SACRED HEART COLLEGE (AUTONOMOUS)

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*Ready for
Every Good Work*

A Don Bosco Institution of Higher Education, Founded in 1951 * Affiliated to Thiruvalluvar University, Vellore * Autonomous since 1987

Accredited by NAAC (4th Cycle – under RAF) with CGPA of 3.31 / 4 at 'A+' Grade

B. Sc. Computer Science

Sem	Part	Subcode	Subtitle	Hours	Credits
1	I	LT114	Tamil – I	5	3
	II	LE115AT	English –I	5	2
	III	AM114C	Allied Mathematics -I	6	5
	III	CS120	Problem Solving Techniques	3	3
	III	CS121	Web Development Using HTML	4	4
	IV	VE105A/B	Christian Religion –I / Value Education –I	2	1
	IV	SK104	Communication Skills	2	1
	IV	CE103	Communicative English –I	-	1
	II	LE115AP	English Lab –I	-	1
	III	PCS108	Practical -I: Web Development Using HTML	3	2
2	I	LT214	Tamil –II	5	3
	II	LE215AT	English –II	5	2
	III	AM214C	Allied Mathematics –II	6	5
	III	CS221	Digital Computer Fundamentals	3	3
	III	CS222	Programming Using C	4	4
	IV	VE205A/B	Christian Religion –II / Value Education –II	2	1
	IV	SK204	Leadership Skills	2	1
	IV	CE203	Communicative English –II	-	1
	II	LE215AP	English Lab –II	-	1
	III	PCS212	Practical -II: Programming Using C	3	2
3	I	LT312	Tamil –III	5	3

	II	LE309T	English –III	5	2
	III	AP309B	Allied Physics for Computer Science I	4	3
	III	CS322	Computer Organization And Architecture	3	3
	III	CS323	Data Structures and Algorithms Using C	4	4
	IV	VE306	Human Rights	2	1
	IV	SK304	Technical Skills	2	1
	III	PCS309	Practical -III: Data Structures And Algorithms Using C	3	2
	II	LE309P	English Lab –III	-	1

Sem	Part	Subcode	Subtitle	Hours	Credits
4	I	LT411P / SS	Tamil -IV :Poem / Short Story	5	3
	II	LE409T	English –IV	5	2
	III	AP409B	Allied Physics For Computer Science II	4	3
	III	CS422	Software Engineering	3	3
	III	CS423	Relational Database Management Systems	4	4
	IV	VE406	Environmental Science	2	1
	IV	SK404	Employability Skills	2	1
	III	PAP409B	Allied Physics Practical's for Computer Science	2	1
	III	PCS412	Practical -IV: Relational Database Management Systems	3	2
	II	LE409P	English Lab –IV	-	1
	V	CO-SHE	Co-Curricular – Groups and Movements	-	2
	V	CO-DED	Co-Curricular – Outreach	-	2
5	III	CS540	Programming Using Java	4	4
	III	CS541	Web Development Using XML	4	4
	III	CS542	Programming Using PHP	3	3
	III	CS4543	Operating Systems	4	4
	III	CS544 A / B / C /D	Elective I : Computer Graphics / Data Mining And Warehousing / Decision Support System / Software Testing And Quality Assurance	4	4
	III	PCS515	Practical -V :Programming Using Java	3	2
	III	PCS516	Practical -VI :Web Development Using XML	3	2
	III	PCS517	Practical -VII :Programming Using PHP	3	2
	III		Non Major Elective -I	2	1
6	III	CS633	Mobile Applications Development	4	4
	III	CS634	Linux and Shell Programming	4	4
	III	CS635	Programming Using Python	3	4
	III	CS636	Microprocessor Using 8086/88	4	4
	III	CS637 A / B / C /D	Elective II :Computer Networks / Software Project Management / Security Systems / Cognitive Computing	4	4

III	PCS627	Practical - VIII :Mobile Applications Development	3	2	
III	PCS628	Practical -IX :Programming Using Python	3	2	
III	PCS629	Practical -X :Linux and Shell Programming/Microprocessor Using 8086/88	3	2	
III	PCS630J	Project Work	-	4	
III		Non Major Elective II	2	1	

COURSE CODE:CS120

TITLE OF THE COURSE: CORE-PROBLEM SOLVING TECHNIQUES

OBJECTIVES:

- To provide a comprehensive overview of the two largest Web technologies, Hyper Text Markup Language (HTML), and Cascading Style.
- To learn through hands-on, practical instruction that will assist the students to tackle the real-world problems they face in building websites today—with a specific focus on HTML and CSS
- To develop an ability to design and implement a web site

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Develop programming techniques required to solve a given problem	K1, K2
CO2	Develop problem solving skill using top – down design principles.	K2
CO3	Design an algorithm for a problem that requirement various mathematical techniques along with suitable data structures.	K1, K3
CO4	Develop techniques to handle array structures.	K4
CO5	Develop techniques such as searching and sorting.	K5

Syllabus

Total Credits:3   **Instructional Hours:3**

UNIT-I:INTRODUCTION TO COMPUTER PROBLEM SOLVING(K1,K2) 10 Hours

Introduction – Problem Solving Aspect – Implementation of Algorithms – Program verification – Efficiency of Algorithms – Analysis of Algorithms.

UNIT-II:FUNDAMENTAL ALGORITHMS(K2)   10 Hours

Exchanging the Values of Two Variables – Counting – Summation of a Set of Numbers – Factorial Computation – Generation of the Fibonacci Sequence – Base Conversion.

UNIT-III:FACTORING METHODS(K1,K3)   9 Hours

Finding the Square Root of a Number – Smallest Divisor of an Integer – GCD of Two Integer – Generating Prime Numbers – Generation of Pseudo-Random Numbers.

UNIT-IV:ARRAY TECHNIQUES (K4)   8 Hours

Array Order Reversal – Finding Maximum Number in a Set – Removal of Duplicatesfrom an Ordered Array

UNIT-V:MERGING, SORTING AND SEARCHING(K5)   8 Hours

Two-way Merge, Sorting by Exchange, Binary Search, Hash Searching.

i.Textbook

1. Dromey R G, "How to Solve it by Computer", Dorling Kindersley India
   Pvt.Ltd, Pearson Education :2007.

Unit - I : Ch. 1.1, 1.2, 1.4, 1.5, 1.6, 1.7

Unit - II : Ch. 2.1, 2.2, 2.3, 2.4, 2.6, 2.8.

Unit - III : Ch. 3.1, 3.2, 3.3, 3.4, 3.6.

Unit - IV : Ch. 4.1, 4.3, 4.4.

Unit - V : Ch. 5.1, 5.3, 5.7, 5.8

ii. References

1. Michael Schneider, Steven W. Weingart, David M. Perlman, "An Introduction
   to Programming and Problem Solving with Pascal", Wiley Eastern Limited,
   New Delhi:1982.

2. Harold Abelson and Gerald Sussman with Julie Sussman, "Structure and
   Interpretation of Computer Programs", MIT Press:1985.

3. Ronald A. Pasko, "Problem Solving Basics and Computer Programming",
   Jones And Bartlett Publishers, 2nd Edition:2001.

iii.Web References

(i) Online Tutorial

1.http://nptel.ac.in/courses/106104074/

2. http://javahungry.blogspot.com/2014/06/algorithm-problem-solving-
   techniques-or-approaches-for-software-programmer.html

(ii) Online Quiz

1. https://www.tutorialspoint.com/cplusplus/cpp_online_quiz.htm

2. http://www.withoutbook.com/OnlineTestStart.php?quizId=11

(iii)Online Compiler

1. https://www.tutorialspoint.com/compile_cpp11_online.php

2. https://www.codechef.com/ide

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars, Library reference works, Group Discussions, Field Visits and Quiz)	Once in a Semester

COURSE CODE:CS121

TITLE OF THE COURSE: CORE-WEB DEVELOPMENT USING HTML

OBJECTIVES:

- To provide a comprehensive overview of the two largest Web technologies, Hyper Text Markup Language (HTML), and Cascading Style.
- To learn through hands-on, practical instruction that will assist the students to tackle the real-world problems they face in building websites today—with a specific focus on HTML and CSS
- To develop an ability to design and implement a web site

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Develop knowledge of HTML and CSS code and an HTML editor to create personal and/or business websites following current professional and/or industry standards.
CO2	Develop critical thinking skills to design and create websites

Syllabus

Total Credits:4   **Instructional Hours:4**

UNIT-I: HTML BASICS, FORMATTING TAGS AND LISTS

HTML Introduction – Web page: Static & Dynamic Page - Web Browsers - HTML Editors - Tags – Elements – Attributes - HTML Page Structure - HTML Basic tags: Head – Title – Body. Basic text formatting: Heading tags – Paragraph tag – hr tag - Line break – Pre formatted. Presentational Element - Phrase Elements. List Tags: Ordered List – Unordered List – Definition List.

