VIRUDHUNAGAR HINDU NADARS' SENTHIKUMARA NADAR COLLEGE
(An Autonomous Institution Affiliated to Madurai Kamaraj University)
Virudhunagar – 626 001.

Course Name : Bachelor of Computer Applications
Discipline   : Computer Applications
(Who those joined in the year June 2024 and after)
Course Objective:

To prepare the students to manage the software components in a computer independently and to be a programmer. To motivate the students to take up higher studies in Computer Applications and other streams.

1) **Eligibility for admission :**

Candidates should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu or any other Examinations accepted by the syndicate as equivalent thereto with Mathematics is one of the subjects.

2) **Duration of the Course :**

The students shall undergo the prescribed course of study for a period of three academic years. (Six Semesters)

<div align="center">

Programme – Bachelor of Computer Applications

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Programme Outcomes:

Undergraduate (B.C.A.,) is 3-year degree programme with 6 semesters consisting the following Programme Outcomes (POs) under various criteria including critical thinking, problem solving, effective communication, societal/ citizenship/ ethical credibility, sustainable growth and employable abilities.

PO 1 - Critical Thinking: Intellectual exploration of knowledge towards actions in clear and rational manner by understanding the logical connections between ideas and decisions.

PO 2 - Problem Solving: Understanding the task/ problem followed by planning and narrow execution strategy that effectively provides the solution.

PO 3 - Effective Communication: Knowledge dissemination by oral and verbal mechanisms to the various components of our society.

PO 4 - Societal/ Citizenship/ Ethical Credibility: Realization of various value systems/ moral dimensions and demonstrate the empathetic social concern as well as equity in all the decisions, executions and actions.

PO 5 - Environmental Concern and Sustainable Growth: Understanding the emerging environmental challenges and provide the possible contribution in sustainable development that integrates environment, economy and employment.

PO 6 - Skill Development and Employable Abilities: Adequate training in relevant skill sector and creating employable abilities among the under graduates.

Programme Specific Outcomes:

PSO1: Understand, analyse and develop computer programs in the areas related to algorithms, web design and mobile application design.

PSO2: Acquire the knowledge of the necessary technical, scientific as well as basic managerial and financial procedures to analyze and solve real world problems within their
Work domain.

PSO3: Apply standard software engineering process and strategies in software project development using open source programming environment to deliver a quality product for business success.

PSO4: Analyse and apply latest technologies to solve problems in the areas of computer applications.

PSO5: Develop practical skills to provide solutions to industry, society and business.

PSO6: Articulate the relevance of latest computing technologies in shaping the life.

PSO7: Get acquainted with latest trends in technological development and thereby innovate
new ideas and solutions to existing problems.

PSO8: Demonstrate advanced skills in the effective analysis design and realization of system
utilizing contemporary current technology.

COURSE SCHEME:

I year BCA

Semester	Part	Subject Name	Hours	Credit	Int + Ext =Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised / New / No Change / Interchanged & Percentage of Revision
I	Part 1	**Tamil**	6	3	25+75=100												**U24PT11**	**New**
	Part 2	English	6	3	25+75=100												U23PE11	No Change
	Core 1	**Programming in C**	4	4	25+75=100				✔							✔	**U24CAC11**	**NEW**
	Core 2	**Digital Principles and Computer Organization**	4	4	25+75=100			✔								✔	**U24CAC12**	**NEW**
	Core 3	**LAB: Programming in C**	4	2	40+60=100				✔					✔			**U24CACP11**	**NEW**
	Allied 1	Discrete Mathematics	4	3	25+75=100		✔									✔	**U24MAAA11**	**Title Change**
	SBE -1	**LAB: Multimedia**	2	2	40+60=100				✔					✔			**U24CASP11**	**NEW**
		Total	**30**	**21**														
II	Part 1	**Tamil**	6	3	25+75=100												**U24PT21**	**New**
	Part 2	English	6	3	25+75=100												U23PE21	No Change
	Core 4	**Object Oriented Programming in C++**	4	4	25+75=100				✔							✔	**U24CAC21**	**Title Change**
	Core 5	**LAB: Object Oriented Programming in C++**	4	2	40+60=100				✔							✔	**U24CACP21**	**Title Change**
	Core 6	**Web Design with HTML and CSS**	4	4	25+75=100				✔							✔	**U24CAC22**	**NEW**
	Allied 2	Optimization Techniques	4	3	25+75=100			✔								✔	U23MAAA21	No Change
	SBE - 2	**LAB: Web Design with HTML and CSS**	2	1	40+60=100				✔					✔			**U24CASP21**	**NEW**
		Total	**30**	**20**														

