



Third Semester B.E./B.Tech. Degree Examination, June/July 2025
Data Structures and Applications

Time: 3 hrs.

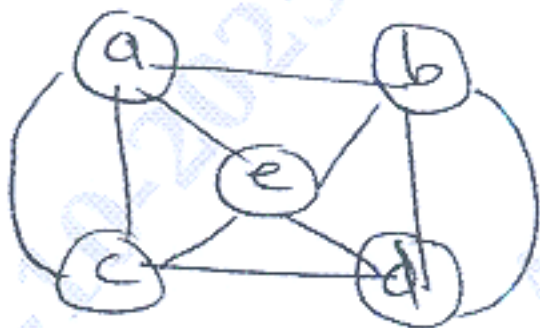
Max. Marks: 100

*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.	Differentiate between static and dynamic memory allocation. Write syntax for malloc(), calloc(), realloc() and free() functions.	08	L2	CO1
	b.	Write KMP pattern matching algorithm and apply the same to search the pattern "abcdabcy" in the text "abcxabcdabxabcdabedabey".	08	L3	CO2
	c.	Differentiate between Structure and Union.	04	L1	CO1
OR					
Q.2	a.	Write a C function to evaluate postfix expression. Evaluate $231 * + 9 -$ using the same.	08	L2	CO2
	b.	Implement push(), pop() and display operations of stack using array.	08	L2	CO2
	c.	Write a C function to perform transpose of a given sparse matrix.	04	L3	CO1
Module – 2					
Q.3	a.	Explain the need of Circular Queue. Implement Insert(), delete() and display() operations on the circular queue.	10	L3	CO2
	b.	Implement following operations on Single Linked List: (i) Delete a node at the end of SLL. (ii) Insert a node at the beginning of SLL.	10	L3	CO3
OR					
Q.4	a.	Explain and write a C function to implement Multiple Stack.	10	L3	CO2
	b.	Develop a C function to add two polynomials using Single Linked List.	10	L3	CO3
Module – 3					
Q.5	a.	Give the diagrammatical representation of below sparse matrix using Linked List. $\begin{bmatrix} 0 & 0 & 7 & 0 \\ 0 & 0 & 0 & 10 \\ 3 & 1 & 0 & 4 \\ 0 & 0 & 0 & 0 \end{bmatrix}$	05	L2	CO3

Q.5	b. Traverse given tree using Inorder, Preorder and Post order traversal. Also write C functions for Inorder, Preorder and Postorder. [Refer Fig.Q5(b)] <pre> graph TD A((A)) --> B((B)) B --> C((C)) C --> D((D)) C --> E((E)) E --> F((F)) F --> G((G)) </pre> Fig.Q5(b)	08	L3	CO4
	c. What are the advantages of threaded binary tree over a binary tree? Construct threaded binary tree for the following elements: A,B,C,D,E,F,G,H,I	07	L3	CO4
OR				
Q.6	a. Define Double Linked List. Create a C function for the following DLL operations: (i) Inserting a node at front (ii) Deleting a node at end	08	L3	CO3
	b. Define Tree. Explain the representation of Tree with an example.	06	L2	CO4
	c. Define the following with example : i) Complete Binary Tree (ii) Height of a Tree (iii) Full Binary Tree	06	L2	CO4
Module – 4				
Q.7	a. Write a iterative C function to perform following operations on Binary Search Tree : i) Search a key element ii) Insert a node	10	L3	CO4
	b. Convert the following forest into Binary Tree and perform inorder, preorder and post order traversal. [Refer Fig.Q7(b)] <pre> graph TD A((A)) --> B((B)) A --> C((C)) A --> D((D)) C --> E((E)) C --> F((F)) C --> G((G)) G --> H((H)) G --> I((I)) </pre> Fig.Q7(b)	10	L2	CO4
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OR

Q.8	a.	Define Selection Tree. Construct first 4 winners from given runs below: <table><tr><td>5</td><td>9</td><td>18</td><td>8</td><td>90</td><td>09</td><td>7</td><td>8</td></tr><tr><td>14</td><td>13</td><td>19</td><td>11</td><td>95</td><td>17</td><td>13</td><td>10</td></tr><tr><td>24</td><td>16</td><td>20</td><td>15</td><td>98</td><td>19</td><td>14</td><td>15</td></tr></table>	5	9	18	8	90	09	7	8	14	13	19	11	95	17	13	10	24	16	20	15	98	19	14	15	10	L2	CO4
5	9	18	8	90	09	7	8																						
14	13	19	11	95	17	13	10																						
24	16	20	15	98	19	14	15																						
	b.	Design the algorithm to traverse below graph using BFS and DFS technique. Traverse the below graph using BFS from source vertex. [Refer Fig.Q8(b)]  Fig.Q8(b)	10	L3	CO4																								

Module – 5

Q.9	a.	Write a note on Static and Dynamic Hashing.	06	L2	CO5
	b.	Construct the OBST for following items. Let $n = 4$ $(a_1, a_2, a_3, a_4) = (\text{do}, \text{if}, \text{int}, \text{while})$ Let $(p_1, p_2, p_3, p_4) = (3, 3, 1, 1)$ $(q_0, q_1, q_2, q_3, q_4) = (2, 3, 1, 1, 1)$	10	L3	CO5
	c.	Explain the following with an example : (i) HBLT (ii) WBLT	04	L3	CO5

OR

Q.10	a.	Define Collision. Explain the methods to resolve collision. Explain linear probing for the data 12, 13, 15, 16, 74, 75, 83, 42	08	L2	CO5
	b.	Explain Leftist tree with an example.	08	L2	CO5
	c.	Explain different Hash functions.	04	L2	CO5