UNIT-II:LINKS, IMAGES AND TABLES

Link: Basic link – creating links. Image and Object: Adding images in a website – Adding other objects – Using images as links.Tables: Basic table elements and attributes – Advanced tables.

UNIT-III:FRAMES AND FORMS

Frames: The Frameset, No Frame Element - Creating Link between Frames - Nested Frameset. Form: Text Fields - Password Field - Radio Button – Checkbox - Submit Button – Reset Button – Button – Select – option – text area.

UNIT-IV:CASCADING STYLE SHEET-I

Introduction – syntax – ID selector - Class selector – External CSS – Internal CSS – Inline CSS – font property: font family - font size – font weight - font style - font variant - font stretch - font size adjust. Text Formatting: Color, text-align, vertical-align, decoration – indent- shadow –transform- letter spacing –word pacing- white space - direction.

UNIT-V:CASCADING STYLE SHEET-II

Background: color – image – repeat – position – attachment. List: style type – style position – style image – marker offset. Table: table specific – border collapse – border spacing – caption side – empty cell – table layout. Outlines: outline width – outline style – outline color.

i.Textbook

1. Jon Ducktt."Web Programming with HTML, CSS andJAVA

   SCRIPT", Wiley Publishing, 2005.

   Unit– I   **:**Ch.1

   Unit– II   **:** Ch. 2, 3 &4

   Unit- III   **:** Ch.5,6

   Unit– IV   **:**Ch.7

   Unit- V   **:**Ch.8

ii. References

1. Joel Skylar. "Principles of Web Design". Singapore : Thomson Asia Pvt. Ltd 2000
2. Powell , Thomas A. "Web Design – The Complete Reference", Tata McGraw Hill Edition2000
3. Alexis Goldstein, Louis Lazaris, Estelle Weyl. "HTML5 & CSS3 for the RealWorld".

iii.Web References

   (i) OnlineTutorial
   1. http://www.w3schools.com/css
   (ii) OnlineQuiz
   1. Http:/www.Indiabix.com/online-test/

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars, Library reference works, Group Discussions, Field Visits and Quiz)	Once in a Semester

SEMESTER: II

TITLE OF THE COURSE: CORE-DIGITAL COMPUTER FUNDAMENTALS

OBJECTIVES:

- To explore the Number System, Number Conversion from one Base to another Base andComplements.
- To understand the Logic Gates, Boolean Algebra and to design the Logical Circuits.
- To simplify the Boolean Functions using K-Map Method
- To Learn Combinational circuits as Adders and Subtractors, Encoders and Decoders.
- To Learn the different types of Flip-Flops such as SR Flip flop, JK Flip flop, T Flip flop and D Flip flop .

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Perform conversions among different number systems, to be familiar withbasic logic gates,	K1,K2,K6
CO2	Examining the Logic circuits and truth table for Boolean functions	K1,K2
CO3	Simplify Boolean functions by using k-map method and Boolean Laws andTheorems.	K1,K5
CO4	Design of combinational circuits such as Adder, Subtractor, Multiplexer, Encoder and Decoder etc.	K1,K2
CO5	Understand the design of sequential Circuits such as Flip-Flops, Edge-trigger and master slave flip flops.	K1,K2

Syllabus

Total Credits:3   **Instructional Hours:3**

UNIT-I: NUMBER SYSTEM AND BINARY ARITHMETIC'S(K1,K2,K6)   10 hours

Digital Computer and Digital System - Number Systems: Number Systems -Decimal, Binary, Octal, Hexadecimal - Conversion from one to another.Characters and Codes: BCD, ASCII, 2421 Code, Excess-3 Code, Gray Code.Binary Arithmetic's: Binary Addition, Subtraction, Multiplication, Division.Complements: n's and n-1's Complements.

UNIT-II: LOGIC GATES AND BOOLEAN ALGEBRA(K1,K2)   8 hours

Logic Gates: AND, OR, NOT, NOR, NAND, XOR, XNOR Gates – Logic Circuits.   Boolean Algebra and Boolean Laws and Theorems - De Morgan'sTheorems – Duality theorem.

UNIT-III: MAP SIMPLIFICATION(K1,K5)   7 hours

Simplification of Sum of Product and Product of Sum Expressions –Karnaugh Map and Simplifications: Three Variable Maps, Four Variable Maps - Don't Care condition.

UNIT-IV: COMBINATIONAL CIRCUITS(K1,K2)   10 hours

Combinational Circuits: Half and Full Adders – Half Subtractor and FullSubtractor   -

Encoders and Decoders – Multiplexers – De-multiplexers.

UNIT-V:FLIP FLOPS AND SEQUENTIAL CIRCUITS(K1,K2)   10 hours

Sequential Logic Design: Flip-Flops - SR, JK, D and T Flip-Flops – EdgeTriggered Flip-Flop –

Master-Slave Flip-Flop – Flip-flop Excitation table.

i. Textbook

2. Morris M Mano, "Digital Logic and Computer Design", Prentice Hall of India

Pvt.Lmt., New Delhi2001.

   Unit - I : Chap. 1.1 - 1.8

   Unit - II : Chap. 2.1 - 2.7

   Unit - III : Chap. 3.1 - 3.3, 3.5& 3.8

   Unit - IV : Chap. 4.3, 4.4, 5.5 & 5.6

   Unit - V : Chap. 6.1 - 6.3 & 6.6

ii. References

4. Morris M Mano, "Computer System Architecture", Prentice Hallof

   India Pvt.Lt., New Delhi:1991.

5. Donald P. Leach and Albert Paul Malvino, "Digital Principles and

   Application", Fifth Edition, Tata McGraw-Hill Publishing Company Ltd.,

   New Delhi:2003.

6. Thomas C. Bartee, "Computer Architecture and Logic Design", McGraw Hill

   International Edition, New Delhi:1991

iii. Web References

(i) Online Tutorial

1.https://www.geeksforgeeks.org/introduction-of-logic-gates/

2.https://www.tutorialspoint.com/computer_logical_organization/logic_gates.htm

(ii) Online Quiz

3. https://www.avatto.com/computer-science/test/mcqs/digital-
   electronics/questions/90/1.html

4. https://www.geeksforgeeks.org/digital-logic-number-representation-gq/

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

OBJECTIVES:

- To enhance analyzing and problem-solving skills and use the same for writing programs in C.
- To develop logics which will help them to create programs, applications in C.
- To use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
- To enter the program on a computer, edit, compile, debug, correct, recompile and run it.

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Understanding a functional hierarchical code organization.
CO2	Ability to define and manage data structures based on problem subject domain.
CO3	Ability to work with textual information, characters and strings.
CO4	Ability to work with arrays, structures, pointers and files.
CO5	Understanding a functional hierarchical code organization.

Syllabus

Total Credits:4   **Instructional Hours:4**

UNIT-I:DATA TYPES, OPERATORS AND STRUCTURES

History of C - Structure of a C program –Constants and Variables - Basic data types (int, float, char, double, void) – operators and expressions (arithmetic operators, relational operators, logical operators, assignment operator, Increment and decrement operator, conditional operator, bitwise operators, mapping input output operator) – Control Constructs (if, if/else, switch, while, do…while, for), break and continue, exit() function, goto and label, The ?:operator.

