S	M	S	S
CO5	M	M	M	S	S

S - Strong; M - Medium; L – Low

Syllabus

UNIT I

15 Hrs.

Introduction to Computer Problem Solving: Introduction – The Problem Solving Aspect. **Fundamental Algorithms:** Introduction – Exchanging the Values of Two Variables – Summation of a Set of Numbers – Factorial Computation – Generation of the Fibonacci Sequence – Reversing the Digits of an Integer. **Overview of C:** History and Importance of C – Basic Structure of C. Constants, Variables, and Data Types – Operators and Expressions.

UNIT II

15 Hrs.

Managing Input & Output Operations: Introduction – Reading and Writing a Character – Formatted Input and Output. **Decision Making and Branching:** Introduction – Decision Making with **if** Statement – Simple **if** Statement – **if ...else** Statement – Nesting of **if ...else** Statements – The **else if** Ladder – The **switch** Statement – The?: Operator – The **goto** Statement. **Decision Making and Looping:** Introduction – The **while** Statement – The **do** Statement – The **for** Statement – Jumps in Loops.

UNIT III

15 Hrs.

Arrays: Introduction – One Dimensional Arrays – Declaration and Initialization of One-Dimensional Arrays – Two-Dimensional Arrays – Initializing Two-Dimensional Arrays – Multidimensional Arrays – **Character Arrays and Strings** : Declaring and Initializing String Variables – Reading and Writing Strings – String-Handling Functions.

UNIT IV

15 Hrs.

User-Defined Functions: Need for User-Defined Functions – Declaration and Definition of Functions – Function Calls and Return Values – Category of Functions – Recursion – Scope , Visibility and Lifetime of Variables

Structures and Unions: Introduction – Defining a Structure – Declaring Structure Variables – Accessing Structure Members - Structure Initialization – Copying and Comparing Structure Variables – Operations on Individual Members – Arrays of Structures – Array within Structures – Structures within Structures – Structures and Functions - Unions.

UNIT V**15 Hrs.**

Pointers: Introduction – Declaration, Initialization and Accessing Pointer variables – Chain of Pointers – Pointers and Arrays – Pointer and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions returning Pointers – Pointers and Structures.

File Management in C: Introduction –Defining, Opening and Closing a File – Input/Output Operations on Files.

Text Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1	R. G. Dromey	How to Solve it by Computer	PHI Pvt. Ltd, New Delhi	2007, 2 nd Edition
2	E.Balagurusamy	Programming in ANSI C	McGraw Hill Education, New Delhi	2017, 7 th Edition
3.	Yashavant Kanetkar	Test Your C Skills	BPB Publications	2015, 5 th Edition

Reference Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Ashok N. Kamthane	Programming and Data Structures	Pearson Education, Private Ltd, New Delhi	2009, 1 st Edition
2.	Ashok N. Kamthane	C Programming: Test Your Skills	Pearson Education, Private Ltd, New Delhi	2010, 1 st Edition

Web Resources

1. <https://swayam.gov.in/course/1388-introduction-to-programming-in-c>
2. www.learn-c.org
3. <https://fresh2refresh.com/c-programming/>
4. <https://www.programiz.com/c-programming>

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER I

CODE	COURSE TITLE
18CSUCP01/ 18CAUCP01	C PROGRAMMING LAB

Category	CIA	ESE	L	T	P	Credit
Core Practical	40	60	-	5	70	3

Preamble

The main objective of C Programming Lab is to provide the students a strong foundation on programming concepts and its applications through hands-on training

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate branching and looping constructs	K2
CO2	Distinguish between Iteration and Recursion	K4
CO3	Construct C programs using arrays and functions	K3
CO4	Make use of Pointers in C Programs	K3
CO5	Build C programs for Biological Problems	K3

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	S
CO2	M	S	M	S	S
CO3	S	M	M	S	S
CO4	S	S	M	S	S
CO5	S	S	M	S	M

S- Strong; M-Medium; L-Low

Prerequisite

- Linux, free and open-source platform for the development of programs and applications using C.
- GCC and GNU C standard library to compile and run C programs on Linux OS.
- Text editors (gedit, vi, eclipse) to write c programming code

Practical List

1. Write a program to find the sum, average, standard deviation for a given set of numbers
2. Write a program to generate n Fibonacci numbers using recursion
3. Write a program to convert a decimal number into binary
4. Write a program to multiply two matrices using functions
5. Calculate the binomial co-efficient nCr using functions
6. Write a program to count the number of vowels and consonants in a given line of text using pointers
7. Implement BINARY SEARCH to find a particular name from a list
8. Write a program to generate permutations of a given string using Pointers
9. Write a program to print the Student Mark sheet assuming Register number, name, and marks in 5 subjects using Structure
10. Write a program to find palindromic nucleic acid sequences in human genome(ACTG)
11. Write a program to find the
 - (i) Complementary sequence of a given DNA sequence
 - (ii) Percentage of nucleotides A, C, T, G in a given DNA sequence.
12. Write a program to find the start codon **ATG** and stop codons **TAA, TAG and TGA** in a given DNA sequence (eg: look for all "ATG"s, "TAA"s, "TAG"s and "TGA"s in the sequence "AAAATGCAGAACCCATGCCCGTAA").

Web Resources

1. <https://www.w3resource.com/c-programming-exercises>
2. <https://www.udemy.com/c-programming-laboratory>

Pedagogy

Demonstration, Flipped Learning

SEMESTER I

CODE	COURSE TITLE
18CSUA101/ 18CAUA101/ 18ITUA101/ 18CTUA101	MATHEMATICS – I (NUMERICAL METHODS AND BIO STATISTICS) (Derivations not included – Problems only)

Category	CIA	ESE	L	T	P	Credit
Allied	25		75	85	5	5

Preamble

The objective of the course is to impart mathematical skills in matrix operations, numerical methods and statistics. The students will be trained on the applications of these methods on scientific and biological problems.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify and Apply the matrix operations for solving any matrix related problems	K1 - K3
CO2	Determine and apply appropriate numerical methods for solving System of Linear Equations	K2 - K4
CO3	Compare and distinguish the use of differentiation / integration methods and plan for solving scientific problems.	K3 - K4
CO4	Analyze and infer the type of data for using measures of location and measures of dispersion.	K2 - K4
CO5	Recognize and apply the correlation/regression methods for finding the association between the dependent and independent variables.	K2 - K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	L	M	S
CO2	S	S	L	M	S
CO3	S	S	L	M	S
CO4	S	S	L	M	S
CO5	S	S	L	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I

15 Hrs.

Matrices: Introduction – Determinant – Inverse of a Matrix – Rank of a Matrix – Eigen Values of a Matrix.

