QUESTION BANK

ARRAYS

Questions

Q.1. What is an array? What are different types of arrays?

Q.2. What are the limitations of array?

03 Describe how the arrays are represented in memory?

Q.4 What is a sparse matrix? How sparse matrices, can be represented in memory?

Q5 Write an algorithm to add two matrices.

Q.6 What do you mean by trace of a matrix? Design an algorithm.

Q.7 Consider the linear array A[S:100], BI-5:20] and c[20]

Find the number of elements in each array.

Suppose Base (A)-0x800 and w-4 per words per memory cell for A. Find the address of A[10] and A[85].

Q.8 What do you understand by polynomial algorithm? Explain NP completeness. [RTU ECE, IT 2009] Q.9 What is a 'sentinel node"? Write algorithm for addition of sparse matrices. Represent a sparse matrix in linked list data struture.

Q.10 Define array as data structure and its operation. Write an alsorithm to read a mxn matrix using row major mapping.

Q.11 Explain how the address of an element is calculated in an array.

Q.12 Write an algorithm for traversing a 1-D array and generating address of each of its element.

Q.13 What is a string? How strings are represented?

Q.14 What is initialization? How many ways are to initialize the string.

LINKED LISTS

Q1. What is a linked list? What are the advantages of linked list over arrays?

Q.2 Write an algorithm to create a singly inked list

Q.3 What do you mean by dynamic memory allocation?

Q.4 Write an algorithm for following terms

    (a) Insert new node in linked list

    (b) Remove existing node from linked list.

    (c) Search a number in linked list.

Q.5 Describe the limitation of linked list.

Q.6 What is the difference between singly linked list and doubly linked list.

Q.7 What do you mean by sparse matrices? Explain different ways to represent sparse matrices in memory by giving examples.

Q.8 Write an algorithm to count the total no. of nodes in circular linked list.

Q.9 Write an algorithm to insert an element into a singly linked list.

Q.10 Write an algorithm to reverse a given linked list.

Q.11 Write short note on following.

    (b) Header Linked list

    (b) Implementation of linked list in memory

Q.12 Write the difference between array and linked list. Also explain the applications of linked list.

Q.13 (a) Define the doubly linked list and circular doubly linked list. Write an algorithm to create a circular linked list. Also give the structure of a node for these lists.

    (b) Write an algorithm to perform the following operations in a doubly linked list:

    (i) To insert a node at the end.

    (ii) To delete a specific node.

Q.14 What is the difference between static and dynamic data structure. Give their merits and demerits. Explain.

Q.15 What is the advantage of doubly linked list over simple linked list? How are skip list over simple linked list? How are skip lists implemented?

Q.16 Write an algorithm to insert an element into a linked list of the beginning and into a sorted list.

STACKS

Q1. What is stack? Explain various operations perform on it.

Q.2 Write an algorithm of push and pop operation.

Q.3 Write an algorithm to transform an infix expression to postfix and prefix expression.

Q.4 Write an algorithm to evaluate an arithmetic expression using stack and show how the expression 4 (5-3) will be evaluated.

Q5 Transform the following infix expression into their prefix and postfix expressions.

      (a) (5+3)/(8-23)

      (b) 6*25/2-3-4

      (c) 7 (8.2)-5/2

Q.6 (a) Convert the following expression into polish notation

      (a) (P-Q)/((ST)+U)

Q.7. Define stack? Explain its basic expression and implement a stack using linked list.

      (b) (PQ2S)/(T+U)

Q.8. Write short note on Tower of Hanoi problem.

Q.9 (a) Write an algorithm for converting INFIX expression to POSTFIX expression form.

    (b) Convert infix expression X into postfix form showing status after every step in tabular form:

    X:A+(8 C-(D/E-F) G) H

Q.10 Write an algorithm to implement stack using pointer.

Q.11 (a) Convert infix expression into postfix and prefix form.

      (a) (A/B) C-D E?F

      (b) A-B C+D?E/F

(b) Write algorithm to convert an infix expression into prefix expression.

Q.12 How will you distinguish stack and array ? Discuss the implementation of stack in the various ways.

Q.13 Transform each of the following infix expressions into its equivalent postfix expression.

(a) (A+B) (C-D)SE*F

(b) (A+B) (CS(D-E))+F-G

Q.14 How is is stack useful in function call and return? Write an algorithm for implementation of recursion.

Q.15 What is back-tracking? Implement parenthesis matching using stack.

QUEUES

Q.1 What is queue? Define the difference between stack and queue

Q.2 Write an algorithm for various operations performed on queue.

Q3 What is a circular queue? Define the ways to represent it.

Q.4 Write an algorithm for various operations performed on the circular queue.
Q.5   (a) Difference between linear queue and circular queue. Also write the advantages and disadvantages of circular queue.

(b) Write an algorithm to delete an element from a circular queue.

(c) What are advantage and disadvantages of representing queue and disadvantages of representing queue as linked list rather than array?

Q.6 (a) What do you mean by queues? How queues are implemented in the system? Give algorithm for insertion and deletion in a queue using array.