UNIT-II:ARRAYS AND FUNCTIONS

Arrays (declaration, one and two dimensional arrays) - Character Arrays and Strings. Function Fundamentals (General form, Function Definition, Function arguments, return value) – Parameter passing: call-by-value and call-by-reference
– Recursion – Passing Arrays to Function – Passing Strings to Function.

UNIT-III:STORAGE CLASSES, STRUCTURES AND UNIONS

Scope rules (Local variables and global variables, scope rules of functions) -Type modifiers and storage class specifiers.Structures – Basics of Structure – Declaring of Structure – Referencing Structure elements - Array of Structures – Nesting of Structures - Passing Structures to function – Pointers and Structures - Unions.

UNIT – IV: POINTERS

Understanding Pointers – Accessing the Address of a Variable – Declaring the Pointer Variables – Initialization of Pointer Variables – Accessing a Variable through its Pointer – Pointer Expressions – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions returning Pointers – Pointers to Functions.

UNIT – V: FILE MANAGEMENT IN C

Introduction – Defining and Opening a File – Closing a File – Input / Output Operations on Files

1. **TeachingResources**

   i. Text

   1. E.Balagurusamy, "Programming in ANSI C", Seventh Edition, McGraw Hill Education Private Limited, NewDelhi:2016.

      Unit - I   : Chap. 2to 7
      Unit - II : Chap. 8 to 10
      Unit - III : Chap. 12
      Unit - IV : Chap. 10& 11
      Unit - V   : Chap. 13

   ii. References

   1. YashavantKanetkar, "Let us C", BPB Publications, Tenth Edition - New Delhi:2010
   2. Ashok N.Kamthane, "Programming in C", Second Impression, Pearson:2012.

   iii. Web References

   (i) OnlineTutorial

   1. http://www.c4learn.com/?gclid=COK1y6nHk7wCFcUA4godmlgAKA/
   2. http://www.cprogramming.com/tutorial/c-tutorial.html/
   3. http://www.tutorialspoint.com/cprogramming/

   (ii) OnlineQuiz

   1. http://www.indiabix.com/online-test/c-programming-test/
   2. http://www.pskills.org/c.jsp/

   (iii) OnlineCompiler

   https://www.tutorialspoint.com/compile_c_online.php

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS322

TITLE OF THE COURSE: CORE-COMPUTER ORGANIZATION ANDARCHITECTURE

OBJECTIVES:

- To understand the basics of ComputerOrganization.
- To know the relationship between computer instruction and the Machine codeexecution.
- To know about the various types of CPU Organization and Addressing Modes.
- To recognize the need of interface between CPU and Input / Outputdevices.
- To think critically, independently, and quantitatively about Computer Memory

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Study basic computer organization, design and micro-operations.
CO2	Prepare machine code from the instructions
CO3	Understand CPU organization and different types of addressing modes.
CO4	Understand how the Input/ Output devices communicate with the computer
CO5	Learn various methods and techniques of memory organization.

Syllabus

Total Credits:3   **Instructional Hours:3**

UNIT-I: COMPUTER ORGANIZATION AND DESIGN

Instruction Codes - Computer Registers - Computer Instructions – Timing and Control – Instruction Cycle - Memory Reference Instructions.

UNIT-II: PROGRAMMING THE BASIC COMPUTER

Introduction - Machine language - Assembly language - The assembler - Program loops - Programming arithmetic and logical operation – Subroutines - Input-output programming.

UNIT-III: CENTRAL PROCESSOR UNIT

Introduction – General Register Organization – Stack Organization – Instruction Formats – Addressing Modes.

UNIT -IV: INPUT / OUTPUT ORGANIZATION

Peripheral Devices – I/O interface – Asynchronous Data Transfer – Modes of Transfer - Direct Memory Access.

UNIT -V: MEMORY ORGANIZATION

Memory Hierarchy – Main Memory - Associative Memory – Cache Memory – Virtual Memory.

Teaching Resources

i. Text

    1. Morris Mano M. "Computer System Architecture". New Delhi**:** Prentice Hall of India Private Limited, 2011

        Unit- I **:** Ch. 5.1 –5.6
        Unit- II **:** Ch. 6.1 –6.8
        Unit- III **:** Ch. 8.1 –8.5
        Unit- IV **:** Ch. 11.1 – 11.4 & 11.6
        Unit- V **:** Ch. 12.1, 12.2 & 12.4 -12.6

ii. References

    1. William Stallings. "Computer Organization and Architecture".8th edition. Pearson Publication, 2010

    2. Morris Mano. "Digital Login and Computer Design". New Delhi: Prentice Hall of India Private Limited, 2001.

iii. Web References

    (i) Online Tutorial

    1. www.onlinevideolecture.com/computer.../computer-architecture

    2. www.computer-pdf.com/architecture/

    3. www.tutorialspoint.com/computer_logical_organization

    (ii) Online Quiz

    1. https://www.pritee.org/index.php/knowledge-base-articles/computer-organisation-and-architecture/30-computer-organization-and-architecture-quiz-1

    2. https://www.geeksforgeeks.org/computer-organization-and-architecture-gq/

    3. https://www.sanfoundry.com/1000-computer-organization-architecture-questions-answers/

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS323

TITLE OF THE COURSE: CORE-DATA STRUCTURES AND ALGORITHMS USING C

OBJECTIVES:

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Learn the basic types for data structure, implementation and application.
CO2	2. Know the strength and weakness of different data structures.
CO3	3. Use the appropriate data structure for a given problem.
CO4	4. Develop programming skills required to solve a given problem

Syllabus

Total Credits:4   **Instructional Hours:4**

UNIT - I: ARRAYS AND LINKED LIST

Arrays: Characteristics of Array-One dimensional Array-Operation with Array: Insertion, Deletion and Sorting-Manipulation of using pointer-Representation of Sparse matrix
Linked list: Important terms-Implementation of linked List-Memory allocation and De-allocation-Operation on linked list-Singly Linked list: Insertion, concatenation, Splitting-Circular linked list-Doubly linked list.

UNIT - II: STACK AND QUEUE

Stack: Related terms-stack implementation-Operation on stack-Pointer and Stack-Representation of Arithmetic expression: Infix, Prefix, and Postfix notations-Application of Stack.Queue: Various positions of Queue-Queue implementation-Operation on Queue-Disadvantages of Simple Queues-Dynamic implementation (Pointer),Insertion and Deletion operation-Types of Queues-Application of Queues.

UNIT - III: TREES

Trees:Basic Terms-Binary Trees-Binary Tree Representation-Operation on Binary Tree-Traversal of a Binary Tree-Binary Search Tree.

UNIT - IV: SEARCHING AND SORTING

Searching Techniques: Searching- Linear (Sequential) Search-Binary Search.
Sorting Techniques: Sorting-Insertion sort-Selection sort-Bubble Sort-Quick sort.

UNIT - V: GRAPH

Graphs:Terminologies of Graphs-Graphs Representation-Traversal of Graphs-Breadth First Search-Depth First Search.

Teaching Resources

i. Text

1. Ashok N.Kamthne, " Introduction to Data Structure in C " Pearson Education:2005(Singapore)

   Unit-I : Ch. 2.1-2.5, 2.10, 2. 11-2.16, 6.1-6.4, 6.6, 6.12-6.24, 6.26, 6.27
   Unit-II : Ch. 4.1-4.10, 5.1-5.9
   Unit-III : Ch. 8.1-8.3, 8.7-8.12
   Unit-IV :Ch.11.1-11.4, 10.1-10.6
   Unit-V : Ch. 9.1-9.6

ii. References

1. SeymoreLipshutz. "Theory problems of Data structure". Schaum's outline series, New Delhi:McGraw Hill Book Company,1986
2. Horowitz E and Shani S. "Fundamentals of Data structure in C", Hyderabad: UNIVERSITIES Press(India)Pvt.Ltd.,2008

iii. Web References

(i) Online Tutorial

1. http://www. Cprogramming.com/algorithms-and-data-structures.html
2. http://www. Tutorialspoint.com
3. http://www. ece.uwaterloo.ca/~dwharder/aads/Lecture materials/

(ii) Online Quiz

1. http://www.tcyonline.com/tests/data-structure-test
2. http://www.pskills.org/c.jsp

(iii) Online Compiler

1. https://www.onlinegdb.com/Sy-fU7gJW

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS422

TITLE OF THE COURSE: CORE-SOFTWARE ENGINEERING

OBJECTIVES:

- Understand the principles of largescale software systems, and the processes that are used to build them.
- Acquire ability to the software-development process, including requirements analysis, design, programming, testing and maintenance.
- Understand the Communication issues in large, complex software projects.
- Understand purpose and importance of the project management from the perspective of planning, tracking and completion of project.

