## END SEMESTER / RETEST EXAMINATION ( New Syllabus )

### Semester: 4th

### Subject code: CO 401(NEW)

### Subject: Data Structure

### Full Marks:     =70 (part A - 25 + Part B - 45)
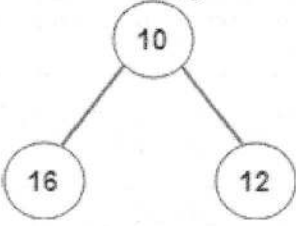
### Duration:    3 hours

*Instructions:*

- *Questions on Part A are compulsory*

- *Attempt any Five Questions from Part B*

| | PART-A MARK-25 | |
|---|---|---|
| Questions no. | Questions | Marks |
| Question 1 | **Fill up the blanks.** | 1x 5 = 5 |
| | | |
| a) | Process of inserting an element in stack is called _____. | |
| b) | The end where insertion of elements can take place in a queue is called _____ . | |
| c) | The process of writing the operators of an expression either before their operands or after them is called _____. | |
| d) | Linked list is a collection of data element called nodes ,each pointing to the next node by means of _____ . | |
| e) | Number of edges incident on a vertex/node is the _____ of the node . | |
| | | |
| Question 2 | **State TRUE or FALSE** | |
| a) | Big O notation helps to determine the time as well space complexity of the algorithm. | |
| b) | Recursion is the name given to the phenomenon of defining a function in terms of other function. | |
| c) | Sparse Matrix also known as Dense Matrix. | |
| d) | Dynamic memory management techniques allow to allocate additional memory space or to release unwanted space at run time. | |
| e) | Trees are Linear data structure. | |
| | | |
| Question 3 | **Define the following Terms** | 1x 5 =5 |
| | | |
| a) | Infix notation. | |

| | | |
|---|---|---|
| b) | Deque . | |
| c) | Leaf node . | |
| d) | Connected graph. | |
| e) | Malloc. | |
| | | |
| Question 4 | **Choose the most appropriate answer** | 1X 10=10 |
| a) | An array m is declared as int m[2][4] ; Array m has<br><br>a) 2 elements<br><br>b) 4 elements<br><br>c) 8 elements<br><br>a) 16 elements | |
| b) | The Data structure that can be used to implement priority queue is<br><br>a) Array<br>b) List<br>c) Heap<br>d) Tree | |
| c) | Linked lists are best suited for<br><br>a) relatively permanent collections of data.<br>b) the size of the structure and the data in the structure are constantly changing.<br>c) both of the above situation.<br>d) none of above. | |
| d) | If the given input array is sorted or nearly sorted, the algorithm that gives the best performance is<br>a) Insertion sort<br>b) Selection sort<br>c) Quick sort<br>d) Merge sort | |
| e) | If the elements "A", "B", "C" and "D" are placed in a queue and are deleted one at a time, the order they will be removed is<br>a) ABCD<br>b) DCBA<br>c) DCAB | |

| | | |
|---|---|---|
| | d) ABDC | |
| f) | The following given tree is an example of<br><br>              10<br><br>   16         12<br><br>a) Binary tree<br>b) Binary search tree<br>c) Fibonacci tree<br>d) AVL tree | |
| g) | The matrix that has most of the elements (not all) as Zero is<br>a) Identity Matrix<br>b) Unit Matrix<br>c) Sparse Matrix<br>d) Zero Matrix | |
| h) | Merge sort uses<br><br>a) Divide-and-conquer<br><br>b) Backtracking<br><br>c) Heuristic approach<br><br>d) Greedy approach | |
| i) | Heap can be used as<br>a) Priority queue<br>b) Stack<br>c) A decreasing order array<br>d) Normal Array | |
| j) | In general the number of orders of traversal applicable to a binary tree is<br><br>a) 1<br>b) 4<br>c) 2<br>d) 3 | |

| | | PART-B<br>MARK-45 | |
|---|---|---|---|
| | | *Instructions: Attempt any 5 (five ) Questions* | |
| 5 | a | Define data structure. What are the different types of data structures? Explain each of them with suitable example. | 2+3=5 |
| | b | Explain what is time complexity and space complexity of an algorithm? | 2+2=4 |

| 6 | a | What is a string? Write a function for concatenating two strings STR1 and STR2 to get new strings STR3. | 2 + 4=6 |
|---|---|---|---|
|   | b | What do you mean by multi dimensional array? Explain with example ? | 3 |
|   |   |   |   |
| 7 | a | What do you mean by Linked List ? Write a function to delete a specified node from a linked list. | 2+4=6 |
|   | b | Write some differences between linked list and array. | 3 |
|   |   |   |   |
| 8 | a | Write a function for implementing Stack using an array. Write function for Push operation. | 5 |
|   | b | Define a Queue and Priority queue. | 2+2= 4 |
|   |   |   |   |
| 9 | a | What is a binary tree? Write some properties of binary tree. | 2+2=4 |
|   | b | What are the different ways of traversing a binary tree? Write a function for traversing a binary tree in any order. | 5 |
|   |   |   |   |
| 10 | a | Write an algorithm and function for insertion sort. | 5 |
|   | b | Write a function to implement binary search and compute its complexity. | 4 |
|   |   |   |   |
| 11 | a | Define weighted graph and adjacency matrix. | 4 |
|   | b | What do you mean by Traversal of graphs ? Write briefly about Depth First Search technique. | 5 |
|   |   |   |   |
| 12 |   | **Write short notes on any 3 (Three)**<br>i) Towers of Hanoi<br>ii) Bubble sort<br>iii) Binary Search Tree<br>iv) Merging and merge sort<br>v)Sequential file organization | 3 X 3 = 9 |

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