(b) What are dequeues and priority queues? What are their uses?

Q.7 What is the difference between queue, circular queue and priority queue?

Q8 Write an algorithm to insert and delete element in priority queue.

0.9 What are advantages of circular queue over queue?

Q.10 What are advantages of queue implementation with linked list rather implement with array.

Q.11 Circular Queue is to be implemented using an array of 10 elements. Write the pseudo code for implementation of inserting an element in queue and checking whether queue is empty or not.

Q.12 What do you understand by descending order priority queue? Explain the importance of heap in Java language program execution.

Q.13 Why is bounded queue important? What are its applications? Write algorithm to dequeue in a bounded queue.

TREES

1. Write a program to perform the various operations on queue.

2. Write a program to implement the circular queue.

3. Write a program to implement queue using linked list and perform the following operations.

(a) Insert an element c) Modify an element

(b) Delete an element

(4. Write a program to implement a dequeue with its various operations.

5. Write a program to implement the priority queue operations.

GRAPHS

1. What do you mean by adjancecy matrix. Explain the adjacency matrix representation using a suitable example.

0.2 Write an algorithm to find the shortest path of a graph.

Q3 What is minimal spanning tree? Explain with algorithm.

0.4 What do you mean by graph data structure? Explain the seqential and linked list implementation of graph data structure.

(a) From the above graph create adjacency matrix
(b) From the above graph create adjacency list.
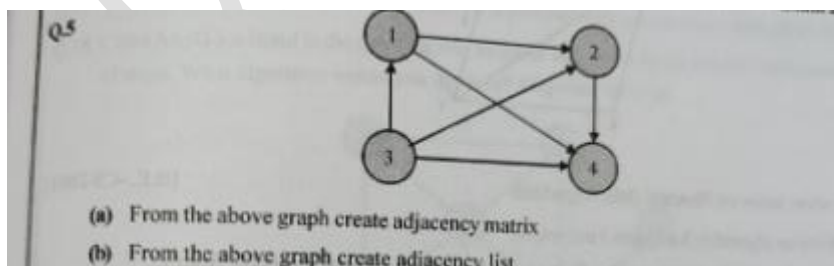
Q6. (a) efine graph. Explain different epresentations of graphs by giving suitable examples.

(b) Write an algorithm of BFS.

Q.7 What is spanning tree? Write an algorithm to find the minimum cost spanning tree. Also show by an example how your algorithm works on a graph.

Q.8 (a) Define the following terms :
Connected graph, non-connected graph. Complete graph, diected graph with suitable example.

(b) Consider the directed graph G as shown.

(i) Find all the simple path from X to Z.   (ii) Find all the simple path from Y to Z.
(iii) Find indegree (Y) and outdegree (Y).   (iv) Are there any source or sinks.

[B.E. Main/Back Exam 2005 CS/IT]

Q9. Write a algorithm to traverse a graph through DFS.

Q10. Write an algorithm to implement breadth first search.

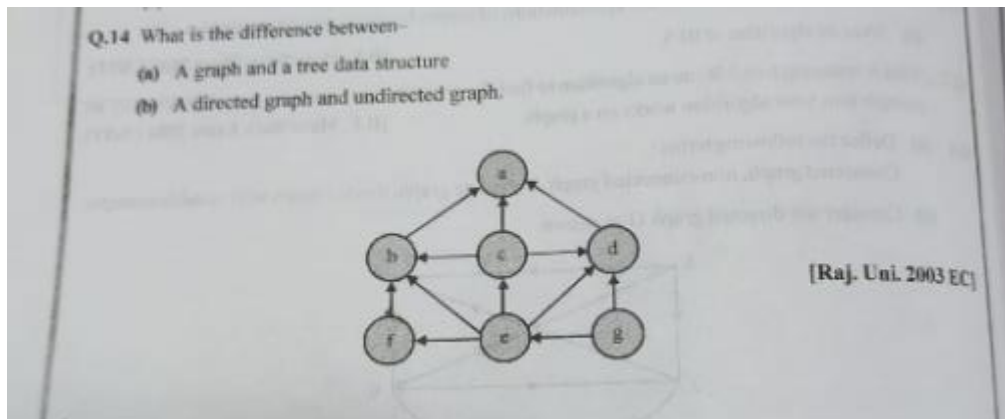Q.11 (a) Describe an algorithm to find a minimum spanning tree T of a weighted graph G

[B.E. -CS 2001]