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Plan and deliver an effective software engineering process, based on knowledge of widely used development lifecycle models.
CO2	Employ group working skills including general organization, planning and time management and inter-group negotiation.
CO3	Capture, document and analyze requirements.
CO4	Translate a requirements specification into an implementable design, following a structured and organized process.
CO5	Make effective use of UML, along with design strategies such as defining a software architecture, separation of concerns and design patterns

Syllabus

Total Credits:3   **Instructional Hours:3**

UNIT - I: SOFTWARE PROCESS

The Software Engineering – Software Process – Process Model – Prescriptive Models – Specialized Models – Unified Process – Personal Software Process – Team Software Process – Agile Process – Extreme Programming.

UNIT - II: MODELING I

Requirement Engineering – Establishing –Eliciting Requirements – Developing use cases – Building Requirements Model – Negotiating and Validating Requirements – Requirement Analysis- Scenario Based Modeling – UML Models – Data Modeling concept – Class Based Modeling – Requirement Modeling – Flow oriented Modeling – Behavioral Model – Design Process – Design Models.

UNIT - III: MODELING II

Software Architecture – Architecture Styles – Architectural Design – Architectural Mapping using Data Flow – Component – Designing class based component – Using traditional

components – User Interface Design – The Golden Rules - User interface Analysis and Design – Interface Analysis – Design Steps.

UNIT - IV: QUALITY MANAGEMENT

Software Quality – Achieving software Quality – Software Quality Assurance, Tasks, Goals and Metrics – Software Reliability – Software Testing Strategies: A Strategic Approach – Strategic Issues – Test Strategies for Conventional Software – System Testing- Validation Testing – The Art of Debugging – Software testing fundamentals –White box testing: Basis Path Testing – Control structure Testing – Black box testing – Model based testing.

UNIT - V: MANAGING SOFTWARE PROJECTS

The Management Spectrum - People – The Product – Process – The Project – The W5HH Principle – Critical Practices – Basic Concepts – Project Scheduling – Defining a Task Network Scheduling – Software Risk – Risk Identification – Risk Projection – Risk Refinement – Risk Mitigation, Monitoring and Management – The RMMM Plan.

1. **Teaching Resources**
   i. Text
   1. Pressman, Roger S. Software Engineering a practitioner's Approach 7th Edition. New York: McGraw Hill International Edition, 2010.
      Unit-I : Ch. 1.1-1.6, 2.1-2.6, 3.1-3.4.
      Unit-I : Ch 5, 6, 7, 8.2, 8.4.
      Unit-III: Ch. 9, 10.1-10.3, 10.5-10.7, 11.1-11.4.
      Unit-IV: Ch. 14, 16.1-16.3, 16.6, 17.1-17.3, 17.6-17.8, 18.1-18.7.
      Unit-V: Ch. 24, 27, 28.
   ii. References
   1. Rajib Mall. Fundamentals of Software Engineering. New Delhi PHI Learning Pvt Ltd., 2009
2. James K.L Software Engineering New Delhi: PHI Learning Pvt Ltd., 2009.
   iii. Web References
   (i) Online Tutorial
   1. http://www.scribd.com/doc/27252883/Software -Engineering-Notes
   2. http://www. People.cs.missouri.edu/~duanye/cs4320/lectures.html
   http://www.Engineeringppt.blogspot.in/2011/12/pressman-software-engineerring-ppt-pdf.html

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS423

TITLE OF THE COURSE: CORE-RELATIONAL DATABASE MANAGEMENT SYSTEMS

OBJECTIVES:

- To understand the basic principles of Databases and DataModels.

- To know about the Relational Data Structures and Relational Algebra.

- To understands the concepts of Functional Dependency and Normalization.

- To learn the features and to write Queries usingSQL.

- To explore the organization and to acquire skills in developing programs usingPL/SQL.

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Gain a good understanding of the architecture functioning of database management systems as well as associated tools and techniques.
CO2	Implement the Entity Relationship Diagram using various E-R Diagram Symbol.
CO3	Develop a good database design using normalization techniques.
CO4	Understand the use of structured query language & PL/SQL, its syntax, its working and its scope.
CO5	Acquire a good understanding of database systems concepts and to be in a position to use and design databases for differentapplications

Syllabus

Total Credits:4   **Instructional Hours:4**

UNIT - I: **BASIC CONCEPTS AND DATA MODELS**
     Basic concepts and definition – Data Dictionary – Database System – Database Administrator – File Oriented System Vs Database System: Advantage and Disadvantage. Three level Database Architecture – Data Independence – Data Model: Physical Data model - Hierarchical Data model – Network Data Model.
UNIT - II: RELATIONAL MODEL
     Structure of Relational Model – Relational Algebra - Entity Relationship Model: Basic E-R Concepts - ER Diagram Symbols.
UNIT - III: RELATIONAL DATABASE DESIGN
     Functional Dependency: Functional Dependency Diagram and Example – Full Functional Dependency. Decomposition: Lossy-Join Decomposition – Lossless-Join Decomposition. Normalization: Normalization - First Normal Form – Second Normal Form –Third Normal Form – Boyce Codd Normal Form.
UNIT - IV: STRUCTURED QUERY LANGUAGE (SQL)
     Creating, Dropping and Altering Tables – Create Table – Drop Table – Alter Table – Inserting Rows – Querving the Database – Simple Select Statement Sub-Selects – Aggregate Functions –

String, Number and Date Functions – SET Operations – Views – Create View – Drop View – Modifying the Database – Insert – Update – Delete Statements.

UNIT - V: PROCEDURAL LANGUAGE – SQL (PL/SQL)

==Data Types and Variables – Program Control Statements – Null Statement –Assignment Statement – Conditional Statements – Loops – Program Structure== – Anonymous Blocks – Procedures and Functions – Stored Procedures and Functions – Packages – Triggers – Database Access using Cursors.

1. **Teaching Resources**
i. **Text**
    1. S.K. Singh, "Database Systems - Concept, Design and Applications", Dorling Kindersley (India) Pvt. Ltd., Second Impression,2008.
        Unit - I   : $1.1 - 1.8_{(1.8.1, 1.8.2, 1.8.5, 1.8.6)}$ & $2.3 - 2.7_{(2.7.3, 2.7.4, 2.7.5)}$
        Unit - II   : 4.1- 4.4& 6.1 - 6.5
        Unit - III   : 9.1 - 9.3& 10.1 – 10.4
    2. RajeshkharSunderraman. Oracle 8 Programming A Primer. New Delhi :Addition - Wesley publication, 2000.
        Unit - IV   : 2.1 – 2.6
        Unit -V   : 4.1 – 4.8

ii. **References**
1. Bipin C Desai, "An Introduction to Database Systems", Galgotia Publications, New Delhi, 1999.
2. Abraham Siberscha, et al. Database System Concepts. McGraw Hill.
3. Ramez Elmasriand Navathe, Shamkant B. Fundamentals of Database Systems.Pearson Education.

iii. **Web References**
i) Online Tutorial
    1. https://www.javatpoint.com/dbms-tutorial
    2. https://www.tutorialspoint.com/dbms/index.htm
    3. http://www.w3schools.com/sql/

ii) Online Quiz
    1. https://www.avatto.com/computer-science/test/mcqs/questions-answers/database/71/1.html
    2. https://www.geeksforgeeks.org/dbms-gq/er-and-relational-models-gq/
    3. https://www.geeksforgeeks.org/dbms-gq/sql-gq/
    https://www.geeksforgeeks.org/dbms-gq/database-design-normal-forms-gq/

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS540

TITLE OF THE COURSE: CORE-PROGRAMMING USING JAVA

OBJECTIVES:
- To acquire the programming skills in core java applications.
- To learn the art of GUI programming with Applet.
- To write interface with Applet Controls.
- To understand the Layouts of Applets.
- To establish database connectivity.
- To learn the Interaction between AWT control and Data Base.