UNIT II

20 Hrs.

System of Simultaneous Linear Algebraic Equations: Gauss Jordan and Gauss Seidal Methods.

The Solution of Numerical- Algebraic & Transcendental Equations: Newton – Raphson Method and False Position Method.

UNIT III

20 Hrs.

Numerical Differentiation: Newton's Forward Difference Formula – Backward Difference Formula – Lagrange's Formula for unequal intervals. **Numerical Integration:** Trapezoidal Rule & Simpson's Rule (1/3 only).

UNIT IV

15 Hrs.

Introduction to Biostatistics: Definition- Types of statistics- Applications and uses of Biostatistics- Types of variables- Identification of the type of variable. **Measures of Central Tendency:** Measures of location- Mode- Median- Mean. **Measures of Spread:** Range- Interquartile range- Standard deviation. **Case Study:** Data analysis using Measures of Central Tendency.

UNIT V**20 Hrs.**

Correlation: Definition- Types of correlation- Calculation of correlation coefficient by definitional and computational formula. **Regression:** Definition- Meaning of regression and Regression coefficient. **Case Study:** Data analysis using Correlation and Regression.

Text Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Vital P. R	Allied Mathematics	Margham Publication	2012
2.	Venkataraman M. K.	Numerical Methods in Science & Engineering	National Publisher	2013 Third Edition

Reference Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Balagurusamy. E	Numerical Methods	Tata McGraw Hill	2008, 25 th Edition
2.	Manju Pandey	Biostatistics Basic and Advanced	MV Learning	2015

Ebook

1. S. B. Bhise, R. J. Dias, K. K. Mali, P.H. Ghanwat, "Textbook of Computer Applications and Biostatistics", Jan 2011 Chapter.

Web Resources

1. <https://statistics.laerd.com/statistical-guides/measures-central-tendency-mean-mode-median.php>
2. <https://www.tutorialspoint.com/statistics/index.htm>
3. <http://www.ece.mcmaster.ca/~xwu/part6.pdf>

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER II

CODE	COURSE TITLE
18CSUC202/ 18CAUC202	DIGITAL FUNDAMENTALS AND ARCHITECTURE

Category	CIA	ESE	L	T	P	Credit
Core	25	75	56	4	-	4

Preamble

On successful completion of this subject the student should have knowledge on fundamental concepts, digital circuits, number system, Boolean functions, interfacing of various components and Memory Organization.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Acquire knowledge on number systems and Boolean algebra	K2
CO2	Interpret logic functions, circuits, truth tables, and Boolean algebra expressions for logic gates	K3
CO3	Simplify the Boolean expressions and circuits using Karnaugh Maps	K3
CO4	Outline the fundamentals of combinational logic design, Flip-Flop, computer buses, I/O Peripherals and various data transfer techniques	K2
CO5	Outline the concept of Memory Organization and mapping Techniques	K2

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	S	M	M
CO3	S	M	M	M	S
CO4	S	L	S	S	M
CO5	S	M	M	S	L

S- Strong; M-Medium; L-Low

Syllabus

UNIT I

12 Hrs.

Binary Systems : Digital Computers and Digital Systems – Binary Numbers – Number base conversion – Octal and Hexadecimal Numbers – Complements – Binary Codes. **Boolean Algebra and Logic gates**: Basic Definitions- Axiomatic Definition of Boolean Algebra – Basic Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – Other Logic Operations – Digital Logic Gates.

UNIT II

14 Hrs.

Simplification of Boolean Functions: The Map method – Two and Three variable Maps – Four Variable Map – Product of Sums simplification – Don't Care Condition. **Combinational Logic**: Introduction – Design procedure – Adders – Subtractors – Code Conversion – Decoders – Multiplexers. **Flip-Flop**: RS Flip-Flop – JK Flip-Flop – D Flip-flop.

UNIT III

12 Hrs.

Input – Output Organization: Peripheral Devices - Input – output interface – I/O Bus and Interface – I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interface.

UNIT IV

12 Hrs.

Asynchronous data Transfer: Strobe Control and Handshaking – **Priority Interrupt**: Daisy-Chaining Priority, Parallel Priority Interrupt – Priority Encoder – Interrupt Cycle – Software Routines – Initial & Final Operations. **Direct Memory Access**: DMA Controller, DMA Transfer.

UNIT V

10 Hrs.

Memory Organization: Memory Hierarchy – Main Memory – Auxiliary Memory - Associative memory. **Cache Memory**: Associative, Direct, Set-associative Mapping – Writing into Cache Initialization.

Text Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Morris Mano M	Digital Logic and Computer Design	Prentice Hall of India	2006, 1 st Edition
2.	Morris Mano M	Computer System Architecture	Pearson Publication	2006, 3 rd Edition

Reference Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Albert Paul Malvino & Donald P Leach	Digital Principles and Applications	McGrawHill	1996, 5 th Edition
2.	Carter	Computer Architecture	TMH	2007, 2 nd Edition

Web Resources

1. https://www.tutorialspoint.com/computer_logical_organization
2. <http://www.ee.ncu.edu.tw/~jfli/computer/lecture/ch05.pdf>

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER II

CODE	COURSE TITLE
18CSUC203/ 18CAUC203	LINUX AND PERL PROGRAMMING

Category	CIA	ESE	L	T	P	Credit
Core	25	75	55	5	-	4

Preamble

This course will prepare students to learn about the Linux Operating System - structure, concepts and commands. Student will be able to write simple shell programming using Linux utilities, pipes and filters. Student will learn fundamentals of Perl programming and write Perl scripts using array, hash data structures, file and regular expressions.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain the structure of Linux Operating System	K2
CO2	Develop Linux utilities to perform File processing, Directory handling, User Management and display system configuration	K3
CO3	Develop shell scripts using pipes, redirection, filters and Pipes	K2
CO4	Understand the concepts of process, backup and compression	K3
CO5	Develop Perl scripts using array, hash data structures and Regular expressions	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	M	S	S	S
CO3	S	M	M	S	S
CO4	S	S	S	S	M
CO5	S	L	M	M	M

S-Strong; M-Medium; L-Low

Syllabus

UNIT I

10 Hrs.

Introduction to LINUX Operating System: Introduction - The LINUX Operating System.