(b) Find a minimum spanning tree T of the graph in the fig. given below

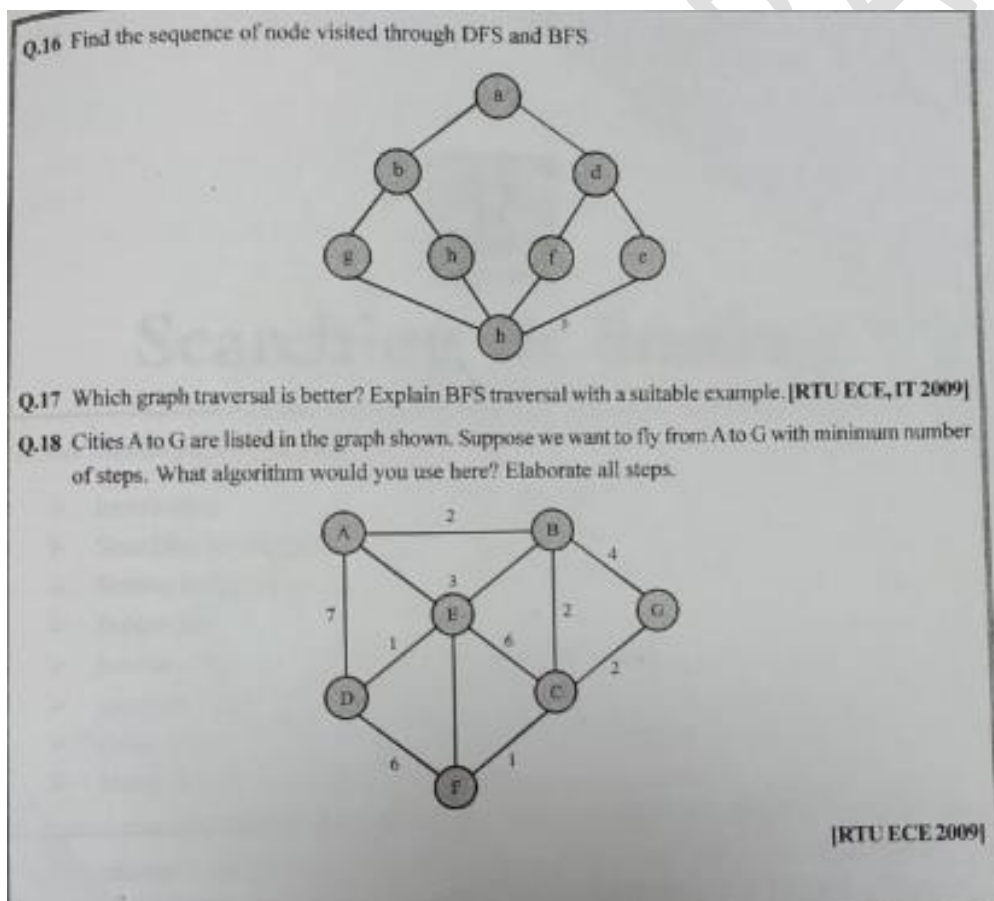Q12. Write short notes on Shortest Path Algorithm

Q13 (a) Write an algorithm for Depth First Search

(b) Show that depth-search starting from vertex V visits all vertices reachable form V.

Q15. Obtain:

a.   In degree and out degree of each vertex.

b.   Its adjacency matrix

c.   Its adjancencey list representation

Q.16 Find the sequence of node visited through DFS and BFS

Q.17 Which graph traversal is better? Explain BFS traversal with a suitable example. [RTU ECE, IT 2009]

Q.18 Cities A to G are listed in the graph shown. Suppose we want to fly from A to G with minimum number of steps. What algorithm would you use here? Elaborate all steps.

[RTU ECE 2009]

SEARCHING AND SORTING

Q1. What is sorting Write a program to short a list of integer numbers using babble sort.

Q2. What do you mean by searching. Write an algorithm for binary search.

Q3. Write a function to merge two sorted arrays A & B into singly sorted array C.

Q4 Write an algorithm to sort the real numbers using insertion sort and selection sort. What is the time complexity for both selection and insertion sort

Q.5 What is the difference between an internal sorting and external sorting

Q.6 What is quick sort. Explain it with a suitable example and write an algorithm for quick sort. What is the time complexity.

Q7 Write an algorithm to create the min heap.

Q.8 What is heap? Write an algorithm for heap sort.

Q.9 Write a short note on Quick Sort

Q.10 (a) Generate a MIN HEAP tree with showing all steps for following elements: 48, 37,55, 25, 70, 28,72,50 (b) Explain Hashing. Discuss its suitability for storing symbol table. Suggest a method to handle collision and overflow in a hash table.

Q.11 Under what circumstances would you recommanded the use others? Shell Sort, heap sort, quick sort.of each of the following sorts over the

Q.12 Write short notes on Bubble sort and selection sort.

Q.13 (a) In which condition insertion sort is batter than quick sort? Explain.

(b) Write an algorithm for heap sort and also show by giving an example how your algorithm works.

(c) Compare and contrast merge sort and quick sort.

Q.14 Write an algorithm to deletion of node from heap.

Q.15 The following are the elements of the original array: 25, 55, 46, 35, 10, 90,

Q.16 Out of the sorting techniques studied by you, which sorting techniques are O(n) and which are O(n log, n)?

Q.17 Write short notes on:

(1) Selection sort

(ii) Quick sort

Q.18 Write an algorithm to sort a list of N integer elements using bubble sort.

Q.19 Which minimum spanning tree algorithm is better and why? Write Kruskal algorithm. Explain it with suitable example.

Q.20 Which is better among bubble, selection and insertion sorting methods?

Q.21 What do you understand by "heap"? Explain quick sort method with a suitable example.