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
CO2	Identify classes, objects, members of a class and the relationships among them needed for a specific problem.
CO3	Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifies, and create user define package for specific task,(reusability concepts) error exception handling)
CO4	Develop programs using the Java standard class library.
CO5	Develop software in the Java programming language, (using applet, AWT controls, and JDBC)

Syllabus

Total Credits:4   **Instructional Hours:4**

UNIT – I: FOUNDATION, ESSENTIALS, CONTROL STATEMENT AND CLASSES & OBJECTS
Stage of Java – origin of Java – challenges - features - Object-Oriented Programming; **Java Essentials:** Elements - API - variables - primitive data types – String Class - operators – combined assignment operators - conversion –scope – comments - keyboard input; **Control Statements:***if,if-else,* nested *if&if-else-if* statements – logical operators – comparison – conditional operator – *switch* – increment and decrement – *while, do-while&for* loops – nested loops – *break* and *continue*; **Classes** and **Objects: c**lasses and objects -**m**odifiers - passing arguments– constructors - package & import - static class members –method overloading– constructor overloading – returning objects – *this* variable – recursion – nested & inner classes – abstract classes & methods.

UNIT – II: ARRAYS, STRING HANDLING, INHERITANCE, INTERFACE AND PACKAGES
Introduction –processing array – passing arrays – returning arrays – String arrays – two Dimensional Arrays - Arrays with Three or More Dimensions; **String Handling :** String class – concatenation – comparison – substring – methods – other methods–*StringBuffer,*

*StringBuilder&StringTokenizer*classes;**Inheritance:** basics –inheriting and overriding superclass methods – calling superclass constructor – polymorphism – inherit from different classes – abstract classes – final Class; **Interfaces:**Basics – multiple Interfaces – multiple inheritance using interface – multilevel interface – **Packages** – Create and access packages in NetBeans IDE – static Import and package class – access specifiers.

UNIT – III: EXCEPTION HANDLING, I/O AND FILE HANDLING AND MULTITHREADING

Introduction - *try* and *catch* block - multiple *catch* block - nested *try* - finally Block – *throw* Statement – exception propagation – *throw* Clause - custom exception – built-in exception; **Multithreading:**Introduction – threads – thread creation – life cycle – joining a thread – scheduler & priority – synchronization – inter-thread communication – thread control – thread Pool – thread group – daemon thread; **Files and I\O Streams:** *file* Class – streams – byte streams – filtered byte streams – *RandomAccessFile* class – character streams.

UNIT – IV: APPLET AND GUI PART I

Fundamentals – applet class – life cycle – steps for applet program – passing values through parameters – graphics – event handling; **GUI I:**GUI – creating windows – dialog boxes – layout managers – AWT component classes – Swing component classes – applications of AWT controls.

UNIT – V: GUI PART II AND JAVA DATABASE CONNECTIVITY

Event handling – AWT components – AWT graphics classes – Swing controls – application using Swing and AWT; **Java Database Connectivity:** types of drivers – JDBC architecture – JDBC classes & interfaces – steps in JDBC applications – creating a new Database and table with JDBC.

1. **Teaching Resources**
   i. Text
1. S.Sagayaraj, R.Denis,   P.Karthik&D.Gajalakshmi, "Constructive Java Programming", Universities Press, 2021

Unit - I	: Ch. 1.1 – 1.5, 2.1 – 2.11, 3.1 – 3.15 & 4.1- 4.13
Unit - II	: Ch. 5.1 – 5.8, 6.1 – 6.9, 7.1 - 7.7 & 8.1 – 8.8
Unit - III	: Ch. 9.1 – 9.10, 10.1 - 10.12 & 11.1 – 11.6
Unit - IV	: Ch. 12.1 – 12.7 & 13.1 – 13.7
Unit - V	: Ch. 14.1 – 14.5& 15.1 – 15.5.

   ii. References
   1. Patrick Naughton and Herbert Schildt. The Complete Reference JAVA 2. 3rd Edition. Tata McGraw-Hill Edition, 1999.
   2. Muthu C. Programming with JAVA. 2nd Edition. Vijay Nicole Imprints, 2011.
3. Ken Arnold Gosling and Davis Holmen. The Java Programming Language. 3rd Edition. Addition Wesley Publication.
   iii. Web References
   (i) Online tutorials
      1. http://www.roseindia.net/java/
      2. www.tutorialspoint.com/java
   (ii) Online quiz
      1. www.bullraider.com/quiz/core-java-quiz
         www.javatpoint.com/examaccess

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS541

TITLE OF THE COURSE: CORE-WEB DEVELOPMENT USING XML

OBJECTIVES:
- To know how to represent data over the Web using XML.
- Understanding of the XML Document Object Model.
- Understanding xml DTD and its uses.
- Understanding xml schema and its uses.
- Understanding JSON and its uses.

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Describe how namespaces are used in XML.
CO2	Follow XML syntax rules.
CO3	Validate XML using DTD.
CO4	Construct XSLT style sheets for transforming HTML.
CO5	Construct XPath expressions for use within XSLT style sheet templates.

Syllabus

Total Credits:3   **Instructional Hours:2**

UNIT - I: FUNDAMENTALS OF XML
SGML - The Beginnings of XML – Benefits of XML - Advantages of XML over SGML, HTML, Databases and Flat Files - Drawbacks of XML. XML Syntax - Document Structure - Declaration - Markup and Content - Elements - Attributes - Entities - Comments - Processing Instructions - Rules of XML Structure – Well Formed and Valid Documents - Applying CSS Style to XML.

UNIT - II: VALIDATING XML WITH THE DTD
Document Type Definitions -Some Simple DTD Examples - Structure of a Document - Type Definition-DTD Attributes-DTD Entities-DTD Directives-DTD Drawbacks and Alternatives

UNIT – III: XML SCHEMA
Schema Recommendation - Document - Schema for XML Document - Creating XML Schemas - Declaring Attributes - Declaring Elements - Declaring Complex Elements - Declaring Simple Types - Refining Simple Types Using Facets - Anonymous Type Declarations - Specifying Mixed Content for Elements - Annotating Schemas - Model Groups - Attribute Groups - Targeting Namespaces - ”Inheriting” from Other Schemas.

UNIT – IV: X-PATH, X-LINK AND XML FOR THE WEB
XPath - Operators and Special Characters - XPath Syntax – Axes – Predicate – XPath Function. XPointer - Points - Ranges - Abbreviating XPointer Notation - XLink - Simple Links - Extended

Links. **JSON**: JSON Introduction - JSON Syntax - JSON Data types - JSON Objects - JSON Schemas - JSON Comparison with XML.

UNIT - V: XML DOM

What Is DOM, Anyway? - What DOM Is Not-Why Do I Need DOM?-Disadvantages of Using DOM - DOM Levels - DOM Core: Parents, Children, and Siblings - DOM Interfaces - Java Bindings - Walking Through an XML Document -Creating an XML Document -DOM Traversal and Range: Traversal - Range.

