



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Computer Application

Choice Based Credit System (CBCS) in the light of NEP-2020

B.Sc. (Computer Science)

SEMESTER-II (2026-29)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCCA103M	Minor -2	PC Software	Max	60	20	20	30	20	3	0	2	4
			Min	24	16		13.5	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To provide the knowledge of using different software packages including word processor, electronic spreadsheet, presentation s/w
2. To develop an understanding of database management system.
3. To explain how to integrate the data stored in word processor, spreadsheet etc.
4. To develop presentation skills using these software.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** To create word documents and to format them using various tools available
- CO2** To create tables and manipulate them, To use mail merge, labels
- CO3** Creating spreadsheet for storing and managing data using functions Format, print spreadsheet
- CO4** Create power point presentation for different purposes using objects, animation
- CO5** To store and manipulate data stored in databases.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

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ASSESSMENT TOOLS:

ATL1	Quiz
ATL2	Activity Based Learning
ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Word Processor: Introduction, Word Processing, Advantages of word processing, Creating, Saving and editing a document: Selecting, Deleting, Replacing Text, Copying text to another file. Formatting Text and Paragraph: Using the Font Dialog Box, Paragraph Formatting using Bullets and Numbering in Paragraphs, Line spacing, Margins.	12	ATL3 ATL6
II	Creating and Formatting Tables: Changing Row height, inserting columns, merging cells Calculations in a Table, Sorting Text, Toolbar using word art, Mail merge: Definition, a Practical Example of mail merge, creating charts. Defining Tabs: Tabs Dialog Box, Enhancing a Document: Inserting page Breaks, Adding Border, Using Header and Footers in the Document.	12	ATL3 ATL6
III	Spreadsheet: Introduction, Definition. Screen parts of worksheet, Entering	12	ATL3

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	information: Numbers, Formula, Editing Data in a cell, Using a Range with SUM, Moving and copying data, Inserting and Deleting Row and Columns in the worksheet, Using the format cells Dialog box.		ATL6
IV	Protecting a workbook with Password, Macro: Recording and Running a Macro, Linking workbook files Using Pivot table, Inserting Hyper links, Using chart wizard to create a chart, Naming ranges, classification of Functions.	12	ATL3 ATL6
V	Presentation : Introduction, Slide show, Formatting, Creating a Presentation, Inserting clip Arts, Adding Objects, Applying Transitions, Animation effects, formatting and checking text, Modifying Visual elements, Preparing a complete presentation, Case studies.	12	ATL3 ATL6
Total Hours		60	

ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

<https://www.redhat.com/en/services/training/rh124-red-hat-system-administration-i>

B. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. Taxali R. K. "PC Software for Windows 98, Made Simple" TMH.
2. Saxena Sanjay, "MS Office 2000 "Vikas Publication House PVT LTD.
3. Busbby M. and Stultz R.A. "Microsoft Office 2000", BPB.
4. Jain S., Geetha M. and Kratika, "Microsoft Office-2007", BPB

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Suggested e- resources (Websites/e- books)

1. Microsoft Office – Complete Reference – BPB Publication.

LIST OF PRACTICAL

	Title	CO Mapping
1.	To open and practice of OS – Folder related operations, My-Computer, window explorer, Control Panel,	CO4
2.	To create, save and editing of Text files using word processor.	CO4
3.	Formatting and printing of document (setting of margins, size, orientation, different breaks etc. Checking of spelling and use of thesaurus)	CO4
4.	Creating, inserting tables, header, footers, hyperlink, different objects in a document	CO4
5.	Use of Charts in Word Processor.	CO4
6.	Creating and manipulating spreadsheets. To create, save and editing of spreadsheets. Use of cell	CO4
7.	Creating a mail merged documents, labels references, sorting and filtering data in a spreadsheet, using formulae	CO4
8.	Formatting and printing of spreadsheets (setting of margins, size,	CO4

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	orientation, different breaks etc. What if analysis, mail merging	
9.	Creating header, footers, hyperlink, different objects in a spreadsheet	CO5
10.	Creation, editing and formatting presentation slides. Creating different types of graphs and printing	CO5