Managing Files and Directories: Introduction – Directory Commands in LINUX – File Commands in LINUX.

UNIT II

10 Hrs.

Creating files using the vi editor: Text editors – The vi editor. **Managing Documents:** Locating files in LINUX – Standard files – Redirection – Filters – Pipes. **Securing files in LINUX:** File access permissions – viewing File access permissions – Changing File access permissions.

UNIT III

15 Hrs.

Automating Tasks using Shell Scripts: Introduction – Variables- Local and Global Shell variables – Command Substitution. **Using Conditional Execution in Shell Scripts:** Conditional Execution – Construct. **Managing repetitive tasks using Shell Scripts:** Using Iteration in Shell Scripts – The while construct – The until construct – The for construct – The break and continue commands – Parameter handling in shell scripts - Simple Programs using Shell Scripts.

UNIT IV

15 Hrs.

Controlling Process Execution : Requesting for background processing – Checking a background process – the top command – Terminating a background process – Finding the time taken to complete a command **Backing up, Restoring & Compressing Files :** Need for making backups – Selecting a Backup medium – Mounting and Unmounting a file system – Compressing Files.

UNIT V

10 Hrs.

Introduction to PERL: Introduction – Program Structure – Perl variables – Loops and Conditionals – Iteration – Files in Perl – Perl Subroutines – die-exit on error-Pattern matching and extraction.

Text Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	NIIT	Operating System LINUX	Prentice-Hall of India Private Limited	2009, Eastern Economy Edition
2.	N.B. Venkateswarlu	Introduction to Linux: Installation and Programming	BS Publications	2008, 1 st Edition

Reference Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Richard Petersen	Linux: The Complete Reference	Tata McGraw-Hill Publishing Company Limited, New Delhi	2008, 6 th Edition

Web Resources

1. <http://spoken-tutorial.org/>
2. <https://www.tutorialspoint.com/perl/index.htm>

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER II

CODE	COURSE TITLE
18CSUCP02/18CAUCP02	LINUX AND PERL PROGRAMMING LAB

Category	CIA	ESE	L	T	P	Credit
Core Practical	40	60	-	-	45	1

Preamble

The student will be able to create programs in the Linux environment using Linux utilities and commands. Student is given an introduction of Perl Programming and they will be able to write Perl scripts.

Course Outcomes

CO Number	CO Statement	Knowledge Level
CO1	Develop Linux utilities to perform File processing, Directory handling and User Management	K3
CO2	Develop shell scripts using pipes, redirection, filters and Pipes	K3
CO3	Develop shell scripts to display system configuration	K3
CO4	Develop simple Perl scripts	K3
CO5	Develop simple Perl scripts applicable to Bioinformatics	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	M	M	M	M
CO5	S	M	M	M	M

S- Strong; M-Medium; L-Low

Syllabus

1. Write a shell script to stimulate the file commands : rm, cp, cat, mv, cmp, wc, split, diff.
2. Write a shell script to show the following system configuration :
 - a) currently logged user and his log name
 - b) current shell , home directory , Operating System type , current Path setting , current working directory
 - c) show currently logged number of users, show all available shells
 - d) show CPU information like processor type , speed
 - e) show memory information
3. Write a shell script to display calendar for a specified month or a range.
4. Write a Shell Script to implement the following: pipes, Redirection and tee commands.
5. Write a shell script to implement the filter commands.
6. Write a shell script to find the frequency of nucleotides in a given sequence.
7. Write a shell script to find the greatest among the given set of numbers using command line arguments.
8. Write a Perl script to find for a motif in protein sequences stored in a file.
9. Write a Perl script to use Array and Hash data structure.
10. Write a Perl script to read a file and count the number of lines containing or not containing certain words.

Pedagogy

Lecture, PPT, Quiz

SEMESTER II

CODE	COURSE TITLE
18CAUA202/18CTUA202	MATHEMATICS – II (OPTIMIZATION TECHNIQUES)

Category	CIA	ESE	L	T	P	Credit
Allied	25	75	70	5	-	5

Preamble

The objective of the course is to understand the mathematical tools needed to solve optimization problems. It is an analytical method of problem-solving and decision-making that is useful in the management of organizations.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Define the basic skills and knowledge of operations research to solve Linear Programming Problem.	K ₂
CO2	Relate and solve different Transportation Models to find the feasible and optimum solutions and apply Hungarian method for assignment problems.	K ₃
CO3	Describe various costs in Inventory and apply EOQ models with shortage and without shortage in Inventory control	K ₃
CO4	Examine the appropriate period for replacement of equipments and analyze new simple models, like CPM and PERT to improve decision-making and develop critical thinking.	K ₃
CO5	Analyze the characteristics and classification of queueing system and apply them to the problems of finite/infinite models.	K ₃

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	S	M	S	M
CO3	S	S	M	M	S
CO4	M	M	M	S	S
CO5	S	M	M	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I

14 Hrs.

Linear Programming: Introduction – Mathematical Formulation of the Problem – Graphical Solution – General Form of LPP – Canonical & Standard form of LPP – Simplex Method – Big-M Method .

UNIT II

15 Hrs.

The Transportation Problem:Mathematical Formulation of the Problem – Initial Basic Feasible Solution (North-West Corner Rule, Minimum Cost Method, Vogel’s Approximation Method) – Moving towards Optimality – Unbalanced Transportation Problems.

Assignment Problem:Mathematical Formulation of an Assignment Problem – Hungarian Assignment Method – Unbalanced Assignment Problems.

UNIT III

16 Hrs.

Inventory Control: Introduction – Various Costs involved in Inventory – EOQ models without Shortage - EOQ models with Shortage - Buffer Stock & Reorder Level.

UNIT IV

15 Hrs.

Replacement Problems: Introduction – Replacement of Equipments that deteriorates gradually - Replacement of Equipment that fails suddenly. **PERT – CPM:**Introduction - Rules of Network Construction – Critical Path Method – PERT Calculations.

UNIT V**15 Hrs.**

Queueing Theory: Introduction – Characteristics of Queueing System – Traffic Intensity – Poisson Process & Exponential Distribution – Classification of Queues – Problems from Single Server Infinite and Finite Population Model.