Year	Part	Subject	Credit	Int=Total	Code
I & II	Part V	NSS/ NCC/ Physical Education – Sports/YRC/RRC	3	100=100	U22NS4 / U22NC4 / U22PS4 / U22YR4 / U22RR4

TENTATIVE SYLLABUS STRUCTURE TABLE
SEMESTER III

Part	Course Title	Hours	Credit	Marks			Course Code	Focus on Employability/ Entrepreneurship/ Skill Development	Revised/ New/ No Change/ Interchanged. (If revised % of change)
				I	E	Total			
Part 1	Tamil	6	3	25	75	100			
Part 2	English	6	3	25	75	100			
Core 6	Java Programming	4	4	25	75	100			
Core 7	Data Structure	4	4	25	75	100			
Allied 2	Computer Based Financial Accounting	4	3	25	75	100			
Core 8	Java Programming Lab	4	2	40	60	100			
SBE - 3	Data Structures Lab	2	2	40	60	100			
SL	Value Education	-	3	25	75	100			
		30	24						

SEMESTER IV

Part	Course Title	Hours	Credit	Marks			Course Code	Focus on Employability/ Entrepreneurship/ Skill Development	Revised/ New/ No Change/ Interchanged. (If revised % of change)
				I	E	Total			
Part 1	Tamil	6	3	25	75	100			
Part 2	English	6	3	25	75	100			
Core 9	Relational Database Management System	4	4	25	75	100			
Core 10	Python Programming	4	4	25	75	100			
Core 11	Python Programming Lab	4	2	40	60	100			
Allied 4	Principles of Costing	4	3	25	75	100			
SBE - 4	Relational Database Management System Lab	2	2	40	60	100			
SL	Environmental Studies	-	2	25	75	100			
		30	23						

SLC* - Self Learning Course

SEMESTER V

Part	Course Title	Hours	Credit	Marks			Course Code	Focus on Employability/ Entrepreneurship/ Skill Development	Revised/ New/ No Change/ Interchanged. (If revised % of change)
				I	E	Total			
Core 12	Operating System	4	4	25	75	100			
Core 13	Data Communications and Networks	4	4	25	75	100			
Core 14	Mobile Application Development Lab	5	3	40	60	100			
Core 15	Web Technology Lab	4	2	40	60	100			
Elective 1	Software Engineering / Mobile Application Development / Mobile Computing	5	5	25	75	100			
Elective 2	Web Technology / Data Mining / TCP/IP	5	5	25	75	100			
NME	Basics of Computer	2	2	25	75	100			
SBE - 5	Employability Skills	1	1		100	100			
		30	26						

SEMESTER VI

Part	Course Title	Hours	Credit	Marks			Course Code	Focus on Employability/ Entrepreneurship/ Skill Development	Revised/ New/ No Change/ Interchanged. (If revised % of change)
				I	E	Total			
Core 16	Software Testing	4	3	25	75	100			
Core 17	Cryptography	4	3	25	75	100			
Core 18	Dot Net Programming Lab	4	2	40	60	100			
Core 19	Software Testing Lab	4	2	40	60	100			
Elective 3	Embedded Systems / Computer Algorithms / Cloud Computing	5	5	25	75	100			
SBE - 6	Internet of Things	2	2	25	75	100			
NME	Internet and Web Technology	2	2	25	75	100			
Project	Project	5	4	40	60	100			
		30	23						

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SEMESTER – I
Core 1: PROGRAMMING IN C

Course Title : Programming in C	Total Hours : 60 Hours
Course Code : U24CAC11	Total Credits : 4

Course Outcomes:

COs	CO Statement
CO1	Describe the basic structure of C Program.
CO2	Understand the fundamentals of C Programming.
CO3	Develop an in-depth understanding of functional and logical concepts of C Programming.
CO4	Implement basic operations on arrays, functions, pointers, structures, unions and files.
CO5	Provide an exposure to problem-solving through C Programming.

