JAIN COLLEGE OF ENGINEERING & RESEARCH, BELAGAVI
Programme: Computer Science and Engineering (AIML)

CONTINUOUS INTERNAL EVALUATION-I

Semester: 3rd

Course: Data Structures and Applications   Code: BCS304

Course Coordinator: Dr. Anand Gudnavar

Date: 22/10/2024

Max. Marks: 50

Duration: 1 Hour 30 Min

Note: Answer any one full question choosing from each part.

Q. No.	Part -A Question	Marks	CO	R.B.T. Level
1 a)	Define data structures. With a neat diagram, explain the classification of data structures with examples. Explain the operations that can be performed.	7	1	L2
1 b)	What do you mean by pattern matching? Outline the Knuth Morris Pratt (KMP) algorithm and illustrate it with an example.	8	1	L3
1 c)	Define sparse matrix. Illustrate the sparse matrix representation. the Fast Transpose Algorithm and explain the working with an example.	10	1	L3
	OR			
2 a)	What is stack? Write the ADT specification for data type Stack. Write C functions for demonstrating various stack operations.	7	1	L2
2 b)	Write Short notes on i) System Stack ii) Stacks using Dynamic Arrays	8	1	L2
2 c)	Write an algorithm to convert an infix expression to postfix expression and also trace the same for the expression a*(b+c)*d	10	1	L3
	Part -B			
3 a)	Define queue, with ADT specification. Write addq() and deleteq() procedures for queues using arrays.	7	2	L2
3 b)	Illustrate the pitfalls of sequential representation of queue with an example. Develop C functions implement insertion, deletion and display operations of a circular queue.	8	2	L3
3 c)	Write short notes on following with necessary diagrams i) Circular queue using dynamic arrays ii) multiple stacks	10	2	L2
	OR			
4 a)	What is a linked list? Develop C functions to implement the following in a singly linked list: i) on Delete a node from the front ii) Concatenate two linked lists	7	2	L3
4 b)	Write a node structure for linked representation of a polynomial. Explain the algorithm to add two polynomials represented using linked list.	8	2	L2
4 c)	Write a program in C to implement a stack of integers using a singly linked list.	10	2	L3

COURSE OUTCOMES (COs)

1	Explain different data structures and their applications. Apply Arrays and Stacks data structures to solve the given problems.
2	Apply Queue data structures and linked list to solve the given problems.
3	Use the concept of linked lists and trees in problem solving.
4	Develop solutions using trees and graphs to model the real-world problem.
5	Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.

REVISED BLOOMS TAXONOMY LEARNING LEVEL (RBT)

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

PROGRAM OUTCOMES (POs)

1	Engineering Knowledge	5	Modern tool usage	9	Individual and Team-Work
2	Problem Analysis	6	Engineer and Society	10	Communication
3	Design / Development Solutions	7	Environment and Sustainability	11	Project Management and Finance
4	Conduct Investigations of Complex problems	8	Ethics	12	Life-long Learning

CONTINUOUS INTERNAL EVALUATION-II

Semester: 3rd
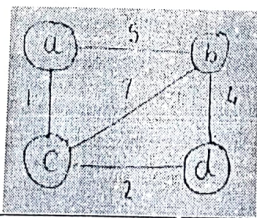Course: Data Structures and Applications   Code: BCS304
Course Coordinator: Dr. Anand Gudnavar

Date: 26/12/2024
Max. Marks: 50
Duration: 1 Hour 30 Min

Note: Answer any one full question choosing from each part.

Q. No.	Question	Marks	CO	R.B.T. Level
	Part -A			
1 a)	Define Sparse matrix. For the given sparse matrix, give the linked list representation: $A = \begin{bmatrix} 0 & 0 & 3 & 0 & 4 \\ 0 & 0 & 5 & 7 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 6 & 0 & 0 \end{bmatrix}$	10	3	L2
1 b)	Write the following algorithms for singly linked list: a)Inserting ITEM as the first node in the list b)Deleting the last node in the list	10	3	L3
1 c)	What are the advantages of doubly linked list over singly linked list? Illustrate with an example.	5	3	L2
	OR			
2 a)	Describe the three types of binary tree traversals (inorder, preorder, postorder) and provide an example illustrating each type.	10	3	L2
2 b)	Define threaded binary trees. Describe the construction of threads and how they are used for binary tree traversal without a stack.	10	3	L2
2 c)	What is level-order traversal, and how does it differ from inorder, preorder, and postorder traversals in terms of implementation and usage?	5	3	L2
	Part -B			
3 a)	Discuss selection Tree with an example.	10	4	L2
3 b)	Define Binary Search tree. Construct a binary search tree (BST) for the following elements: 100, 85, 45, 55, 120, 20, 70, 90, 115, 65, 130, 145. Traverse using in-order, pre-order, and post-order traversal techniques. Write recursive C functions for the same.	10	4	L3
3 c)	Construct a binary tree from the Post-order and In-order sequence given below In-order: GDHBAEICF Post-order: GHDBIEFCA	5	4	L3
	OR			
4 a)	Define graphs. Give the adjacency matrix and adjacency list representation for the following graph in below figure.	10	4	L3
4 b)	Write the algorithm for following graph traversal method (i) Breadth First search (ii) Depth First search.	10	4	L2
4 c)	Explain the concept of spanning trees. How is it related to connected graphs?	5	4	L2