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	3	-	-	-	-	-	3	-	1	2	-			
CO2	1	3	1	-	-	-	-	2	-	1	2	-			
CO3	2	3	2	1	-	-	-	1	-	-	2	-			
CO4	-	3	-	1	-	-	-	3	1	-	2	-			
CO5	3	2	2	1	3	-	-	-	-	1	2	1			

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BCA (No Branch)

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCCA204	Major -3	Data Structures	Max	60	20	20	0	0	3	1	0	4
			Min	24	16		0	0				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. To understand the students with the applications of Standard data structure in real world problems.
2. To provide knowledge of creation of new data structures.
3. To familiarize the students with the analysis and design a particular problem.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Demonstrate familiarity with major algorithms and data structures.
- CO2** Analyse performance of algorithms.
- CO3** Choose the appropriate data structure and algorithm design method for a specified application..
- CO4** Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs.
- CO5** Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1** Quiz
- ATL2** Activity Based Learning

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				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCCA204	Major -3	Data Structures	Max	60	20	20	0	0	3	1	0	4
			Min	24	16		0	0				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	The Concept of Data Structure, Abstract Data Type, Concept of List and Array, Introduction to Stack, Stack as an Abstract Data Type, Primitive Operations on Stack, Stack's Applications - polish notations Infix, Postfix, Prefix and Recursion. Introduction to Queues, Primitive operations on Queues, Queue as an Abstract Data Type, Circular Queue, Dequeue, Priority Queue, Applications of Queue.	8	ATL3 ATL6
II	Linked List - Introduction to Linked List, Memory Representations of Linked List, comparison; Operations on Linked List, Linked Representation of Stack and Queue, Header Nodes. Types of Linked List : Doubly Linked List, Circular Linked List, Application of Linked List, Self Referential Structures.	8	ATL3 ATL6
III	Trees: Definition, Basic Terminology of Trees, Tree Representations as Array and Linked. Binary Trees, Binary Tree Operations. Traversal of Binary Trees – In order, Preorder & Post order, Complete Binary Tree, almost complete binary tree; Application of Binary Tree.	8	ATL3 ATL6
IV	Complexity: concept and notations. Searching: Sequential, Binary and their comparison. Sorting - External and Internal Sorting, Insertion Sort, Selection	8	ATL3

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BCCA204	Major -3	Data Structures	Max	60	20	20	0	0	3	1	0	4
			Min	24	16		0	0				

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	Sort, Quick Sort, Bubble Sort, Heap Sort, Comparison of Sorting Methods. Hashing;		ATL6
V	Graphs - Introduction to Graphs, Basic Terminology, Directed, Undirected and Weighted graph, Representation of Graphs, Graph Traversals - Depth First and Breadth First Search. Applications of Graphs.	8	ATL3 ATL6
Total Hours		30	

ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

<https://www.redhat.com/en/services/training/rh124-red-hat-system-administration-i>

B. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. Kruse R.L. Data Structures and Program Design in C; PHI
2. Aho, "Data Structure & Algorithms".
3. Trembly and SORRENSON, "Introduction to Data Structure with Applications".
4. Tennenbaum A.M. & others, "Data Structures using C & C++"; PHI
5. Horowitz & Sahney, "Fundamentals of Data Structures", Galgotia Publishers.

Suggested e- resources (Websites/e- books)

1. Yashwant Kanetkar, "Understanding Pointers in C", BPB.
2. Lipschultz, "Data Structure", (Schaum's Outline Series, McGraw Hill publication)
3. Ellis Horowitz and Sartaj Sahney, "Fundamentals of Computer Algorithm"

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			Min	24	16		0	0				

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Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1							1				
CO2	3	2	3	2							1				
CO3	3	2	3	2			1				1	-			
CO4	3	2	2	1							1	-			
CO5	3	2	3	2							1	-			

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BCCA205	Major -2	Object oriented Methodology and C++	Max	60	20	20	0	0	3	1	0	4
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COURSE OBJECTIVES:

The student will have ability to:

1. To familiarize the students with programming and to encourage them to develop their logic.
2. To make students well versed with C++ language to solve problems efficiently.
3. Using simple and well-drawn illustrations develop their programming skills using modular programming.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1 Develop algorithms for problems.
- CO2 To understand the object oriented paradigm.
- CO3 Apply the programming concepts to solve the given problems.
- CO4 Write the programs using modular programming.
- CO5 Understand and write programs using various data structures very efficiently.