1. **Teaching Resources**

   i. Text

   1. Ron schmelzer. et al. XML and Web Services Unleashed. Sams Publishing, 2002.

Unit 1	**:** Ch. 1 & 2
Unit 2	**:** Ch. 3
Unit 3	**:** Ch. 4
Unit 4	**:** Ch. 5
Unit 5	**:** Ch. 7

   ii. Reference

   1. David Chappell and Tyler Jewell. Java Web Services. 1st Edition. O'Reilly, 2002.

   iii. Web References

   (i) Online Tutorial
   1. http://www.w3schools.com/xml/
   2. http://www.scribd.com/doc/29110068/XML-and-Web-Services
   3. http://msdn.microsoft.com/en-us/library/ms996507.aspx

   (ii) Online Quiz
   1. http://www.indiabix.com/online-test/
   2. http://www.pskills.org/xml.jsp

   (iii) Online Compiler
   1. http://compileonline.com/

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS542

TITLE OF THE COURSE: CORE-PROGRAMMING USING PHP

OBJECTIVES:
- To learn about PHP is a server scripting language, and a powerful tool for making dynamic and interactive Web pages
- To Understand File handling concepts
- Understanding PHP code to connect, access, and update a MySQL database
- Understanding PHP using XML

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Understand process of executing a PHP-based Script on a webserver.
CO2	Understand basic PHP syntax for variables use and standard language constructs, such as conditional and loops.
CO3	Storing data in arrays.
CO4	Using PHP built-in functions and creating custom functions
CO5	Understanding POST and GET in form submission.

Syllabus

Total Credits:3   **Instructional Hours:3**

UNIT – I: FUNDAMENTALS OF PHP

Web server – Apache - PHP Intro- PHP Install -PHP Syntax -PHP Variables-PHP Echo / Print - PHP Data Types- PHP Strings -PHP Constants.PHP Operators- Control structures - PHP Functions - Directory Functions - File System Functions -PHP ArraysPHP Sorting ArraysPHP Super global - String Functions - Date and Time Functions-Mathematical Functions - Miscellaneous Functions.

UNIT – II: PHP FORMS

Basic Form Processing (GET and POST Method) - PHP Form Handling - PHP Form Validation-PHP Form Required– URL - E-mail- PHP Form Complete.

UNIT - III: PHP ADVANCED

PHP Arrays Multi-PHP Date and Time- PHP Include-PHP File Handling-PHP File Open/Read-PHP File Create/Write- PHP File Upload-PHP Cookies- PHP Sessions-PHP Filters- PHP Filters Advanced- PHP Error Handling- PHP Exception-COM-DOM - CURL-SOAP.

UNIT – IV: PHP WITH MYSQL DATABASE

PHP MySQL Functions -Connect- Create DB -Create Table- Insert Data- Get Last ID- Insert Multiple- Prepared-Select Data- Delete Data- Update Data- Limit Data -Table join - Database driven application.

UNIT - V: PHP - XML

PHP XML Parsers - PHP Simple XML Parser- PHP <mark>Simple XML</mark> - GetPHP XML ExpatPHP XML DOM.

1. **Teaching Resources**

   i. Text

   1. Julie C.Meloni, Sams Teach yourself PHP, MySQL and Apache, Fourth edition, 2008 by sams publishing.

      Unit - I   **:** Ch. 3 – 8, 10
      Unit - II   **:** Ch. 11
      Unit - III   **:** Ch. 12-13
      Unit - IV   **:** Ch. 16
      Unit - V   **:** Ch. 28

   ii. References

   1. Nowicki, et al. Professional PHP, Wrox Press, 2000.

   iii. Web References

   (i) Online Tutorial

   1. www.w3schools.com
   2. www.php.net
   3. www.phpclasses.org

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS4543

TITLE OF THE COURSE: CORE-OPERATING SYSTEMS

OBJECTIVES:
- To acquire the principles of Operating System, Process, its Description, Uniprocessor and Multiprocessor and its Scheduling Techniques.
- To understand the concept of Mutual Exclusion, Deadlock and its detection, prevention & avoidance.
- To learn the various Main Memory and Virtual Memory Management techniques.
- To explore the Organization and Management of I/O, Disk and File Managements.

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	To make students able to learn different types of operating systems along with concept of file systems and CPU scheduling algorithms used in operating system.
CO2	To provide students knowledge of memory management schemes and I/O handling algorithms.
CO3	At the end of the course, students will be able to implement various algorithms required for management, scheduling, allocation and communication used in operating system.
CO4	Able to compare & constant various scheduling algorithm
CO5	Understanding POST and GET in form submission.

Syllabus

Total Credits:4   **Instructional Hours:4**

UNIT – I: OPERATING SYSTEM OVERVIEW AND PROCESS DESCRIPTION
Operating System Objectives and Functions - The Evolution of Operating Systems - Developments Leading to Modern Operating Systems - Process Description and Control: What is a Process? - Process States - Process Description - Process Control - Security Issues.

UNIT – II: UNIPROCESSOR, MULTIPROCESSOR AND REAL-TIME SCHEDULING
Types of Processor Scheduling - Scheduling Algorithms - Multiprocessor Scheduling - Real-Time Scheduling.

UNIT – III: MUTUAL EXCLUSION, SYNCHRONIZATION AND DEADLOCK
Mutual Exclusion: Hardware Support – Semaphores : Message Passing – Readers / Writers Problem - Principles of Deadlock - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection.

UNIT – IV: MEMORY MANAGEMENT AND VIRTUAL MEMORY
Memory Management Requirements - Memory Partitioning – Paging – Segmentation - Security Issues – Virtual Memory: Hardware and Control Structures - Operating System Software.

UNIT – V: I/O MANAGEMENT, DISK SCHEDULING AND FILE MANAGEMENT

I/O Devices - Organization of the I/O Function - I/O Buffering - Disk Scheduling – File Management: Overview - File Organization and Access - File Directories - File Sharing – Record Blocking – Secondary Storage Management - File System Security.

1. **Teaching Resources**
   i. Text
   1. William Stallings," Operating Systems: Internals and Design Principles", 7th Edition, Pearson Education Inc., Fourth Impression: 2016.
   ii. Reference
   1. Madnick S.E and Donovan J.J. Operating Systems. New Delhi: McGraw hill International Book Co, 1987.

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS544A

TITLE OF THE COURSE: CORE-COMPUTER GRAPHICS

OBJECTIVES:
- Understand the Role and importance of Algorithms like Line drawing Algorithm, Circle drawing Algorithm, Character generating Algorithm.
- Understand 2D and 3D Transformations.
- Understand various Clipping Algorithms like point clipping, line clipping and polygon clipping.
- Understand the importance of the User Dialogue and various input functions.
- Understand the Visible Surface Detection Methods.

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	To provide comprehensive introduction about computer graphics system, design and two dimensional transformations.
CO2	To make the students familiar with techniques of clipping, three dimensional graphics and three dimensional transformations.
CO3	Prepares the students for activities involving in design, development and testing of modeling, rendering, shading and animation.

Syllabus

Total Credits:4   **Instructional Hours:4**

UNIT - I: OVERVIEW OF GRAPHICS SYSTEM

Raster scans display - Random scan display - Graphics software's - Output Primitives: Points and Lines - Line drawing algorithms: DDA Algorithm - Bresenham's Line Algorithm - Circle generating algorithms: Properties of Circles - Mid Point Circle Algorithm.

UNIT – II: 2D TRANSFORMATIONS

Two-Dimensional Transformation: Translation-Scaling-Rotation - Homogenous Representation - Inverse Transformation - Composite Transformation: Translation –Rotation - Scaling-Pivot point Rotation-fixed point scaling - Other Transformation: Reflection-Shear.

UNIT – III: 2D VIEWING AND CLIPPING

The viewing pipeline - Window to Viewport coordinate Transformation - Clipping operation - Point clipping - line clipping: Cohen Sutherland line clipping - Polygon clipping: Sutherland Hodgeman polygon clipping.

UNIT – IV: GRAPHICAL USER INTERFACES AND 3D TRANSFORMATION

The User Dialogue - Input of Graphical Data: Locator, Stroke, String, Valuator, And Choice, Pick Devices - Interactive picture construction techniques - Three Dimensional Display Methods: 3D Transformation - 3D Viewing.

UNIT – V: VISIBLE SURFACE DETECTION METHODS

Visible Surface Detection: Back Face Detection - Depth Buffer Method - A Buffer Method - Scan Line Method - Depth Sorting Method - Area Subdivision Method.