USN | 2 | J | P | 2 | 3 | C | I | 0 | 3 | 2 |

Third Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Data Structures and Applications

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define Data Structures. Explain the classification of data structures with a neat diagram.	8	L2	CO1
	b.	Write a C Functions to implement pop , push and display operations for stacks using assays.	7	L2	CO2
	c.	Differentiate structures and unions.	5	L2	CO1
		OR			
Q.2	a.	Write an algorithm to evaluate a postfix expression and apply the same for the given postfix expression. $6\ 2\ /\ 3 - 4\ 2\ *\ +$.	7	L3	CO2
	b.	Explain the dynamic memory allocation function in detail.	8	L2	CO1
	c.	What is Sparse matrix? Give the triplet form of a given matrix and find its transpose $$A = \begin{bmatrix} 0 & 0 & 3 & 0 & 4 \\ 0 & 0 & 5 & 7 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 6 & 0 & 0 \end{bmatrix}$$	5	L3	CO1
		Module – 2			
Q.3	a.	Define Queue. Discuss how to represent a queue using dynamic assays.	8	L2	CO2
	b.	Write a C Function to implement insertion ( ) , deletion ( ) and display ( ) operations on circular queue.	6	L3	CO2
	c.	Write a note on Multiple stacks and queues with suitable diagram.	6	L2	CO2
		OR			
Q.4	a.	What is a linked list? Explain the different types of linked list with neat diagram.	6	L2	CO3
	b.	Write a C function for the following on singly linked list with example : i) Insert a node of the beginning ii) Delete a node at the front iii) Display.	8	L3	CO3
	c.	Write the C function to add two polynomials.	6	L2	CO3

		Module – 3			
Q.5	a.	Discuss how binary trees are represented using : i) Assay ii) Linked list.	6	L2	CO4
	b.	Define Threaded binary tree. Discuss In – threaded binary tree.	6	L2	CO4
	c.	Write the C function for the following additional list operation : i) Inverting Singly linked list ii) Concatenating Singly linked list.	8	L3	CO3
		OR			
Q.6	a.	Discuss Inorder , Preorder , Postorder and Level order traversal with suitable function for each.	8	L3	CO4
	b.	Define the threaded binary tree. Construct threaded binary tree for the following element : A, B, C, D, E, F, G, H, I.	6	L2	CO4
	c.	Write a C function for the following : i) Insert a node at the beginning of doubly linked list. ii) Deleting a node at the end of the doubly linked list.	6	L3	CO3
		Module – 4			
Q.7	a.	Define Forest , Transform the forest into a binary tree and traverse using inorder , preorder and postorder traversal with an example.	8	L1	CO5
	b.	Define Binary search tree. Construct a binary search tree for the following elements : 100 , 85 , 45 , 55 , 120 , 20 , 70 , 90 , 115 , 65 , 130 , 145.	6	L2	CO5
	c.	Discuss Selection tree with an example.	6	L2	CO5
		OR			
Q.8	a.	Define Graph. Explain adjacency matrix and adjacency list representation with an example.	8	L2	CO5
	b.	Define the following terminology with example : i) Digraph ii) Weighted graph iii) Self loop iv) Connected graph.	6	L2	CO5
	c.	Briefly explain about Elementary graph operations.	6	L3	CO5
		Module – 5			
Q.9	a.	Explain in detail about Static and Dynamic Hashing.	6	L2	CO5
	b.	What is Collision? What are the methods to resolve collision?	7	L2	CO5
	c.	Explain Priority queue with the help of an examples.	7	L2	CO5
		OR			
Q.10	a.	Define Hashing. Explain different hashing functions with suitable examples.	12	L2	CO5
	b.	Write short note on : i) Leftist trees ii) Optimal binary search tree.	8	L3	CO5

* * * * *