Unit I   **12 Hours**
Overview of C - History of C; Importance of C; Basic Structure of C Programs; Programming Style; Executing A 'C' Program.
Constants, Variables and Data types - Introduction; Character set; C Tokens; Keywords and Identifiers; Constants; Variables; Data types; Declaration of Variables, Declaration of Storage class; Assigning values to variables; Defining Symbolic Constants; Declaring a Variable as Constant; Declaring a variable as Volatile.
Operators and Expressions – Introduction; Arithmetic Operators; Relational Operators; Logical Operators; Assignment Operators; Increment and Decrement Operators; Conditional Operator; Bitwise Operators; Special Operators; Arithmetic Expression; Evaluation of Expressions; Precedence of Arithmetic Operators; Some Computational Problems; Type Conversions in Expressions; Operator Precedence and Associativity.

Unit II   **12 Hours**
Managing Input and Output Operations – Introduction; Reading a Character; Writing a Character; Formatted Input; Formatted Output.
Decision Making and Branching – Introduction - Decision Making with if statement; Simple if Statement; The if ... Else Statement; Nesting of if...Else statement; 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   **12 Hours**
Array – Introduction; One-Dimensional arrays; Declaration of One-Dimensional Arrays; Initialization of One-Dimensional Arrays; Two-Dimensional Arrays; Initializing Two-Dimensional Arrays; Multi-Dimensional Arrays; Dynamic Arrays; More about Arrays.
Character Arrays and Strings – Introduction; Declaring and Initializing String Variables; Reading Strings from Terminal; Writing Strings to Screen; Arithmetic Operations on Characters; Putting Strings Together; Comparison of Two Strings; String-Handling Functions; Table of Strings; Other Features of Strings.

Unit IV   **12 Hours**
User defined functions – Introduction; Need for User-Defined Functions; A Multi-Function Program; Elements of User Defined Functions; Definition of Functions; Return Values and

Their Types; Function Calls; Function Declaration; Category of Functions; No Arguments and no Return Values; Arguments but no Return Values; Arguments with Return Values; No Arguments but Returns a Value; Nesting of Functions; Recursion.

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; Arrays within Structures**;** Structures within structures**;** Structures and Functions; Unions; Size of Structures.

Unit V   **12 Hours**

Pointers – Introduction; Understanding Pointers; Accessing the Address of a Variable; Declaring Pointer Variables; Initialization of Pointer Variables; Accessing a Variable Through its Pointer; Chain of Pointers; Pointer Expressions; Pointer Increment and Scale Factors; Pointers and Arrays; Pointers and Character Strings; Array of Pointers; Functions that Return Multiple Values; Pointers as Function Arguments.

File Management in C – Introduction; Defining and Opening a File; Closing a File; Input/output Operations on Files; Error Handling During I/O Operations; Random Access to Files; Command Line Arguments.

Text Book :

1. E.Balagurusamy, "Programming in ANSI C", McGraw Hill Education India Pvt. Ltd., Eighth Edition,2019.

Unit I	Chapter 2 (17-19), (28-31) Chapters 3, 4
Unit II	Chapters 5, 6, 7
Unit III	Chapters 8, 9
Unit IV	Chapter 10 (291-315), Chapter 11 (347- 366)
Unit V	Chapter 12 (381-403), Chapter 13

Reference Books :

1. Yaswant Kanetkar, "Let usC", BPB Publications, 10th Edition, 2010.
2. Gottfried, "Programmingwith C (Schaum"soutlineseries)", TataMcGraw Hill, 2006

e- Resources :

1. https://www.programiz.com/c-programming
2. https://www.freecodecamp.org/news/what-is-the-c-programming-language-beginner-tutorial/
3. https://nptel.ac.in/courses/106/104/106104128/
4. https://www.digimat.in/nptel/courses/video/106104128/L01.html
5. https://youtu.be/KJgsSFOSQv0

Core 2: Digital Principles and Computer Organization

Course Title: Digital Principles and Computer Organization	Total Hours : 60
Course Code : U24CAC12	Total Credits : 4

Course Outcomes:

COs	CO Statement
CO1	To obtain basic idea about logic gates.
CO2	To obtain knowledge arithmetic and combinational circuits.
CO3	To have a thorough understanding of the basic structure and operation of a digital computer.
CO4	To study the different ways of communicating with I/O devices and standard I/O interfaces.
CO5	To study the hierarchical memory system including cache memories and virtual memory.