1. **Teaching Resources**
   i. Text
   1. Donald Hearn and Pauline Baker M. Computer Graphics C version 2nd Edition, Prentice Hall, 2011(Reprint).
      Unit I   :Ch 2.1, 2.7, 3.1-3.2, 3, 3.11, 3.14
      Unit II   :Ch 5.1-5.4
      Unit III   :Ch 6.1-6.7, 6.8
      Unit IV   :Ch 8.1-8.2, 9.1, 10.1, 11.1- 11.3
      Unit V   :Ch 13.1-13.8
   ii. References
   1. Neumann W.M. and Sproull R.F. Principles of Interactive Computer Graphics 2nd Edition Tata McGraw Hill International: 1979.
   2. Edward Angel. Interactive Computer Graphics 5th Edition Pearson Education, 2009.
   iii. Web References
      (i) Online Tutorial
         1. http://www.svecw.edu.in/Docs%5CITCGLNotes2013.pdf
         2. http://www.cprogrammingexpert.com/C/Tutorial/graphics.aspx
         3. http://www.opengl.org/archives/resources/code/samples/glut_examples/examples.html
         4. http://www. Openglsamples.sourceforge.net/
         5. http://www.openglsamples.sourceforge.net/triangle.html

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS633

TITLE OF THE COURSE: CORE-MOBILE APPLICATIONS DEVELOPMENT

OBJECTIVES:
- To develop a mobile application.
- To understand the concept of SQLite.

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Describe the platforms upon which the Android operating System will run.
CO2	Create a simple application that runs under the Android operating system.
CO3	Access and work with the Android file system.
CO4	Create an application that uses multimedia under the Android operating system.
CO5	Access and work with database under the Android operating system.

Syllabus

Total Credits:4   **Instructional Hours:4**

UNIT - I: INTRODUCING ANDROID

Introduction – History – Versions – Features – Understanding the Android market - Android software stack – Life cycle of an Android – The layers of Android – The Intent of Android development – Four kinds of Android components – Understanding the AndroidManifest.xml file – Mapping applications to processes – Android development environment – Introducing the Android SDK – Exploring the development environment – Building an Android application in Eclipse - Creating an Android Hello World Application – Using the Android emulator – Debugging your application.

UNIT - II: BUILDING BASIC USER INTERFACES AND USING CONTROLS

User Interfaces – Understanding Android's Common Controls – Adapters and List Controls – Understanding Layout Managers – Working with Menus and Action Bars - Working with views – Intents and Services – Toast.

UNIT - III: ANDROID APPLICATIONS

Telephony – Exploring telephony background and terms – Accessing telephony information – Interacting with the phone – Working with messaging: SMS – Notifications and alarms – Introducing Toast – Placing your Toast message – Making custom Toast view – Introducing notifications – Making a custom notification view – Introducing alarms – Graphics and animation – Drawing graphics in Android – Creating animations with Android`s Graphics API – Multimedia – Introducing to Multimedia and Stage fright – Playing audio – Playing video – Capturing media.

UNIT - IV: THE MATURING PLATFORM

Location – Simulating your location within the emulator – Using Location Manager and Location Provider – Working with Maps – Converting places and addresses with Geocoder – Bluetooth and sensors – Exploring Android's Bluetooth capabilities – Interacting with the Sensor Manager

– App Widgets – Drag and Drop – The drag-and-drop classes – Drag-and-drop operations – The shadow builder – Drag events – Starting drag operations – Listening for drag-and-drop events – Responding to drag-start operations – Handling drop operations.

UNIT - V: DATABASE OPERATIONS

Storing and retrieving data – Creating a SQLite Database – Migrating a Database – SQLite DB: CRUD Operations. Publishing Android Application: Export android application – Google play store registration.

3. Teaching Resources

i. Text Book

1. W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz, **"Android in Action",** Third Edition 2012.
2. Dave Maclean, SatyaKomatineni, Grant Allen, **"Pro Android 5",**Apress Edition 2015.

ii. Reference

1. Dave Smith and Jeff Friesen, "Android Recipes: A Problem – Solution Approach", Rakmo Press (P) Ltd, New Delhi, 2011.

iii. Web Reference

1. Android Developer's Guides - available at http://developer.android.com/

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS634

TITLE OF THE COURSE: CORE-LINUX AND SHELL PROGRAMMING

OBJECTIVES:
- State the major components and describe the architecture of the UNIX operating system.
- To learn and understand UNIX commands.
- State how the shell functions at the user interface and command line interpreter.
- Create structured shell programming with flow control constructs.

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Understand the basic Unix command
CO2	Understand the concepts piping and redirections.
CO3	Create a shell script using VI editor.
CO4	Able to develop using shell script to solve simple application problem.
CO5	Access and work with system calls

Syllabus

Total Credits:4   **Instructional Hours:4**

UNIT - I: ORGANIZATION
   Salient Features of Unix – Unix System Organization – Types of Shells – Unix Commands – The Unix File System – Creating Files – Listing Files and Directories. - The Boot Block – The Super Block – The Inode Table – Data Blocks – How Does Unix Access Files – Storage of Files – Disk Related Commands.

UNIT - II: UNIX COMMANDS
   Essential Unix commands: Password – Commands: cal, banner, touch – File Related Commands – Viewing Files – Taking Printouts – File Compression. I/O Redirection and Piping.vi editor – Modes of operation – The First Editing Session. Processes in Unix: What's Running Right Now – Still More Processes – Background Processes – The nohup command – Killing a process – Changing Process Priorities – Scheduling of Processes, Communication – Unix write and wall command - Basis of Unix Communication.

UNIT - III: SHELL PROGRAMMING - I
   Interactive Shell Scripts – Shell Variables – Shell Keywords –Assigning Values to Variables – Positional Parameters – Passing Command Line Arguments – Setting Values of Positional Parameters – Displaying Date in Desired Format – Using Shift on Positional Parameters – Arithmetic in Shell Script, Taking Decisions: if-then-fi Statement – if-then-else-fi Statement – The test Command – Nested if-else – Form of if – Use of Logical Operators – else - if Equals elif – The Case Control Structure.

UNIT - IV: SHELL PROGRAMMING - II

Loop Control Structure: Loops – The While Loop – Reading from a file – The Until and for Loop – Creating Nested Directories – Generating Values for a for Loop – The Break and Continue Statement- Shell script using Command Line Arguments.

UNIT - V: SYSTEM CALLS

System calls: Operational mode – Kernel mode – User mode. File Handling calls: open(), create(), open(), read(), write(), lseek(),close(). Directory Handling calls: mkdir(), rmdir(), chdir(), getcwd(), opendir(), readdir(), telldir(), seekdir(), rewiddir(), closedir(). Process related calls - exec(), fork(), wait(), exit(). Interrupted system calls – Error Handling: strerrorn – perror().

1. **Teaching Resources**
   i. Text
   1. YashavantKanetkar. Unix Shell Programming. New Delhi: BPB Publisher, 1996.
      Unit – I   **:** Ch. 1, 2, 3.
      Unit – II   **:** Ch. 4, 5, 6, 7, 8.
      Unit – III   **:** Ch. 9 - 10
      Unit – IV   **:** Ch. 11.
   2. BM. Harwani. Unix and Shell programming. OXFORD University press.
      Unit – V   **:** Ch. 7.1, 7.2.1- 7.2.6, 7.3, 7.4, 7.5, 7.8.

   ii. Reference
   1. Kernighan. et al. The UNIX Programming Environment. 2nd Edition. New Delhi: Prentice Hall of the India, 1988.

   iii. Web References
   (i) Online tutorials
   1. http://www.cgl.ucsf.edu/Outreach/bmi219/slides/shell.html
   2. http://www.cs.utk.edu/~huangj/cs360/360/notes/Syscall-Intro/lecture.html
   (ii) Online quiz
   1. www.tcyonline.com/tests/unix-and-shell-scripts
   (iii) Online compiler
   1. www.compileonline.com/execute_bash_online.php/

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS635

TITLE OF THE COURSE: CORE-PROGRAMMING USING PYTHON

OBJECTIVES:
- Develop basic understanding of the basics of Python programming language.
- Learn core Python scripting elements such as data types and flow control structures.
- Design simple applications using Python.