Text Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1	KantiSwarup, Gupta P K & Man Mohan	Operations Research	S.Chand& Company Pvt. Ltd, New Delhi	2014 , 17 th Edition

Reference Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Prem Kumar Gupta , Hira D S	Problems in Operations Research	S.Chand& Company Pvt. Ltd, New Delhi	Reprint 2007, 1 st Edition

Web Resources

1. <http://personal.maths.surrey.ac.uk/st/J.F/chapter7.pdf>
2. http://web.tecnico.ulisboa.pt/mcasquilho/compute/_linpro/TaylorB_module_b.pdf
3. http://www.pondiuni.edu.in/storage/dde/downloads/mbaii_qt.pdf
4. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5579525>

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER III

CODE	COURSE TITLE
18CSUC304/ 18CAUC304	DATA STRUCTURES AND ALGORITHMS

Category	CIA	ESE	L	T	P	Credit
Core	25	75	85	5	-	4

Preamble

The objective of the course is to introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of data structures and algorithms	K1-K2
CO2	Construct and analyze of stack and queue operations with illustrations	K2-K4
CO3	Enhance the knowledge of Linked List and dynamic storage management.	K2-K3
CO4	Demonstrate the concept of trees and its applications.	K2-K3
CO5	Design and implement various sorting and searching algorithms for applications and understand the concept of file organizations.	K1-K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	L	M	M
CO2	S	S	M	M	S
CO3	M	M	L	M	S
CO4	S	S	L	M	M
CO5	S	M	L	M	M

S- Strong; M-Medium; L-Low

Syllabus

UNIT I

15 Hrs.

Introduction: Overview – SPARKS- Phases in Creating Programs - Analyzing Programs.

Arrays: Axiomatization – Ordered Lists – Sparse Matrices - Representation of Arrays.

UNIT II

16 Hrs.

Stacks and Queues: Fundamentals – Mazing Problem - Evaluation of Expressions - Multiple Stacks and Queues. **Applications of Stacks and Queues:** Towers of Hanoi, Simulation.

UNIT III

18 Hrs.

Linked lists: Singly Linked Lists – Linked Stacks and Queues – The Storage Pool – Polynomial Addition - Sparse Matrices - Doubly Linked Lists and Dynamic Storage Management.

UNIT IV

24 Hrs.

Trees: Basic Terminology – Binary Trees – Binary Tree Representation – Binary Tree Traversal – Binary Tree Representation of Trees – Applications of Trees: Decision Trees.

Internal Sorting: Searching – Linear Search, Binary Search, Fibonacci Search – Insertion Sort – Quick Sort – Two way Merge Sort – Heap Sort – Radix Sort.

UNIT V**17 Hrs.****Symbol Tables:** Static Tree Tables-Hash Tables: Hashing Functions -Overflow Handling.**Files:** File Organizations: Sequential, Random, Linked Organizations, Inverted Files, Cellular Partitions.**Text Books**

S.No	Author Name	Title of the Book	Publisher	Year and Edition
1.	Ellis Horowitz and Sartaj Sahni	Fundamentals of Data Structures	Galgotia Book Source	2003

Reference Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Jean-Paul Tremblay & Paul G.Sorenson	An Introduction to Data structures with Applications (for Applications of Stacks and Queues only)	Tata McGraw Hill Company	2008, 2 nd Edition.
2.	Samanta.D	Classic Data Structure	Prentice Hall of India Pvt Ltd	2007, 9 th Edition
3.	Seymour Lipschutz	Data Structures	McGrawHill Publications	2014, 1 st Edition
4.	S.Lovelyn Rose R.Venkatesan	Data Structures	Wiley India Private Limited	2015, 1 st Edition

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER III

CODE	COURSE TITLE
18CSUC305 / 18CAUC305 / 18CTUC305	OBJECT ORIENTED PROGRAMMING WITH JAVA

Category	CIA	ESE	L	T	P	Credit
Core	25	75	70	5	-	4

Preamble

The objective of the course is to train the students to acquire problem-solving skills through object oriented programming

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the concept of object oriented programming through Java	K1, K2
CO2	Illustrate the syntax and semantics of Java	K2
CO3	Apply the concept of Inheritance, Modularity, Concurrency, Exceptions handling and data persistence to develop java program	K3
CO4	Develop java programs for applets and graphics programming	K3
CO5	Understand the fundamental concepts of AWT controls, layouts and events	K1,K2

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	M	M	S	S
CO3	S	S	M	M	S
CO4	S	M	M	M	M
CO5	S	M	M	S	M

S - Strong; M - Medium; L – Low

Syllabus

UNIT I

15 Hrs.

Fundamentals of Object-Oriented programming: Introduction-Object –Oriented Paradigm- Basic concepts of Object-Oriented Programming-Benefits of OOP-Applications of OOP. **JAVA Evolution:** History – Features – How Java Differs from C and C++ - Java and Internet – Java and WWW – Web Browsers. **Overview of Java Language:** Introduction – Simple Java Program – Structure – Java Tokens – Statements – Implementing Java Program – Java Virtual Machine. Constants – Variables – Data Types - Operators and Expressions.

UNIT II

15 Hrs.

Decision Making and Branching: If – If else, Else if ladder, Switch, ?: Operator. **Decision Making and Looping:** While, do, for – Jumps in Loops – Labeled Loops. Classes, Objects and Methods. Arrays, Strings and Vectors.

UNIT III

15 Hrs.

Interfaces: Multiple Inheritance – **Packages:** Putting Classes together – Multi Threaded Programming. **Managing Errors and Exceptions:** Introduction – Types of Errors – Exceptions – Syntax of Exception Handling Code – Multiple Catch Statements – Using Finally Statement – Throwing our own Exceptions – Using Exceptions for Debugging.

UNIT IV

15 Hrs.

Applet Programming – Graphics Programming. **Files:** Introduction – Concept of Streams – Stream Classes – Using Streams - I/O Classes – File Class – I/O Exceptions – Creation of Files – Reading/ Writing Characters/ Bytes.

UNIT V

15 Hrs.

Introducing the AWT: AWT Classes - Window fundamentals. **Using AWT Controls, Layout Managers and Menus:** AWT Control Fundamentals – Labels - Using Buttons - Applying Check Boxes-Checkbox group - Choice controls - Using Lists- Using a TextField- Using a TextArea -

Understanding Layout Managers: Flow layout-Border layout. **Event Handling:** Introduction-The MouseEvent Class.

