Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination Dec-2023

CA5CO34 Data Structures & Algorithms

Programme: MCA / BCA - MCA (Integrated) Branch/Specialisation: Computer Application

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. Which operation on stack requires a loop? **1**

(a) push (b) pop (c) peek (d) None of these

ii. Which data structure is Non – linear? **1**

(a) Stack (b) Queue (c) Link list (d) Tree

iii. Pick the correct statement to add an element item at end of linear queue using array implementation- **1**

(a) front = front +1; a[front] =item;

(b) front = front -1; a[front] =item;

(c) rear = rear +1; a[rear] =item;

(d) rear = rear -1; a[rear] =item;

iv. Which condion is check for underflow in circular queue? **1**

(a) if(rear == MAX-1) {}

(b) if(front == -1) {}

(c) if((front== 0 && rear == MAX -1)||(front == rear+1)) {}

(d) if(front == 0 && rear == MAX -1) {}

v. Accessing an item/element is faster in _____. **1**

(a) Array (b) Link list

(c) Circular link list (d) Doubly link list

vi. Which operation requires a loop? **1**

Note: Head pointer points to first node. No tail pointer is available

(a) Insert a node at beginnig in link list

(b) Insert a node at beginnig in circular link list

(c) Insert a node at beginnig in doubly link list

(d) None of these

P.T.O.

vii. Which sort uses the pivot element? **1**
(a) Insertion (b) Bubble (c) Merge (d) Quick

viii. The time complexity of the binary search is- **1**
(a) O(n) (b) $O(\log_2 n)$ (c) $O(n\log_2 n)$ (d) $O(n^2)$

ix. Number of edges in a tree of n nodes are _____. **1**
(a) n (b) n-1
(c) n^2 (d) Any number of edges is possible

x. Graph is said to be connected when _____. **1**
(a) There must be an edge between every two vertices.
(b) There must be a path between every two vertices.
(c) There must be a cycle in the graph.
(d) Graph must be directed.

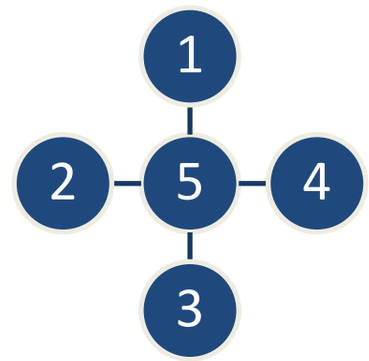
Q.2 i. Explain stack and its usage. **4**
ii. Convert infix to postfix- **6**
A+(B*C-(D/E↑F)*G)*H
OR iii. Write a complete C program for the implementation of stack operations using array. **6**

Q.3 i. Draw a diagram to explain, how circular queues solve the problem of queue? **2**
ii. Write a C program for array implementation of circular queue. **8**
OR iii. Write a C program for linked list implementation of queue. **8**

Q.4 i. Compare the array and linked list. **4**
ii. Write a C program for implementation of insert a node at beginning and display all items in the linked list. Write main function to call other functions. **6**
OR iii. Write a C program for the implementation of insert a node at last and search in the doubly linked list. Write main function to call other functions. **6**

Q.5 i. Explain how binary search works using an example. **4**
ii. Write a complete C program to sort an array using quick sort. **6**
OR iii. Sort the array using merge sort- **6**
10 90 20 30 60 100 70 50 40 80

Q.6 Attempt any two:
i. Draw the adjacency matrix, adjacency list, and adjacency multi-list of the graph given below **5**



ii. Write Kruskals algorithm. **5**
iii. Explain how BFS and DFS work with the help of an example. **5**

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Marking Scheme

CA5CO34 (T)-Data Structures & Algorithms (T)

Q.1 i) Which operation on stack requires a loop? **1**
(d) None of these

ii) Which data structure is Non – linear? **1**
(d) Tree

iii) Pick the correct statement to add an element item at end of linear queue using array implementation. **1**
(c) rear = rear +1; a[rear] =item;

iv) Which condion is check for underflow in circular queue? **1**
(b) if(front == -1) {}

v) Accessing an item/element is faster in_____ **1**
(a) Array

vi) Which operation requires a loop? **1**
Note: Head pointer points to first node. No tail pointer is available
(b) Insert a node at beginnig in circular link list

vii) Which sort uses the pivot element? **1**
(d) Quick

viii) The time complexity of the binary search is: **1**
(b) $O(\log_2 n)$

ix) Number of edges in a tree of n nodes are ___? **1**
(b) n-1

x) Graph is said to be connected when ___? **1**
(b) There must be a path between every two vertices.

Q.2 i. Explain stack and its usage. **4**
Stack: 2 Marks
Usage: 2 Marks

ii. Convert infix to postfix **6**
A+(B*C-(D/E↑F)*G)*H
Conversion: 6 Marks

OR iii. Write a complete C program for the implementation of stack operations using array. **6**
Push: 2 Marks
Pop: 2 Marks
Display: 1 Marks
Main: 1 Marks

Q.3 i. Draw a diagram to explain, how circular queues solve the problem of queue? **2**
Diagram : 2 Marks

ii. Write a C program for array implementation of circular queue. **8**
Insert: 2 Marks
Delete: 2 Marks
Display: 2 Marks
Main: 2 Marks

OR iii. Write a C program for linked list implementation of queue. **8**
Insert: 2 Marks
Delete: 2 Marks
Display: 2 Marks
Main: 2 Marks

Q.4 i. Compare the array and linked list. **4**
1 Comparison: 1 Mark: 1* 4 Marks 4 Marks

ii. Write a C program for implementation of insert a node at beginning and display all items in the linked list. Write main function to call other functions. **6**
Insert a node at beginning : 2 Marks
Display: 2 Marks
Main function : 2 Marks

OR iii. Write a C program for the implementation of insert a node at last and search in the doubly linked list. Write main function to call other functions. **6**
Insert a node at last : 2 Marks
Search: 2 Marks
Main function : 2 Marks

Q.5 i. Explain how binary search works using an example. **4**
Binary search using an example: 4 Marks

ii. Write a complete C program to sort an array using Quick Sort. **6**
Partition function & Recursive function: 4 Marks
Main function: 2 Marks

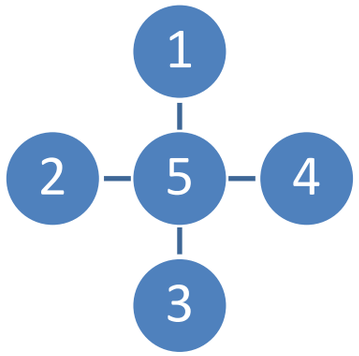
OR iii. Sort the array using merge sort **6**
10 90 20 30 60 100 70 50 40 80

Q.6 Attempt any two:

i. Draw the adjacency matrix, adjacency list, and adjacency multi-list of the graph given below **5**

[2]

[3]



Adjacency matrix: 1 Marks
Adjacency list: 2 Marks
Adjacency multilist: 2 Marks

ii. Write Kruskals algorithm. **5**
Kruskals algorithm : 5 Marks

iii. Explain how BFS and DFS work with the help of an example. **5**
BFS with Example : 2.5 Marks
DFS with Example : 2.5 Marks

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P.T.O.