Unit I   **12 Hours**
Digital Logic - The Basic gates-NOT, OR, AND; Universal Logic gates - NOR, NAND.
Combinational Logic Circuits - Boolean Laws and Theorems; Sum-of-Products method; Truth table to Karnaugh Map; Pairs, Quads and Octets; Karnaugh Simplifications; Don't care Conditions; Product-of-sums Method; Product-of-sums simplification.

Unit II   **12 Hours**
Number Systems and Codes - Binary Number system; Binary-to-decimal Conversion; Decimal-to-Binary Conversion; Octal Numbers; Hexadecimal Numbers; The ASCII Code; The Excess-3 code.
Arithmetic Circuits - Binary Addition; Binary Subtraction; 2'S complement representation; Arithmetic Building Blocks.

Unit III   **12 Hours**
Flip-Flops - RS FLIP-FLOPs; Gated FLIP-FLOPs; Edge-triggered JK FLIP-FLOPs; JK Master-Slave FLIP-FLOPs.
Registers - Types of registers; Serial In-serial Out; Serial In-parallel Out.

Unit IV   **12 Hours**
Basic structure of Computers - Computer types; Functional units; Basic operational concepts; Bus Structures; Software; Historical Perspective.
Machine Instructions and Programs - Memory Locations and Addresses; Memory operations; Instructions and Instructions Sequencing; Addressing modes; Assembly Language; Basic Input/Output Operations.
Input/Output organization - Accessing I/O devices; Interrupts; Direct Memory Access; Buses; Interface Circuits.

Unit V   **12 Hours**
The Memory System - Some Basic Concepts; Semiconductor RAM Memories; Read-Only Memories; Cache Memories; Virtual Memories; Secondary Storage.
Basic Processing Unit – Some Fundamental concepts; Hardwired Control; Microprogrammed Control.
Pipelining – Basic Concepts; Data Hazards; Instructional Hazards.

Text Books :

1. Donald P Leach, Albert Paul Malvino, GoutamSaha, "Digital Principles and Applications", McGraw Hill Education Pvt. Ltd, 7th Edition, 2013.

Unit I	Chapter 2 (2.1, 2.2)
	Chapter 3 (3.1 to 3.8)
Unit II	Chapter 5(5.1 to 5.7)
	Chapter 6(6.1, 6.2, 6.5, 6.7)
Unit III	Chapter 8(8.1, 8.2, 8.5, 8.8)
	Chapter 9(9.1 – 9.3)

2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", McGraw-Hill Higher Education, Fifth Edition, 2012.

Unit IV	Chapter 1(1.1 - 1.5, 1.8)
	Chapter 2(2.2 - 2.7)
	Chapter 4(4.1, 4.2, 4.4, 4.5, 4.6)
Unit V	Chapter 5(5.1 - 5.3, 5.5, 5.7, 5.9)
	Chapter 7(7.1, 7.4, 7.5)
	Chapter 8(8.1 – 8.3)

Reference Books :

1. M.Morris Mano, "Digital Logic and Computer Design", Pearson Prentice Hall, Thirteenth Impression, 2011.
2. S.Salivaganan, S.Arivalagan, "Digital Circuits and Design", Vikas Publishing House Pvt. Ltd., Third Edition, 2007.
3. M.Morris Mano, "Computer System Architecture", Pearson Prentice Hall, Third Edition, 2006.

e– Resources:

1. https://www.youtube.com/watch?v=3zvINQUdUns&t=124s
2. https://www.tutorialspoint.com/digital_circuits/digital_circuits_logic_gates.htm
3. https://docs.google.com/file/d/0B8-drkZsESDnN2NmYTQxYjQtYTMwZi00N2IzLTkxNjgtZjI1NTZiN2FjNDli/edit?resourcekey=0-Yk8bAsCt9I5epBNFTG8KMQ
4. https://www.javatpoint.com/computer-organization-and-architecture-tutorial
5. https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/
6. https://nptel.ac.in/courses/106/106/106106092/

Core 3

Course Title : LAB: Programming in C	Total Hours : 60 Hours
Course Code : U24CACP11	Total Credits : 2

Course Outcomes:

COs	CO Statement
CO1	Develop programming skills using the fundamentals and basics of C Language.
CO2	Develop programs using the basic elements like control statements, Arrays and Strings
CO3	Enable effective usage of arrays, structures, functions and pointers.
CO4	Implement files and command line arguments.
CO5	Able to solve real-world problems through C Programming.