TEACHING PEDAGOGY:

- T1 Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2 ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1 Quiz
- ATL2 Activity Based Learning
- ATL3 Midterm Exams
- ATL4 Flip Class
- ATL5 Seminar Presentation

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BCCA205	Major -2	Object oriented Methodology and C++	Max	60	20	20	0	0	3	1	0	4
			Min	24	16		0	0				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Object Oriented Paradigm: Need, Features, comparison with other programming paradigm, various programming styles; Basic concepts: C++ basics, C++ character set, C++ Tokens (Identifiers, Keywords, Constants), operators, precedence and associativity, expressions, type conversion and type casting, Structure of a C++ Program (include files, main function), cout, cin, loops and decisions. Use of I/O Operators (<< and >>), Cascading of I/O Operators, Inline Functions, Reference Variables, Call by Reference, Function Overloading.	8	ATL3 ATL6
II	Concept of a class, Data Members and Member Functions, visibility modes, scope resolution operator (::); Objects: accessing members through object, object and classes, object arrays, passing objects as function arguments, Friend Function; Constructor and Destructor functions: Default Constructor, Overloaded Constructors, Copy Constructor, Constructor with default arguments, Dynamic Constructors.	8	ATL3 ATL6
III	Operator overloading; Inheritance: Concepts of Base Class and Derived Class; Private, Public and Protected derivation of classes, accessibility of base class members by objects of derived class, access mechanism in classes, ambiguity resolution in inheritance, virtual base classes, constructors in derived classes, member/nested classes.	8	ATL3 ATL6
IV	Pointers: Declaration and Initialization of Pointers; Dynamic memory	8	ATL3

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SEMESTER-II (2026-29)

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	allocation, new, delete operators; Pointers and Arrays: Array of Pointers, Pointer to an Array, Pointer to Objects, Array of Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Early and Late Binding, Runtime Polymorphism, Pure Virtual Functions, Abstract Classes.		ATL6
V	C++ I/O system, Use of defined manipulators, formatted I/O, creating inserters and extractors, file I/O basics, Data File Handling: creating disk files and file manipulations using seekg(), seekp(), tellg() and tellp() functions, ifstream, ofstream, file stream classes; Exception Handling: Try, Catch and Throw	8	ATL3 ATL6
	Total Hours	30	

ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

<https://www.redhat.com/en/services/training/rh124-red-hat-system-administration-i>

B. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. Robert Lafore, "Object-Oriented Programming in C++", 4e, SAMS.
2. Ricahrd C. Lee, Wiiliam M. Tepfenhart "UML & C++: A Practical Guide To Object Oriented Development", 2e, Pearson.
3. Herbert Schildt, "C++ the complete reference", 4e, 2003.

Suggested e- resources (Websites/e- books)

1. E Balagurusamy, "Object Oriented Programming with C++", 6e, McGraw Hill Education.
2. G.Booch, "Object Oriented Analysis And Design With Applications", 3e, Pearson.
3. K.R. Venugopal, RajkumarBuyya, "Mastering C++", 2e, McGraw Hill Education.

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COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	-	-	-	-	-	-	1	-			
CO2	3	3	2	3	-	-	-	-	-	-	1	-			
CO3	3	3	3	2	-	-	-	-	-	-	1	-			
CO4	2	3	2	3	-	-	-	-	-	-	1	-			
CO5	3	3	3	2	-	-	-	-	-	-	1	-			

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SEMESTER-I (2026-29)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCCA206	Practical (Major-2)	Programming Lab in C++	Max	0	0	0	30	20	0	0	4	2
			Min									

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

- To familiarize the students with programming and to encourage them to develop their logic.
- To make students well versed with C++ language to solve problems efficiently.
- Using simple and well-drawn illustrations develop their programming skills using modular programming.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Develop algorithms for problems.
- CO2** To understand the object oriented paradigm.
- CO3** Apply the programming concepts to solve the given problems.
- CO4** Write the programs using modular programming.
- CO5** Understand and write programs using various data structures very efficiently.