TEXT BOOKS:

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1	Balagurusamy E.	Programming with Java - A primer	TMH pub	5 th Edition, 2017
2.	Herbert Schildt	Java: The Complete Reference	McGrawHill Education, Oracle press	10 th Edition, 2018

REFERENCE BOOKS:

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1	John R. Hubbard	Programming with Java	TMH Pub	2 nd Edition, 2012
2	Patrick Naughton and Herbert Schildt	The Complete Reference Java 2	TMH Pub	3 rd Edition, 1999

Web Resources

1. www.spoken-tutorial.org
2. www.nptel.ac.in
3. <https://www.slideshare.net/>
4. <https://www.w3schools.in/java-tutorial/>

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER III

CODE	COURSE TITLE
18CAUC409/18ITUC409	CLIENT/SERVER COMPUTING

Category	CIA	ESE	L	T	P	Credits
Core	25	75	71	4	-	4

Preamble

This course focuses on fundamental concepts of client/server technology and SQL database servers. It also provides a deep understanding of web based client-server programming.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statements	Knowledge Level
CO1	Explain client-server computing and types of servers	K2
CO2	Examine the client/server capabilities of current crop of operating system.	K3
CO3	Explore the database server model of client/server.	K2
CO4	Understand the TP monitor and distributed object model of client/server.	K2
CO5	Demonstrate the web based client/server programming	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	M	M
CO2	M	S	L	M	L
CO3	M	M	S	L	S
CO4	M	M	M	M	S
CO5	S	S	M	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I

15 Hrs.

Client – Server computing - What is client / server? – File servers, database servers, Transaction servers, Groupware servers, Object servers, Web server – *FAT server* or client / server -Client / Server building blocks.

UNIT II

15 Hrs.

Client / Server and operating systems – the Anatomy of a server program – Needs of Client / Server from an OS – server scalability – Client anatomy – *Client and server OS trends* – Client OS and server OS. NOS: Creating the single system image - Remote procedure Calls (RPC) – Messaging and Queuing: The MOM Middleware.

UNIT III

15 Hrs.

SQL Database servers: What does SQL do? – The ISO standards – What does a database server do? – Stored procedures, Triggers and Rules. Data warehouses – OLTP (Online Transaction Processing) – *Decision Support System (DSS)* – Executive Information System (EIS) – comparing Decision Support and OLTP system – Production vs. Information Database – The data ware house.

UNIT IV

15 Hrs.

Client / Server Transaction Processing – The ACID properties – Transaction Models – TP monitors – Client / Server groupware – *Importance of Groupware* – What is Groupware – The components of Groupware. Distributed Object, CORBA style – CORBA : ORB- The Anatomy of a CORBA ORB.

UNIT V

15 Hrs.

Web client / server – The Evolution of the Web- Client/Server , Web Style-What is URL? – Shortest HTML tutorial – HTTP – 3tier client / server – HTML web based forms – CGI: The server side of the web.

TEXT BOOKS

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1.	Robert Orfali, Dan Harkey and Jeri Edwards	Client /Server Survival guide	Wiley India Edition	2008 3 rd Edition

REFERENCE BOOKS

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1.	Nein Jenkins	Client / Server Unleashed	Tech Media	1998 1 st Indian Edition
2.	Partick N.Smith, Steven L.Guengerich	Client /Server Computing	PHI	2002 2 nd Edition

Web Resources

1. https://www.webopedia.com/Computer_Science/Client_Server_Computing
2. <https://www.tutorialspoint.com/Client-Server-Computing>
3. <https://gradestack.com/Gate-Computer-Science-/Web-Technologies/Basic-Concepts-Of-Client/21104-4273-47588-study-wtw>
4. <https://www.w3schools.com/html/>

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER III

CODE	COURSE TITLE
18CSUCP03/ 18CAUCP03 / 18CTUCP03	JAVA PROGRAMMING LAB

Category	CIA	ESE	L	T	P	Credit
Core	40	60	-	5	55	3

Preamble

The main objective of JAVA Programming Lab is to provide the students a strong foundation on programming concepts and its applications through hands-on training

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, Arrays, branching and looping	K2
CO2	Develop Java programs using Strings, Interfaces and Packages	K3
CO3	Construct Java programs using Multithreaded Programming and Exception Handling	K3
CO4	Build Java programs for Applets and Graphics programming	K3
CO5	Create data files and Design a page using AWT controls & MouseEvents in Java programming	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	M	S	S	M
CO3	S	M	M	M	S
CO4	S	M	M	M	M
CO5	S	S	M	M	M

S - Strong; M - Medium; L - Low

Prerequisite

- Linux, free and open-source platform for the development of programs and applications using JAVA.
- Text editors (eclipse) to write JAVA programming code.

Practical List

1. Write a program to display multiplication table using default and argument constructors.
2. Write a program to find the area of the square, rectangle and triangle using the method of overloading.
3. Create a class Employee which includes employee number, Name, Year of experience. To accept N number of employee details, and sort it by employee name wise.
4. Write a program to extract a portion of a character string and print the extracted string.
5. Define an interface having one method that takes an integer parameter. For this method, provide two implementations: In the first one, just print the value and in the second one, print the square of the number. Try to call both the versions.
6. Create a package to calculate arithmetic operations of two numbers and another package to calculate logical operations of two numbers. Write a Java program to use these packages.
7. Write a program using threads to increment a shared variable.
8. Design an applet program to draw several shapes.
9. Write a program to read and write the contents from one file to another file and handles exceptions.
10. Write a program to design a Form using any three AWT controls and MouseEvents.

Web Resources

1. <https://www.w3resource.com/java-exercises/>
2. <https://www.udemy.com/introduction-to-java-programming/>

Pedagogy

Demonstration, Flipped Learning

SEMESTER III

CODE	COURSE TITLE
18CSUA404/ 18CAUA303	Business Accounting (40% Theory & 60% Problems only)

Category	CIA	ESE	L	T	P	Credit
Allied	25	75	55	5	15	5

Preamble

The objective of the course is to impart accounting skills in Final Accounting and Cost Accounting. The students will be trained on the preparation of final accounts and cost sheet using an accounting package.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Identify and Apply the appropriate accounting rules for the preparation of Journal and method of posting the same into Ledger	K1 - K3
CO2	Select, Classify, Choose and Categorize the given entries to enter in appropriate subsidiary books	K1 - K4
CO3	Classify, Apply and Build various financial statements like Trial Balance, Trading, P&L account and Balance Sheet	K2 - K4
CO4	Define, Explain and Apply appropriate depreciation method to prepare Machinery Account	K1 - K3
CO5	Classify the elements of cost and Construct the Cost Sheet accordingly	K2 - K3
CO6	Apply the knowledge and skill of preparation of various accounting concepts using an accounting package	K2 - K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	-	-	S	M	M
CO2	-	-	S	M	M
CO3	-	-	S	M	M
CO4	-	-	S	M	M
CO5	-	-	S	M	M
CO6	S	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus**UNIT I****15 Hrs.**

Accounting: Definition – Objectives – Branches of Accounting – Accounting Concepts – Conventions – Systems of Accounting – Rules for Double-Entry System of Book Keeping – Preparation of Journal and Ledger Accounting. Hands on training.