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Understand and apply Python's core data types while writing new programs.
CO2	Express different decision-making statements and functions
CO3	Understand and summarize the different file handling operations
CO4	Able to develop using function, modules and packages.
CO5	Access and work with Exception handling

Syllabus

Total Credits:3   **Instructional Hours:4**

UNIT - I: OVERVIEW
Introduction to Python: Features of Python - How to Run Python – Identifiers - Reserved Keywords - Variables - Comments in Python - Indentation in Python - Multi-Line Statements - Multiple Statement Group(suite) – Quotes in Python - Input, Output and Import Functions - Operators.

UNIT - II: DATA TYPES AND OPERATIONS
Data Types and Operations: Numbers- Strings - List- Tuples – Set- Dictionaries -Data type conversion.

UNIT - III: FLOW CONTROL
Flow Control: Decision Making- Selection Structures-Loops-Nested Loops-Types of Loops.

UNIT - IV: FUNCTIONS, MODULES AND PACKAGES
Functions: Function Definition-Function Calling - Function Arguments - Recursive Functions - Function with more than one return value- Modules and Packages: Built-in Modules - Creating Modules - import Statement - Locating Modules - Namespaces and Scope - The dir() function - The reload() function - Packages in Python - Date and Time Modules.

UNIT - V: FILE HANDLING AND EXCEPTION HANDLING

<mark>File Handling: Opening a File - Closing a File - Writing to a File – Reading from a File - File Methods - Renaming a File - Deleting a File</mark> - Directories in Python- Exception Handling: Built-in Exceptions - Handling Exceptions - Exception with Arguments- Raising Exception - User-defined Exception - Assertions in Python

3. Teaching Resources

    i. Text

1. Jeeva Jose and P. SojanLal, "Introduction to Computing and Problem Solving with Python", Khanna Book Publising Co. (P) Ltd., 2016.

    ii. References

1. ChSatyanarayana, M Radhika Mani & B N Jagadesh, "Python Programming",

    Universities Press, 2018.

iii. Web references

1. www.learnpython.org/
2. https://www.codecademy.com/learn/python
3. https://www.Codementor.io
4. https://www.Python.org

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS636

TITLE OF THE COURSE: CORE-MICROPROCESSOR USING 8086/88

OBJECTIVES:

- To Understand the basic architecture of the Microprocessor

- To learn the instruction sets of the processor

- To write applications using assembly level language program

- To study the input/output interfaces of the processor

- To understand the importance of interrupts in programming

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	Identify the types of instructions and the organization of registers and memory
CO2	Describe the translation model of assembly language to machine language.
CO3	Understand the micro-program by mapping the instructions.
CO4	Recognize the types of computer organizations.
CO5	Accept the better ways of Parallel and Vector processing.

Syllabus

Total Credits:4   **Instructional Hours:4**

UNIT - I: SOFTWARE ARCHITECTURE AND MACHINE CODING

Microcomputer : PC – Architecture – Microprocessor Evolution – micro architecture of the 8088/8086 - Software Model - Memory Address Space And Data Organization - Data Type - Segment Registers And Memory Segmentation - Dedicated And General Use Of Memory - Instruction Pointer - Data Registers - Pointer And Index Registers - Status Register - Generating A Memory Address - The Stack - I/O Address Space - Addressing Modes.

UNIT - II: MICROPROCESSOR PROGRAMMING - I

The Instruction Set Of 8086 - Data Transfer Instructions - Arithmetic Instructions - Logic Instructions - Shift Instructions - Rotate Instructions.

UNIT - III: MICROPROCESSOR PROGRAMMING - II

Flag Control Instructions - Compare Instructions - Control Flow and the Jump Instructions - Subroutines and Subroutine - Handling Instructions - The Loop and The Loop Handling Instructions - Strings And String - Handling Instructions.

UNIT - IV: I/O INTERFACE OF THE 8086 MICROPROCESSORS

8088 and 8086 Microprocessors – Minimum mode and Maximum mode systems – Minimum mode Interface Signals – Maximum mode Interface Signals –Memory Control Signals – Read and Write cycles.

UNIT - V: INTERRUPT INTERFACE OF THE 8086

Interrupt Mechanism, Types, and Priority – Interrupt Vector Table - Interrupts Instructions - Enabling/Disabling Of Interrupts - External Hardware Interrupt Interface -External Hardware Interrupt Sequence - 8259A Programmable Interrupt Controller -Software Interrupt - Non-Maskable Interrupt – Reset - Internal Interrupt Functions - DMA.

4. Teaching Resources

i. Text

3. Triebel. et al. The 8088 And 8086 Microprocessors Programming, Interfacing Software, Hardware And Applications. 4th Edition. New Delhi: Prentice Hall Of The India, 2011.

>   **Unit - I:** Ch. 1.1 – 1.2, 2.1-2.16
>
>   **Unit - II:** Ch. 4.1-4.7
>
>   **Unit - III:** Ch. 5.1-5.7
>
>   **Unit - IV:** Ch. 6.1-6.5, 6.11-6.12
>
>   **Unit - V:** Ch. 8.1-8.8&8.10-8.13

ii. Reference

7. John Uffenbeck, The 8086/8088 Family, Design, Programming And Interfacing. 7th Edition. New Delhi: Prentice Hall of India, 2000.

iii. Web Reference

(i) Online Tutorial

1. https://www.udemy.com/course/8086-microprocessor-architecture-in-one-video-in-easy-way/

2. https://www.geeksforgeeks.org/microprocessor-tutorials/

3. https://www.wisdomjobs.com/e-university/microprocessor-tutorial-2391.html

(ii) Online Quiz

5. https://gatetestseries.in/ec-ese-computer-engineering/8086-microprocessors/

6. https://www.goconqr.com/quiz/10973890/microprocessor-and-assembly-language-8085-8086

7. http://examradar.com/microprocessor-8086-mcqs-set-1/

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester

COURSE CODE:CS637A

TITLE OF THE COURSE: CORE-COMPUTER NETWORKS

OBJECTIVES:

- To learn the basic concepts of Computer Networks.

COURSE OUTCOMES

At the end of the Course the Students will be able to:

CO1	To explain how communication works in computer networks and to understand the basic terminology of computer networks
CO2	To explain the role of protocols in networking and to analyze the services and features of the various layers in the protocol stack.

Syllabus

Total Credits:4   **Instructional Hours:4**

UNIT – I: DATA COMMUNICATIONS
Introduction:Data Communications – Networks – Network Models: Layers in the OSI Model – Addressing. Transmission Media: Guided Media – Unguided Media.

UNIT – II: DATA LINK LAYER
Error Detection and Correction: Introduction – Block Coding – Linear Block Codes – Cyclic Codes: Cyclic Redundancy check – Checksum.Data Link Control: Framing – Flow and Error Control – Protocols – Noiseless Channels – Noisy Channels.

UNIT – III: NETWORK LAYER
Internet Protocol: Internetworking – IPv4 – IPv6 – Transition from IPv4 to IPv6 - Delivery, forwarding and Routing: Delivery- Forwarding.

UNIT – IV: TRANSPORT LAYER
Process–to–Process Delivery: User Datagram Protocol – TCP.Quality of service: Data Traffic – Congestion – Congestion Control – Quality of Service.

UNIT – V: APPLICATION LAYER
Domain Name System: Name Space – Domain Name Space – Distribution of Name Space – DNS in the Internet – Resolution – DNS Messages – Types of Records – Registrars –Dynamic Domain Name System – Encapsulation. Remote Logging – Electronic MailS – File Transfer.

3. Teaching Resources
   i. Text
   1. Behrouz A Forouzan, "Data Communication and Networking", 4th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi: 2008.
   ii. Reference
   1. Andrew S Tanenbaum," Computer Networks", 4th Edition, Pearson Education, New Delhi: 2003.

Checked by CDC: **Approved by:**

S.No	Assessment Methods	Frequency of Assessment
1	First CA	Once in a Semester
2	Second CA	Once in a Semester
3	Attendance	Once in a Semester
4	MCQ Test Using MOODLELMS	Once in a Semester
5	Assignment/Open Book Test /ProblemSolving	Twice in a Semester
6	OtherComponents (Seminars)	Once in a Semester