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCCA206	Practical (Major-2)	Programming Lab in C++	Max	0	0	0	30	20	0	0	4	2
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	Title	CO Mapping
1.	Define a friend function. Explain the relation of friend function with respect to Public, Private and Protected data members of the class.	CO4
2.	Write a C++ program that uses a function to check whether a given number is divisible by another number or not. Give proper comments whether the denominator number is a prime number or not.	CO4
3.	Write a program in C++ a. To generate the number pyramid	CO4
4.	Create two function max and min to find the largest and smallest numbers respectively	CO4
5.	Write a function in C++ that take one string argument and return a reversed string.	CO4
6.	Write a C++ program using structure to store information of 10 employee (id_no, empname, empadd, sal) and display information of an employee depending upon the employee no given.	CO4
7.	Create a class contains name & telephone number as two of it's fields. Write a C++ Program	CO4
8.	Using an object to do the following. (a) to add a record (b) to search of telephone number for a given name. (c) to determine the name of telephone number is known .(d) Updating the data file, whenever there is a change in telephone number.	CO4
9.	Member function: (1)to assign initial values (2) to increment only people total in case ticket is not sold out. (3) to increment people total as well as amount total in case ticket is not sold out (4) to display the two totals (5) to display the number of tickets sold out.	CO5

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCCA206	Practical (Major-2)	Programming Lab in C++	Max	0	0	0	30	20	0	0	4	2
			Min									

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

10.	Create a class Bank account of 20 customers with the following data members depositor no, (a) initialize the data member (b) deposit money (c) Display the customer information (d) withdraw money after checking the balance (min bal for saving account is 500 and for current 1000) (e) search the depositor details according to name or number or both.	CO5
11.	Write a program to interchange the private values of two classes by using a friend function swap().	CO5
12.	Write C++ code to create a class date. Using this class, calculate the age of a person as on the current date.	CO5
13.	Define a class string use overloaded == operator to compare two string.	CO5
14.	Find the largest value of two objects using > operator.	CO5
15.	Write a C++ program to print the number between 1 to 100 and 100 to 1 using operator overloading.	CO5

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	-	-	-	-	-	-	1	-			
CO2	3	3	2	3	-	-	-	-	-	-	1	-			
CO3	3	3	3	2	-	-	-	-	-	-	1	-			
CO4	2	3	2	3	-	-	-	-	-	-	1	-			
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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCCA207	Practical (Major-3)	Data Structure lab in C/ C++	Max	0	0	0	30	20	0	0	4	2
			Min									

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COURSE OBJECTIVES:

The student will have ability to:

- To understand the students with the applications of Standard data structure in real world problems.
- To provide knowledge of creation of new data structures.
- To familiarize the students with the analysis and design a particular problem.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Demonstrate familiarity with major algorithms and data structures.
- CO2** Analyse performance of algorithms.
- CO3** Choose the appropriate data structure and algorithm design method for a specified application..
- CO4** Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs.
- CO5** Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.

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		Mapping
1.	Write a program to create a two dimensional array and perform add, subtract and multiplication operations.	CO4
2.	Write a program to create a two dimensional array using dynamic memory allocation	CO4
3.	Write a program to implement stack.	CO4
4.	Write a program to convert infix expression into postfix expression.	CO4
5.	Write a program to check balanced parentheses for a given infix expression.	CO4
6.	Write a program to evaluate postfix expression.	CO4
7.	Write a program to implement queue.	CO4
8.	Write a program to implement circular queue.	CO4
9.	Write a program to implement link list with insert, delete, search, view, and delete function.	CO5
10.	Write a program to implement ordered link list.	CO5
11.	Write a program to add two polynomials.	CO5
12.	Write a program to create doubly link list.	CO5
13.	Write a program to implement tree with insert, delete and search function.	CO5
14.	Write a program for in order, post order and preorder traversal of tree.	CO5
15.	. Write a program for binary search and sequential search using recursion.	CO5
16.	Write a program for bubble sort and sequential search.	
17.	Write a program for insertion sort and quick sort.	

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

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