UNIT II**15 Hrs.**

Subsidiary Books: Purchase Book – Sales Book – Purchase Return Book – Sales Return Book – Cash Book (Two Columnar only) - Petty Cash Book. Hands on training.

UNIT III**15 Hrs.**

Preparation of Trial Balance – **Final Accounts:** Trading, Profit and Loss Account and Balance Sheet with Simple Adjustments. Hands on training.

UNIT IV**15 Hrs.**

Accounting Package: Features – Home Screen – Accounts Info Menu – Display Menu. Company Creation – Alteration & Deletion of Company – Selection of Company – Ledger Creation – Preparation of Trial Balance & Final accounts.

UNIT V**15 Hrs.**

Depreciation: Definition - Causes of depreciation – Basic factors - Methods of Depreciation – Straight Line Method and Diminishing Balance Method (Simple Problems). **Cost Accounting:** Elements of Costing – Types of Costing – Preparation of Simple Cost Sheets.

Text Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Murthy.A, & Reddy .T.S.	Advanced Accountancy	Margham Publications	Second edition, 2012
2.	Jain S. P & Narang, K.L,	Cost Accounting Principles and Practice	Kalyani Publishers	Twenty Third edition, 2012

Reference Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Grewal, T.S.	Double Entry Book Keeping	Sultan Chand & Sons Publisher	2004
2.	VinayakamM.N., Mani P.L., Nagarajan K.L,	Principles of Accountancy	Sultan Chand & Sons Publisher	3 rd Edition, 2008

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER IV

CODE	COURSE TITLE
18CSUC407/ 18CAUC407/ 18CTUC304	RELATIONAL DATABASE MANAGEMENT SYSTEMS

Category	CIA	ESE	L	T	P	Credit
Core	25	75	55	5	15	4

Preamble

The objective of the course is to present an introduction to Relational Database Management Systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a RDBMS using Oracle9i and PL/SQL

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of Relational Data Model, Entity-Relationship Model and process of Normalization	K1 – K2
CO2	Understand and construct database using Structured Query Language (SQL) in Oracle9i environment	K1 – K3
CO3	Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	K2 - K4
CO4	Understand and use built-in functions and enhance the knowledge of handling multiple tables	K1 – K3
CO5	Learn basics of PL/SQL and develop programs using Cursors, Exceptions, Procedures and Functions	K1 – K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	L	M	M
CO2	S	S	L	M	S
CO3	S	M	L	M	S
CO4	S	S	L	M	M
CO5	S	M	L	M	M

S- Strong; M-Medium; L-Low

Syllabus

UNIT I

15 Hrs.

Database Concepts: A Relational approach: Database – Relationships – DBMS – Relational Data Model – Integrity Rules – Theoretical Relational Languages. Database Design: Data Modeling and Normalization: Data Modeling – Dependency – Database Design – Normal forms – Dependency Diagrams – De-normalization.

UNIT II

15 Hrs.

Oracle9i: Overview: Personal Databases – Client/Server Databases – Oracle9i an introduction – SQL *Plus Environment – SQL – Logging into SQL *Plus - SQL *Plus Commands – Errors & Help – Alternate Text Editors - SQL *Plus Worksheet - iSQL *Plus.

Oracle Tables: DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table – Table Types – Spooling – Error codes.

Implementing the SQL*Plus Commands using Create, Update, Alter, Drop, Rename, Truncate and Spooling

UNIT III

15 Hrs.

Working with Table: Data Management and Retrieval: DML – adding a new Row/Record – Customized Prompts – Updating and Deleting an Existing Rows/Records – retrieving Data from Table – Arithmetic Operations – restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure.

Writing queries to Add, Update, Delete records, Retrieving data from a table using Where and ORDERBY Clause.

UNIT IV

15 Hrs.

Functions and Grouping: Built-in functions –Grouping Data. Multiple Tables: Joins and Set operations: Join – Set operations. *Designing queries using Built in functions.*

PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators.

UNIT V

15 Hrs.

Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQ L in PL/SQL – Data Manipulation – Transaction Control statements.

Implementing the basic control structures in PL/SQL – sequential structure, selection structure and looping structure.

PL/SQL Named Blocks : Procedure – Function, Package and Trigger

Declaring Functions and Triggers.

Text Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Nilesh Shah	Database Systems Using Oracle	PHI	2008, 2 nd Edition

Reference Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Arun Majumdar, Pritimoy Bhattacharya	Database Management Systems	Tata McGraw Hill	2007
2.	Gerald V. Post	Database Management Systems	Tata McGraw Hill	2008, 3 rd Edition

Ebook

1. Diana Lorentz, “Oracle® Database SQL Reference”, ORACLE, Dec, 2005.
2. Bill Pribyl, Steven Feuerstein, “Oracle PL/SQL Programming”, O'Reilly Media, Inc., 6th Edition, February 2014.

Web Resources

1. <http://www.digimat.in/nptel/courses/video/106105175/L01.html>
2. https://www.tutorialspoint.com/oracle_sql/index.htm

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER IV

CODE	COURSE TITLE
18CSUC408/ 18CAUC408	WEB PROGRAMMING

Category	CIA	ESE	L	T	P	Credit
Core	25	75	70	5	-	4

Preamble

This course aims at exploring the knowledge to the student to understand the web-development techniques that use HTML, CSS and JavaScript as a web development essentials and advanced technique of web programming.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of XHTML document and create a basic web page using forms and Tables.	K2
CO2	Create document with different styles and Identify the positioning of web page elements using Cascading Style Sheets.	K2
CO3	Understand the basic concepts of JAVA SCRIPT.	K3
CO4	Describe the concept of Arrays and Functions.	K3
CO5	Develop applications using Objects and Events.	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	M
CO2	S	M	M	S	M
CO3	M	S	M	S	L
CO4	S	M	S	M	S
CO5	S	M	S	S	M

S- Strong; M-Medium; L-Low

Syllabus**UNIT I****15 Hrs.**

Introduction: History of the Internet and World Wide Web – Key Software Trend- Object Technology – JavaScript : Object-Based Scripting for the Web.

