

RGPV (DIPLOMA WING) BHOPAL		OBE CURRICULUM FOR THE COURSE			FORMAT-3		Sheet No. 1/3	
Branch	COMPUTER SCIENCE AND ENGINEERING					Semester	Third	
Course Code		304		Course Name	DATA STRUCTURE AND ALGORITHM			
							Teaching Hrs	Marks
Course Outcome 1		APPLY BASICS OF DATA STRUCTURES, POINTERS & DYNAMIC MEMORY MANAGEMENT IN A GIVEN PROBLEM SITUATION.					30	34
Learning Outcome 1		EXPLAIN DATA TYPES & ABSTRACT DATA TYPES (ADT), POINTERS, STRUCTURE AND DYNAMIC MEMORY.					14	14
Contents		Overview of Data, Abstract Data Types and Data-Structure.  Classification of Data Structure: Linear, Non-Linear, Primitive, Non-Primitive, etc.  Pointers: Introduction, Declaring and initializing pointers, Accessing variables using pointers, Pointer arithmetic, Array of Pointers, Row-major & Col-major implementation of 2-D array.  Structure: Definition, Declaration, Initializing Structure, Accessing Structure elements, Array of Structure, Pointer to Structure.  Dynamic Memory Allocation/Deallocation: malloc(), calloc(), free(), realloc().						

<b>Learning Outcome 2</b>	<b>INTERPRET</b> STRUCTURE & POINTERS, DYNAMIC MEMORY ALLOCATION AND DE-ALLOCATION.	08	10
<b>Contents</b>	Pointers and constant pointer self referential structures, Dynamic structures, Comparative Study of Union & Structure.		
<b>Learning Outcome 3</b>	<b>USE</b> STRUCTURE & POINTERS FOR A GIVEN PROBLEM SITUATION.	08	10
<b>Contents</b>	Invoking functions by passing the pointers, Declaration and use of structure.		
<b>Method of Assessment</b>	LO - 1 Paper pen test (End semester Exam) LO - 2 Paper pen test (Progressive test - I) LO - 3 Lab Assessment (External)		
<b>Course Outcome 2</b>	<b>USE</b> SEARCHING/SORTING & HASHING TECHNIQUES TO SOLVE REAL WORLD PROBLEMS.	<b>34</b>	<b>34</b>
<b>Learning Outcome 1</b>	<b>EXPLAIN</b> COMPLEXITY ANALYSIS AND VARIOUS SEARCHING, SORTING & HASHING TECHNIQUES.	12	14
<b>Contents</b>	Basics of algorithm, Analysis of an Algorithm, Asymptotic Notation: O-Notation, $\Omega$ -Notation and $\theta$ -Notation.  <b>Searching Techniques:</b> Linear search and Binary search.		

	<b>Sorting Techniques:</b> Insertion sort, Selection sort, Bubble sort, Merge sort, Radix sort. <b>Hashing:</b> Hash Table & Hash Function, different hashing techniques and linear probing collision technique. <b>Different operations in hashing-</b> Search, Insert & Delete.		
<b>Learning Outcome 2</b>	WRITE PROGRAM FOR LINEAR SEARCH & BINARY SEARCH TECHNIQUES.	08	10
<b>Contents</b>	Algorithm of linear search and binary search technique.		
<b>Learning Outcome 3</b>	WRITE PROGRAM FOR SORTING TECHNIQUES.	14	10
<b>Contents</b>	Algorithm of insertion sort and bubble sort.		
<b>Method of Assessment</b>	LO - 1 Paper pen test (End semester Exam) LO - 2 Lab Assessment (External) LO - 3 Lab Assessment (External)		
<b>Course Outcome 3</b>	APPLY APPROPRIATE LINEAR DATA STRUCTURE IN PROBLEM SOLVING.	40	48
<b>Learning Outcome 1</b>	EXPLAIN THE BASIC STRUCTURE OF LINKED LIST WITH ITS VARIOUS OPERATIONS.	10	14
<b>Contents</b>	<b>Terminologies:</b> Node, Data field, Link field, Null pointer, External pointer, Empty list. Memory Representation of Linked List and Comparison between Linked List & Array.		

