Question Bank

Sub: Data Structures Class: SYBScIT

Unit I

1) What is data structure? Explain the categories in which data structure can be divided.
2) What is an algorithm? What are the characteristics of an algorithm?
3) What is meant by complexity of an algorithm? Explain different types of complexities.
4) Write an algorithm to insert an element into the array and to delete an element from the array.
5) What is bubble sort? Sort the following data items using bubble sort method. 14, 33, 27, 35, 10
6) What are the advantages and limitations of an array?
7) List and explain different operations that can be performed on data structure.
8) What is Sparse matrix? Explain different ways of representing Sparse matrix into memory.
9) Differentiate between Array and Linked list.
10) Differentiate between Linear search and Binary search.
11) Consider a two dimensional array D[3:7,-2:6]. If the base address of D is 5639 and each element takes 2 memory cells then find the address of D 4,0 element assuming that:
    i. Array D is sorted in column major order.
    ii. Array D is sorted in row major order.
12) Write a program to enter element in an array and print the element.
13) Define different asymptotic notations used to measure the complexity of data.
14) Explain multidimensional Array. How to declare 2 D array? Give example.

Unit II

1) What is linked list? Write and explain an algorithm to insert an element at the beginning of the singly linked list.
2) Write and explain an algorithm to split a link list into two linked lists
3) What is circular linked list? How to traverse a circular linked list?
4) What is the need of two way linked lists? Explain the structure of a node in a two way linked list.
5) Write a short note on header linked list.
6) Explain how to represent a sparse array using an array and a linked list with an example.
7) Explain how the memory is allocated and deallocated for linked list.
8) Write an algorithm for inserting a node after particular value in doubly linked list.
9) Write and explain an algorithm for deleting a node containing value in doubly linked list.
10) Write an algorithm to subtract two polynomials.
11) Write an algorithm for inserting a node at last position in circular linked list.
12) Write an algorithm for merging two linked list.
13) Write an algorithm for searching in linked list.

Unit III

1) Define stack. Discuss the basic operations performed on the stack. Also explain overflow and underflow conditions of the stack.
2) Write an algorithm to implement the stack operations using an array.
3) Convert the following expressions in postfix and prefix notations.

   1) I_{in}= (x – y) x ((z + v) / f)

   2) I_{in}= (x * y) + (z + ((a + b - c) * d)) – I * (j / k)

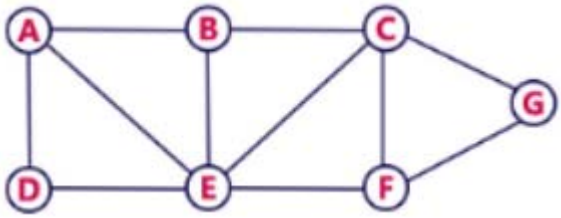
4) Define queue. How queue is represented in memory using linked list?
5) Write a short note on double ended priority queue.
6) Write an algorithm to insert and delete a node from a circular queue.
7) Convert the following expressions in postfix and prefix notations.
   1) A * b *(c – d) – (e ^ 3 * f) + g / h
   2) (a * b * c ^ 2) + d – (c / d + e)
8) What is recursion? What are disadvantage of recursion?
9) Write an algorithm to evaluate an arithmetic postfix expression and calculate the result of the expression. Give suitable example.
10) Explain with example priority queue.
11) Define Queue. Explain different types of queue.
12) Differentiate between Stack and Queue.

Unit IV

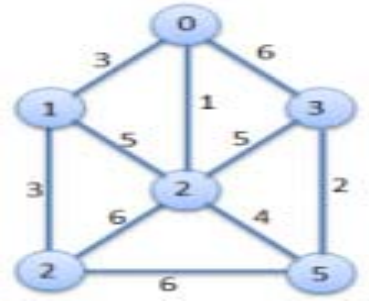
1) Reconstruct the binary tree whose in-order and pre-order traversals are: In-order Traversal : g d b h e i a f c
   Pre-order Traversal: a b d g e h i c f
2) Sort the following data elements using heap sort algorithm. 22, 35, 17, 8, 13, 44, 5, 28
3) What is AVL tree? How balancing is done in AVL tree? Explain with example.
4) What are 2-3 trees? How to delete a key value from 2-3 trees?
5) What are the algorithmic steps of insertion sort method? Sort the following data elements using insertion sort method. 7, 8, 5, 2, 4, 6, 3.
6) Sort the following element using Merge sort: 23 56 13 34 78 62 98 53 49 82
7) Define the following 1) Degree of node 2) Path 3) Internal node 4) Similar binary tree 5) Complete binary tree 6) Leaf node
8) Make a binary search tree by inserting the following number in sequence:
   52 36 98 29 123 39 15 56 31 365 278 45 72
9) Draw max and min heap with the following elements:
   80 59 25 30 100 45 62 89 51 23 11 27 323
10) Write an algorithm for Binary Search and explain with example.
11) Sort the following element using Insertion sort: 23 56 13 34 78 62 98 53 49 82
12) Explain different operations performed on Binary Search Tree.

Unit V

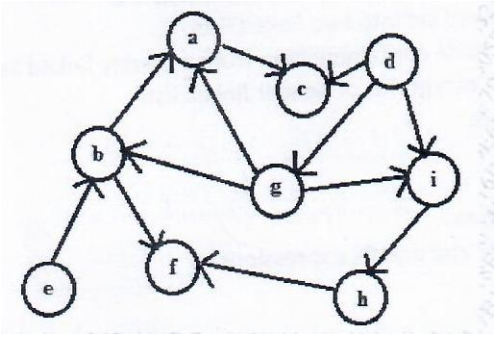
1) Describe the following collision resolution techniques. 1. Linear probing 2. Chaining.
2) Define the following terms. 1. Graph 2. Outdegree and Indegree 3. Source and sink 4. Path 5. Strongly connected graph
3) Traverse the following graph using Depth First Search traversal technique. Start traversing from the source vertex ‘A’.



4) Explain Warshall’s algorithm of finding path matrix of a graph.
5) Find the minimum spanning tree for the following graph using Prim’s algorithm and the source vertex ‘S’.



6) List the graph traversal technique. Write and explain algorithm for any one. Give suitable example.
7) Explain with example Dijkstra shortest path algorithm.
8) Explain with example Prim’s algorithm to find Minimum Spanning Tree (MST).
9) List different Hashing Methods. Explain with example any two of them.
10) List different techniques of open addressing. Explain any one.
11) Find the adjacency matrix and list representation of the following graph.



12) Explain with example Kruskal’s Algorithm to find Minimum Spanning Tree (MST).
13) Write a short note on Rehashing.