Introduction to HTML : Introduction - Editing HTML – Headers – Linking – Images –Special Characters, Horizontal Rules – Unordered Lists – Nested and Ordered List- Basic HTML Tables – Basic HTML Forms – Internal Linking - Frameset Tag- Nested Frameset Tags.

UNIT II**15 Hrs.**

Cascading Style Sheets (CSS): Introduction – Inline Styles - Conflicting Styles – Linking External Style Sheets – Positioning Elements – Backgrounds – Element Dimensions – Text Flow and Box Model – User Style Sheets.

UNIT III**15 Hrs.**

Introduction to Scripting: JavaScript – Introduction to Scripting – Simple Programs - Memory Concepts – Arithmetic – Decision Making : Equality and Relational Operators –Control Structures – if Selection statement- if..else Selection Statement – while Repetition Statement – Assignment operators- Increment and Decrement Operators - Essentials of counter-controlled repetition – for repetition Statement – switch Multiple Selection Statement – Do..While Repetition Statement – The break and continue Statements – Labeled break and Continue Statements - Logical operators.

UNIT IV**15 Hrs.**

Functions: Program Modules in Java Script - Programmer-Defined Functions - Function Definitions – Scope Rules – Recursion – Recursion vs. Iteration - JavaScript Global Functions.

Arrays: Arrays - Declaring and allocating Arrays – Examples using Arrays - References and Reference Parameters – Passing Arrays to Functions - Sorting arrays – Searching Arrays : Linear and Binary Search – Multiple-Subscripted Arrays.

UNIT V**15 Hrs.**

Objects: Introduction to Object Technology -Math Object - String Object - Date Object - Boolean & Number Objects.

Events : Introduction –Event ONCLICK – Event ONLOAD – Tracking the mouse with Event ONMOUSEMOVE – Rollovers with ONMOUSEOVER and ONMOUSEOUT – Form Processing with ONFOCUS and ONBLUR – More Form Processing with ONSUBMIT and ONRESET – More DHTML Events.

Text Book:

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	H.M.Deital, P.J.Deital & T.R.Nieto	Internet and World Wide Web – How to Program	Pearson Prentice Hall of India	2012, Fourth Impression

Reference Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Shelley Powers, et al.,	Dynamic Web Publishing Unleashed	Techmedia, New Delhi	1998, 2 nd Edition
2.	Thomas A.Powell,	HTML: The Complete Reference	Tata McGraw Hill	2000, 2 nd Edition,
3.	Xavier C	World Wide Web design with HTML	Tata McGraw-Hill	2007 1 nd Edition

Web Resources

1. <http://www.webbasedprogramming.com>
2. <https://www.w3schools.com>

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

SEMESTER III

CODE	COURSE TITLE
18CSUC409/ 18CAUC306	OPERATING SYSTEMS

Category	CIA	ESE	L	T	P	Credit
Core Paper	25	75	55	5	-	4

Preamble

The course provides a high-level understanding of the basic concepts and some knowledge of the services provided by the operating system.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of a process and its states	K1
CO2	Acquire the knowledge of real storage and virtual storage	K2
CO3	Procure the facts of processor scheduling by means of various scheduling algorithms	K2
CO4	Understand the basic operations on primary and secondary storage disks	K3
CO5	Get awareness about the functions of a file system. Able to relate UNIX and LINUX operating system	K2

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	M
CO2	M	S	S	M	S
CO3	S	M	S	M	M
CO4	M	M	S	S	S
CO5	S	M	S	S	M

S- Strong; M-Medium; L-Low

Syllabus

UNIT I

14 Hrs.

Introduction: Operating System. **Process Concepts:** Definition of Process – Process States – Process States Transitions – The Process Control Block – Operations of Processes – Suspend and Resume - Interrupt Processing - Semaphores. **Deadlock and Indefinite Postponement.**

Hands-on Exercise: Process- Create, Delete, Suspend and Resume a thread, Deadlock in Multithreading.

UNIT II

14 Hrs.

STORAGE MANAGEMENT

Real Storage: Real Storage Management Strategies – Contiguous Versus Non-Contiguous Storage Allocation – Single User Contiguous Storage Allocation – Fixed Partition Multiprogramming – Variable Partition Multiprogramming. Virtual Storage: Virtual Storage Management Strategies – Page Replacement Strategies – Demand Paging – Page Size.

Hands-on Exercise: Best Fit algorithm in Memory Management.

UNIT III

15Hrs.

PROCESSOR MANAGEMENT

Job and Processor Scheduling: Introduction – Scheduling Levels, Objectives, Criteria - Preemptive Vs Non-Preemptive Scheduling – Priorities – Deadline Scheduling – FIFO – RR – SJF – SRT – HRN.

Hands-on Exercise: Programming FIFO method.

UNIT IV

16 Hrs.

AUXILIARY STORAGE MANAGEMENT

Disk Performance Optimization: Introduction - Operation of Moving-Head Disk Storage – Need for Disk Scheduling – Characteristics of Disk Scheduling Policies - Seek Optimization – RAM Disks - Optical Disks.

Hands-on Exercise: SSTF disk scheduling algorithm.

UNIT V**16 Hrs.**

File and Database Systems: Introduction – The File System – File System Functions – File Organization – Allocating and Freeing Space – File Descriptor – Access Control Matrix.- Access Control by User Classes.

Case Study: UNIX and Linux Comparison – Process Management – File Management – Device Drivers – Security.

Text Books

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1	Deitel H.M.	Operating Systems	Pearson Education Publication	2nd Edition

Reference Books

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1	Achyut S Godbole	Operating Systems	TMH Publications	2002
2	Harvey M. Deitel, Paul J. Deitel, David R. Choffnes	Operating Systems	Pearson Education	2003

Web Resources

1. <https://computer.howstuffworks.com/operating-system.htm>
2. <https://www.techopedia.com/definition/9654/scheduling>
3. https://www.tutorialspoint.com/operating_system/os_memory_management.htm
4. <https://operatingsystemsam.wordpress.com/processor-management/>
5. https://www.ibm.com/support/knowledgecenter/en/SSLTBW_2.3.0/com.ibm.zos.v2r3.ieae100/auxover.htm
6. <https://www.includehelp.com/operating-systems/file-management-in-operating-system.aspx>

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar.