	<p><b>Operation(s) on Linked List:</b> Create, Insert, Delete, Traverse, Search, and Display.</p> <p><b>Types of Linked List:</b> Singly Linked List, Doubly Linked List, Circular Linked List, Circular Doubly Linked List.</p> <p>Polynomial Representation, Addition and multiplication of Two Polynomials.</p>		
<b>Learning Outcome 2</b>	ILLUSTRATE STACK AND QUEUE DATA STRUCTURE.	08	10
<b>Contents</b>	<p><b>Stack:</b> Introduction to Stack, Stack Operation- PUSH, POP, Stack as an Array, Stack as a Linked List(Linked stack).</p> <p><b>Queue:</b> Introduction to Queue, Queue Operation- Insertion &amp; Deletion, Queue as an Array.</p>		
<b>Learning Outcome 3</b>	APPLY LINEAR DATA STRUCTURE TO SOLVE STACK'S & QUEUE'S PROBLEMS.	10	14
<b>Contents</b>	<p><b>Application of Stack:</b></p> <p>Reversal of given line, Polish Notations, Infix to Postfix Conversion, Evaluation of Postfix Notation.</p> <p><b>Types of Queue &amp; Application:</b> Simple Queue, Circular Queue &amp; Double Ended Queue, Application of Queue.</p>		
<b>Learning Outcome 4</b>	USE ARRAY AND LINKED LIST FOR STACK'S AND QUEUE'S FUNCTIONS.	12	10
<b>Contents</b>	Perform various operations on stack like insertion (PUSH) & deletion (POP). Perform various operations on queue like insertion and deletion.		

<b>Method of Assessment</b>	LO - 1 Paper pen test (End Semester Exam) LO - 2 Paper pen test (Progressive test - II) LO - 3 Paper pen test (End Semester Exam) LO - 4 Lab Assessment (Internal)		
<b>Course Outcome 4</b>	<b>ILLUSTRATE NON-LINEAR DATA STRUCTURE.</b>	<b>31</b>	<b>34</b>
<b>Learning Outcome 1</b>	<b>DIFFERENTIATE</b> VARIOUS TYPES OF BINARY TREE.	<b>13</b>	<b>14</b>
<b>Contents</b>	<b>Terminologies:</b> Root node, Terminal node, Non-Terminal node, Degree of a node, Degree of a tree, Siblings, Depth, Level, Path, Sub tree, Forest.  <b>Types of Tree:</b> Binary Tree, Complete Binary Tree, Strictly Binary Tree, Expression Tree, Binary Search Tree, AVL Tree, Threaded Binary Tree.  <b>Tree Traversal:</b> In-order, Pre-order and Post-order.		
<b>Learning Outcome 2</b>	<b>EXPLAIN</b> MINIMUM SPANNING TREE AND DIFFERENT TYPES OF GRAPH WITH REPRESENTATION.	10	10
<b>Contents</b>	<b>Graph:</b> Introduction to Graph, Graph Vs Tree, Vertex, Edge, Adjacent Vertex, Connected Graph, Simple Graph, Weighted Graph, Complete Graph And Directed Graph.  <b>Graph Traversal:</b> Breadth First Search, Depth First Search.  <b>Graph Representation:</b> Adjacent Matrix, Adjacency List Representation.  <b>Minimum Spanning Tree:</b> Kruskal's & Prim's Techniques.		
<b>Learning Outcome 3</b>	<b>WRITE</b> AN ALGORITHM FOR TREE & GRAPH TRAVERSAL.	8	10

<b>Contents</b>	<p>Algorithm of in-order, preorder and post order traversal of tree.</p> <p>Algorithm to traverse a graph using Breadth First Search and Depth First Search.</p>		
<b>Method of Assessment</b>	<p>LO - 1 Paper pen test (End Semester Exam)</p> <p>LO - 2 Paper pen test/Assignment: Term Work (Internal)</p> <p>LO - 3 Lab Assessment (Internal)</p>		