1. Program to use if else statement.
2. Program to use if else if statement.
3. Program to illustrate the use of Else-If Ladder.
4. Program to illustrate the use of Switch Case.
5. Program to use while statement.
6. Program to use do while statement.
7. Program to use for statement.
8. Program to use single dimensional array.
9. Program to use two dimensional arrays.
10. Program to implement User Defined Functions.
11. Program to implement User Defined Functions that returns multiple values.
12. Program to use Recursive function.
13. Program to perform string manipulations using built-in string functions.
14. Program to perform string operations without using built-in functions.
15. Program to demonstrate pointers.
16. Program to demonstrate structures.
17. Program to implement command line arguments.
18. Program to demonstrate Files.

Allied 1: Discrete Mathematics

Course Title: Discrete Mathematics	Total Hours: 60 Hours
Course Code: U24MAAA11	Total Credits:3

Course Outcomes:

COs	CO Statement
CO1	Understand sets and perform operations and algebra on sets
CO2	Determine the Properties of Relations, Equivalence Relation, Properties of Relations Matrix and Graph Representation of Relations
CO3	Analyse logical propositions via truth tables.
CO4	Perform the Matrix Operations and Rank of a Matrix
CO5	Able to define the basic concepts of Graphs, Directed graphs and Weighted Graphs

Unit I   **12 Hours**
Set Theory - Introduction – Sets – Notation and Description of sets – Subsets - Venn – Euler Diagrams – Operations on sets – Properties of set operations – Verification of basic laws and algebra by Venn diagram.

Unit II   **12 Hours**
Relations - Relations – Representation of a relation - Operations on relations – equivalence relation – Closures and Warshalls Algorithm.

Unit III   **12 Hours**
Logic - Introduction – IF statements – Connectives – Truth table of a formula – Tautology – Tautological implications and Equivalence of formulae.

Unit IV	**12 Hours**

Matrix Algebra **-** Introduction – Matrix Operations – Inverse of a Square Matrix – Elementary Operations and Rank of a Matrix (For all the theorems, consider statement only - Solved examples only)

Unit V	**12 Hours**

Graph Theory - Basic concepts – Matrix representations of graphs –shortest path problem. (For all the theorems, consider statement only)

Text Book :

M Venkataraman, N. Sridharan and N. Chandrasekaran, "Discrete Mathematics", The National Publishing Company, May 2009.

Unit 1	Chapter 1 (1.1 - 1.8)
Unit II	Chapter 2(2.2 - 2.6)
Unit III	Chapter 9 (9.1 - 9.3, 9.6 - 9.8)
Unit IV	Chapter 6 (6.1 - 6.4)
Unit V	Chapter 11 11.1 (P.No: 11.1 – 11.9) 11.2 (P.No: 11.34 – 11.42 & 11.47 – 11.51) 11.4 (P.No: 11.69 – 11.71) 11.5 (P.No: 11.79 – 11.80

Reference Book :
1. Kenneth H.Rosen, "Discrete Mathematics and its Applications"

e – Resources :
1. https://notendur.hi.is/mbh6/html/_downloads/Discrete%20Mathematics%20and%20Its%20Applications%20-%20Kenneth%20Rosen%20(2012).pdf
2. https://home.iitk.ac.in/~arlal/book/mth202.pdf
3. https://nptel.ac.in/courses/106/106/106106183/
4. https://youtu.be/wRMC-ttjhwM
5. https://youtu.be/2spTnAiQg4M

SBE 1: LAB: Multimedia

Course Title : LAB: Multimedia	**Total Hours: 30 Hours**
Course Code : U24CASP11	**Total Credits: 2**

Course Outcomes:

COs	CO Statement
CO1	To increase the ability to edit and add special features to the images.
CO2	To increase the ability to create flash movie.
CO3	To design various applications such as cards, invitations, certificates etc.
CO4	To use various tools and Filters effectively.

List of Programmes:

Photoshop:
1. Merge more than one image into a single file.
2. Design a visiting card.
3. Implement Flaming Hot Fire Text.
4. Implement Rain effect.
5. Using Photoshop to change the color of an image.
6. Implement Ripple effect.
7. Create a water drop effect
8. Implement Blinking effect.
9. Create Out of Bound effect.
10. Place an image into a text.

Flash:
11. Create a text animation.
12. Create a picture animation.
13. Create an animation to indicate a ball bouncing on steps.
14. Implement Masking Concept.
15. Shape Tweening.
16. Animate a Globe.
17. Create an animation using Guide Layer.
18. Procedure to implement moving ball using mouse drag (Action Script).

Open Shot Video Editor:
19. Program to illustrate the use of multiple tracks.
20. Program to illustrate the use of Razor tools.
21. Program to add effects to the videos.
22. Program to add Transitions to the videos.
23. Program to create a video by using images.
24. Program to add text and logo watermark.

e-Resources :
1. https://www.eecis.udel.edu/~yarringt/103/labs/PhotoshopLab3
2. https://www.studocu.com/row/document/king-khalid-university/data-base-management-system/multimedia-laboratory-manual/34052788
3. https://cdn.openshot.org/static/files/user-guide/OpenShotVideoEditor.pdf

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SEMESTER - II

Core 4: Object Oriented Programming in C++

Course Title : Object Oriented Programming in C++	Total Hours :60 Hours
Course Code : U24CAC21	Total Credits : 4

Course Outcomes:

COs	CO Statement
CO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
CO2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc.

CO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
CO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
CO5	Demonstrate the use of various OOPs concepts with the help of programs

Unit I   **12 Hours**

Principles of Object-Oriented Programming: Software Evolution – A Look at Procedure-Oriented Programming – Object-Oriented Paradigm – Basic Concepts of Object-Oriented Programming – Benefits of OOP – Applications of OOP.

Beginning with C++: C++ - A Simple C++ Program – More C++ Statements – Structure of C++ Program.

Unit II   **12 Hours**

Tokens, Expressions and Control Structures: Tokens – Keywords – Identifiers and Constants – Basic Data Types – User-Defined Data Types – Storage Classes – Derived Data Types - Symbolic Constants – Type Compatibility – Declaration of Variables – Dynamic Initialization of Variables – Reference Variables – Operators in C++ - Scope Resolution Operator – Member Dereferencing Operators – Memory Management Operators – Manipulators – Type Cast Operator – Expressions and their Types – Special Assignment Expressions – Implicit Conversions – Operator Precedence – Control Structures.

Functions in C++: Introduction – The Main Function – Function Prototyping – Call by Reference – Return by Reference - Inline Functions – Default Arguments – Const Arguments – Recursion – Function Overloading – Math Library Functions.

Unit III   **12 Hours**

Classes and Objects: C Structures Revisited – Specifying a Class – Defining Member Functions – C++ Program with Class – Making an Outside Function Inline – Private Member Functions – Arrays within a Class – Memory Allocation for Objects – Static Data Members – Static Member Functions – Arrays of Objects – Objects as Function Arguments – Friendly Functions – Returning Objects.

Constructors and Destructors: Introduction – Constructors – Parameterized Constructors – Multiple Constructors in a Class – Constructors with Default Arguments – Copy Constructor – Destructor.

Unit IV   **12 Hours**

Operator Overloading and Type Conversions: Introduction – Defining Operator Overloading – Overloading Unary Operators – Overloading Binary Operators – Overloading Binary Operators using Friends – Rules for Overloading Operators.

Inheritance: Extending Classes: Introduction – Defining Derived Classes – Single Inheritance – Making a Private Member Inheritable – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract Classes – Constructors in Derived Classes.

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Unit V	12 Hours

Pointers, Virtual Functions and Polymorphism: Introduction – Pointers – Pointers to Objects – this Pointer – Polymorphism – Pointers to Derived Classes – Virtual Functions – Pure Virtual Functions.

Managing Console I/O Operations: Introduction – C++ Streams – C++ Stream Classes – Unformatted I/O Operations – Formatted Console I/O Operations.

Working with Files: Introduction – Classes for File Stream Operations – Opening and Closing a File.

Text Book:

E. Balagurusamy, "Object-Oriented Programming with C++", TMH 2013, 7th Edition.

Unit I – Chapter 1 (1.2 to 1.6,1.8), Chapter 2 (2.1,2.3,2.4,2.6)

Unit II - Chapter 3 (3.2 to 3.22,3.24,3.25) Chapter 4 (4.1 to 4.10, 4.12)

Unit III – Chapter 5 (5.2 to 5.6,5.8 to 5.16) Chapter 6 (6.1 to 6.5, 6.7,6.11)

Unit IV – Chapter 7 (7.1 to 7.5,7.8) Chapter 8 (8.1 to 8.11)

Unit V – Chapter 9 (9.1 to 9.8) Chapter 10 (10.1 to 10.5) Chapter 11(11.1 to 11.3)

Reference Book:

1. Ashok N Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003.
2. Maria Litvin& Gray Litvin, "C++ for you", Vikas publication 2002.

e- Resources :

* https://alison.com/course/introduction-to-c-plus-plus-programming

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Core 5: LAB: Object Oriented Programming in C++

Course Title : LAB: Object Oriented Programming in C++	Total Hours : 60 Hours
Course Code : U24CACP21	Total Credits : 2

Course Outcomes:

CO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
CO2	Understand dynamic memory management techniques using pointers, constructors, destructors, etc
CO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
CO4	Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
CO5	Demonstrate the use of various OOPs concepts with the help of programs

1. Write a C++ program to demonstrate I/O statements.
2. Write a C++ program to demonstrate conditional statements.
3. Write a C++ program to implementation of functions.
4. Write a C++ program to implementation of function overloading.
5. Write a C++ program to demonstrate classes and objects.

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6. Write a C++ program to demonstrate friendly functions.
7. Write a C++ program to demonstrate constructor.
8. Write a C++ program to demonstrate destructor.
9. Write a C++ program to demonstrate Unary Operator Overloading.
10. Write a C++ program to demonstrate Binary Operator Overloading.
11. Write a C++ program to demonstrate:
    - Single Inheritance
    - Multilevel Inheritance
    - Multiple Inheritance
    - Hierarchical Inheritance
    - Hybrid Inheritance
12. Write a C++ program to demonstrate pointers.
13. Write a C++ program to implementation of files.

e- Resources :
- https://alison.com/course/introduction-to-c-plus-plus-programming

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Core 6: Web Design with HTML and CSS

Course Title :Web Design with HTML and CSS	Total Hours : 60 Hours
Course Code : U24CAC22	Total Credits : 4

Course Outcomes:

COs	CO Statement
CO1	Provide fundamental knowledge and expose to the concepts of website.
CO2	Describe the various tags used for web page development.
CO3	Understand the basic layout used in web pages.
CO4	Familiarize the various types of CSS styles used to styling the website.
CO5	Understand the process involving to developing a website.

Unit I   **12 Hours**
Structure – Understanding structure; Learning about markup; Tags and elements.
Text – Headings and paragraphs; Bold, italic, emphasis; Structural and semantic markup.
Lists – Numbered lists; Bullet lists; Definition lists.

Unit II   **12 Hours**
Images – How to add images to pages; Choosing the right format; Optimizing images for the web.
Tables – How to create tables; What information suits tables; How to represent complex data in tables.
Links – Creating links between pages; Linking to other sites; Email Links.

Unit III   **12 Hours**
Forms – How to collect information from visitors; Different kinds of form controls; New HTML5 form controls.
Introducing CSS – What CSS does; How CSS works; Rules, properties, and values
Text – Size and typeface of text; Bold, italics, capitals, underlines; Spacing between lines, words, and letters.

Unit IV	12 Hours

Color – How to specify colors; color terminology and contrast; Background color.

Extra Markup – Specifying different versions of HTML; Identifying and grouping elements; Comments, meta information and iframes

Unit V	12 Hours

Boxes – Controlling size of boxes; Box model for borders, margin and padding; Displaying and hiding boxes.

Flash, Video & Audio – How to add video and audio to your site; HTML5 <video> and <audio> elements.

Text Book :
1. Jon Duckett, "HTML & CSS design and build websites", John Wiley & Sons Inc,
   Unit I   1, 2, 3
   Unit II   5, 6, 4
   Unit III 7,10,12
   Unit IV   11, 8
   Unit V   13,9

Reference Books :
1. Elizabeth Castro, Bruce Hyslop, "HTML5 and CSS3", Peachpit Press.
2. Patrick Carey, "New Perspectives on HTML5 and CSS3", Cengage Learning, Seventh Edition.

e- Resources :
1.https://www.htmlandcssbook.com/code-samples/
2. https://www.htmlandcssbook.com/extras/
3.https://www.htmlandcssbook.com/extras/table-styles/
4. https://html.com/
5. https://www.w3schools.com/css/
6. https://www.w3schools.com/html/

Allied 2: OPTIMIZATION TECHNIQUES

Course Title: Optimization Techniques	Total Hours: 60 Hours
Course Code: U23MAAA21	Total Credits:3

Course Outcomes:

COs	CO Statement
CO1	Understand scopes and Modelling of OR
CO2	Determine the standard and canonical form of LPP
CO3	To enrich the knowledge of solving Assignment Problem
CO4	Perform the Transportation problem and find the cost
CO5	To solve the matrix in Game Theory

Unit I	12 Hours

Origin and development of OR –Nature and Features of OR- Modelling in OR – Scope of OR in decision making – Linear programming problems – Mathematical formulation of L.P.P – Graphical solution of L.P.P. (Solved Examples only)

Unit II   **12 Hours**

Canonical form-Standard form - Simplex methods (Solved Examples only)

Unit III   **12 Hours**

Mathematical formulation of assignment problem – Hungarian method for solving the assignment problem – Travelling salesmen problem. (Solved Examples only)

Unit IV   **12 Hours**

Mathematical formulation of Transportation problem – Methods for finding initial feasible solution (North – West Corner Rule, least cost method and Vogel's approximation method) – Optimal solution (Modi Method) – Unbalanced T.P. (Solved Examples only) (For all the theorems consider the statements without proofs)

Unit V   **12 Hours**

Two persons zero sum game – game with and without saddle point – Solution of 2 x 2 game – dominance – graphical method. (Solved Examples only) (For all the theorems consider the statements without proofs)

Text Books:
1. Dr.S.Arumugam and Mr.A.Thangapandi Isaac, "Topics in Operations Research Linear Programming", New Gamma publishing house,2015.
2. Kanti Swarup, P.K. Gupta and Manmohan, "Operations Research", Sultan Chand and Sons, 13th Edition, 2008.

Unit – 1	(Text Book 2) Chapter 1 Section 1.2, 1.4, 1.5, 1.6 (Text Book 1) Chapter 3 (P.No 3.0-3.7 and 3.64-3.77)

Unit – II	(Text Book 1)
	 (TextBook 1) Chapter 3(P.No 3.33-3.39 Problem 1 – 4)
	          P.No(3.86-3.102 Problem 1 – 4),
	          P.No(3.107-3.111) (Problem 7,8)

Unit – III	(Text Book 1) Chapter 5 (P.No 5.1-5.33)
Unit – IV	(Text Book 1) Chapter 4 (P.No 4.1-4.66)
Unit – V	(Text Book 2) Chapter 17 Section 17.1 – 17.7

Reference Book :
1. Operations Research – S.D. Sharma. KedarNathRamNath and Co, Pearson Publications, 2005.

e – Resources :
1. https://www.bbau.ac.in/dept/UIET/EMER-601%20Operation%20Research%20Queuing%20theory.pdf
2. https://ncert.nic.in/ncerts/l/lemh206.pdf
3. https://egyankosh.ac.in/bitstream/123456789/20790/1/Unit-5.pdf
4. http://www.nitjsr.ac.in/course_assignment/CA02CA3103%20RMTTransportation%20Problem.pdf
5. https://www.maa.org/sites/default/files/pdf/ebooks/GTE_sample.pdf

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Syllabus for those who joined in 2024 – 2025 and afterwards   I – B.C.A.

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SBE 2: LAB: Web Design with HTML and CSS

Course Title: Lab: Web Design with HTML and CSS	Total Hours :30 Hours
Course Code : U24CASP21	Total Credits : 1

Course Outcomes:

COs	CO Statement
CO1	Understand the important HTML tags for designing static pages and seperate design from content using Cascading Style sheet.
CO2	Design and develop web pages using CSS styles, internal and/or external style sheets.
CO3	Develop interactive web pages using Tables and Forms.
CO4	Implement different types of Layouts in developing a web page.
CO5	Able to create a website using HTML & CSS.

1. Create a simple webpage using basic tags.
2. Create a simple webpage using paragraphs and headings tags.
3. Create a simple webpage using lists tags.
4. Create a simple webpage using images.
5. Create a simple webpage using tables.
6. Create a simple webpage using forms
7. Create a simple webpage using hyperlinks.
8. Create a simple webpage using different CSS
9. Create a simple webpage using video and audio
10. Create a simple website on your own using any HTML tags.

e – Resources :

- https://www.w3schools.com/html/
- https://www.tutorialspoint.com/html/index.htm
- https://html.com/

Syllabus for those who joined in 2024 – 2025 and afterwards   I – B.C.A.

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