SEMESTER IV

CODE	COURSE TITLE
18CSUCP04/ 18CAUCP04	WEB PROGRAMMING LAB

Category	CIA	ESE	L	T	P	Credit
Practical - IV	40	60	-	5	65	3

Preamble

This course provides the knowledge for students to design web pages using simple HTML, CSS and JavaScript. This also enables the students to understand and implement the WEB applications.

Course Outcomes

On the successful of this course, student will be able to

CO Number	CO Statement	Knowledge Level
CO1	Design and develop their own web page	K2
CO2	Design and develop programs using CSS	K2
CO3	Implement the concept of functions in javascript	K3
CO4	Implement the concept of arrays and strings..	K3
CO5	Develop applications using Events and Objects.	K4

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	M
CO2	M	S	S	M	M
CO3	S	M	M	S	L
CO4	M	S	S	M	M
CO5	S	S	M	M	S

S- Strong; M-Medium; L-Low

Practical List

1. Create a web page with
 1. Correct Structure (header and body)
 2. A title
 3. At least two different headings, with separate content following each heading
 4. An unnumbered list with at least 3 items
 5. A numbered list with at least 3 items
 6. At least 4 links to other web pages
 7. At least 1 picture
2. Create a XHTML Document using nested list with indentation
3. Use HTML and CSS to create a 3 column layout with a top banner section, 3 columns, and a bottom footer section. First column contains Buttons, second column shows the main content and third column contains advertisements.
4. Write CSS to make the following style changes:
 - a) All elements in the body should have a white background with a text color of #330033 and the font Verdana or any serif available.
 - b) The first-level headers are 40px bold serif font. The second-level headers are 24px underlined sans serif.
 - c) Paragraph text and lists should have a width of 550px and a top and bottom padding of 10px.

- d) Ordered lists should have a background color of #FFCC99 and unordered lists should have a background color of #CCFFCC. All list elements should be in italics.
 - e) Links should never show the default underlining and upon hovering they should become neon green(#33ff33)
5. Write a recursive function GCD that returns the greatest common division of x and y. The GCD of x and y is defined recursively as follows: if y is equal to 0 then GCD(x,y) is x;otherwise GCD(x,y) is GCD(y,x%y) where % is the modulus operator. Write a XHTML document to implement this function.
 6. Write a function PERFECT that determines whether the given parameter is a perfect number. Use this function in a script that determines and displays all the perfect numbers between 1 and 1000.
 7. Write a program to read numeric data and sort them using bubble sort.
 8. Create a XHTML document using functions to calculate the volume of a sphere, cylinder and a cube. Use radio buttons for selecting a particular shape.
 9. Write a program to read a string and use indexOf, lastIndexOf and split methods of String object.
 10. Write a simple drawing program using onmousemove that allows the user to draw inside a box in red or blue by holding down the Shift or Ctrl keys.

Web Resources

1. <https://www.w3resource.com/javascript-exercises>
2. <https://www.udemy.com/complete-web-development-course>

Pedagogy

Demonstration, Flipped Learning

SEMESTER IV

CODE	COURSE TITLE
18CAUA404	ENTERPRISE RESOURCE PLANNING

Category	CIA	ESE	L	T	P	Credits
Allied	25	75	70	5	-	5

Preamble

This course focuses on fundamental concepts of manufacturing perspective, modules and benefits of ERP.

Course Outcomes

On the successful completion of the course, students will be able to

COs	CO Statements	Knowledge Level
CO1	Explain the fundamentals and importance of ERP	K2
CO2	Examine the manufacturing perspectives of CAD/CAM in ERP	K3
CO3	Illustrate the modules of ERP	K2
CO4	Describe the benefits of ERP in various business field	K2
CO5	Demonstrate the Lifecycle and implementation of ERP	K3

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	M	M
CO2	M	S	L	M	L
CO3	M	M	S	L	S
CO4	M	M	M	M	S
CO5	S	S	M	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I

15 Hrs.

Introduction to ERP: Evolution of ERP - Reasons for the growth of the ERP market-The advantages of ERP- Reason for failure in ERP implementations - ERP packages.

UNIT II

14 Hrs.

ERP-A manufacturing perspective : Introduction-ERP-CAD/CAM-Materials Requirement Planning(MRP)-Bill Of Material-Closed loop MRP-Manufacturing Resource Planning(MRP-II)-Distribution Requirements Planning(DRP)-JIT and Kanban-Computer Aided Design/Computer Aided Manufacturing(CAD/CAM)- Product Data Management (PDM)-Data Management-Benefits of PDM-Make-To- Order(MTO) and Make-To-Stock(MTS)-Assemble-To-Order(ATO)-Engineer-To- Order(ETO)-Configure-to-Order(CTO).

UNIT III

15 Hrs.

ERP Modules: Introduction–Finance-Plant Maintenance-Quality Management-Materials Management.

UNIT IV

15 Hrs.

Benefits of ERP: Introduction-Reduction of Lead-Time-On-Time Shipment- Reduction in cycle Time-Improved Resource Utilization-Better Customer satisfaction- Improved Supplier Performance-Increased Flexibility-Reduced Quality costs- Improved Information Accuracy and Decision Making Capability.

UNIT V

16 Hrs.

ERP implementation Lifecycle: Introduction-Pre-Evaluation Screening- Package Evaluation-Project Planning Phase-Gap Analysis-Reengineering- Configuration-Implementation Team Training-Testing-Going Live-End-User Training-Post Implementation (Maintenance mode).

TEXT BOOKS

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1.	Alexis Leon	Enterprise Resource Planning	Tata Mcgraw Hill, New Delhi	2006

REFERENCE BOOKS

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1.	Mary Summer	Enterprise Resource Planning	Pearson Education	2006
2.	Ravi Shankar, S. Jaiswal	Enterprise Resource Planning	Galgolia Publication Pvt. Ltd., New Delhi	1999

Web Resources

1. https://www.tutorialspoint.com/management_concepts/enterprise_resource_planning.htm
2. <https://www.slideshare.net/silvygoldy/enterprise-resource-planning-by-alexis-leon-mohit>

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar