

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester-III C.E./I.T.

Subject Code:-CE/IT 304

Date:- 16.4.15

Subject name:-DATA STRUCTURE AND ALGORITHMS

Time:- 10:30 to 11:30

Total Marks:-70

Instruction:

1. Answer each section in separate Answer sheet.
2. Use of Scientific Calculator is permitted.
3. All questions are **Compulsory**.
4. Indicate **clearly**, the options you attempt along with its respective question number.
5. Use the last page of main supplementary of **rough work**.

Section-I

Q-1 (All compulsory)

- (A) Define data structure. Briefly explain linear and nonlinear data structures [5] with their applications.
- (B) Write an algorithm for stack operations Push and Pop. Assume stack is [5] implemented using array.
- (C) Discuss best case, average case and worst case time analysis with example. [5]
- OR**
- (C) Evaluate the following infix expression: [5]
 $2 \$ 3 + 5 * 2 \$ 2 - 6 / 6$

Q-2 Answer the following Questions.

- (A) Write an algorithm to insert a node in an ordered linked list. [5]
- (B) Translate the following string into polish notation and trace the content of [5] stack : A - (B / C + (D % E * F) / G) * H
- OR**

- (A) Explain delete operation of doubly linked list. [5]
- (B) Explain insert and delete function of circular queue. [5]

Q-3 Answer the following Questions.

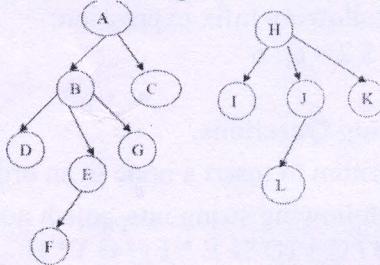
- (A) Given the following traversals create a binary tree from that. Also give the [5] Postorder traversal for the same.
Preorder = {7,10,4,3,1,2,8,11} Inorder = {4,10,3,1,7,11,8,2}
- (B) Explain the application of linked-list. [5]
- OR**
- (A) Define threaded binary tree. What are the advantages of threaded binary [5] tree?
- (B) Define tree. Write an algorithm to do in-order traversal and post-order [5] traversals of Binary Search Tree.

Section-II

- Q-4 (All compulsory)**
- (A) Define the following terms [5]
i) Node
ii) Sibling
iii) Path
iv) Indegree & outdegree of a vertex
v) Connected graph
- (B) Construct a binary search tree for the following sequence. [5]
45,56,39,12,34,78,54,67,10,32,89,81
- (C) Explain Binary search with example. [5]
- OR**
- (C) Explain linear search with example. [5]

- Q-5 Answer the following Questions.**
- (A) Explain DFS traversal of Graph using example. [5]
(B) Write an algorithm for selection sort. [5]
- OR**

- (A) Trace procedure to convert following forest into binary tree. [5]



- (B) Write an algorithm for quick sort. [5]

- Q-6 Answer the following Questions.**
- (A) Explain various multiple key access file organization in brief with advantages and disadvantages of each method. [5]
(B) The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function $h(k) = k \bmod 10$ and linear probing. What is the resultant hash table?
OR
- (A) Write a short note on inverted key file organization. [5]
(B) What do you mean by Hashing? Explain any FOUR hashing techniques. [5]

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester-III C.E.I.T.

Subject Code:-CE/IT 304

Date:-26/04/2014

Subject name:-DATA STRUCTURE AND ALGORITHMS

Time:-10:30 am to 1:30 pm

Total Marks:-70

Instruction:

1. Answer each section in separate Answer sheet.
2. Use of Scientific Calculator is permitted.
3. All questions are **Compulsory**.
4. Indicate **Clearly**, the options you attempt along with its respective question number.
5. Use the last page of main supplementary of **rough work**.

Section-I

Q-1 (All compulsory)

(A) Define following terms:-

[5]

- Tree
- Graph
- Stack
- Queue
- Array

(B) Describe operations on a Stack.

[5]

(C) Explain Tower of Hanoi Problem.

[5]

OR

(C) What is sparse matrix? Explain memory representation of sparse matrix.

[5]

Q-2

(A) Convert following infix expressions to the postfix expressions. Shows stack trace. $(P + Q) * R + S / (T + U * V) + W$

[5]

(B) Write an algorithm to insert a node into singly linked list.

[5]

OR

(A) Write an algorithm to delete a node from singly linked list.

[5]

(B) Write an algorithm/program to implement insert operation into a Queue.

[5]

Q-3

(A) Differentiate between Array and Stack.

[5]

(B) Give advantage and uses of a Circular Linked List.

[5]

OR

(A) Explain Priority Queue.

[5]

(B) Construct the Binary tree for the following Expression:

[5]

$((a + b) - (c * d)) \% ((e ^ f) / (g - h))$

Section-II

Q-4 (All compulsory)

- (A) Explain insertion operation in binary search tree. [5]
(B) Differentiate between depth-first search and breadth-first search traversal of a graph. [5]
(C) Explain prim's algorithm. [5]

OR

- (C) What is AVL tree? Explain insertion operation in it. [5]

Q-5

- (A) Create a binary search tree for the following data : [5]
98 , 2 , 48 , 12 , 56 , 32 , 4 , 67 , 23 , 87 , 23 , 55 , 46
(B) Explain Bubble sort using example. [5]

OR

- (A) Explain BFS (Breadth First Search) with example. [5]
(B) Explain Insertion sort with example. [5]

Q-6

- (A) What is collision in hash table? Explain open addressing techniques to resolve a collision. [5]
(B) Write a short note on inverted key file organization. [5]

OR

- (A) Consider hash table with size= 9. Using Chaining method , insert the keys 7, 24, 18, 52, 36, 54, 11, 23, 60 in chained hash table. Use $h(k) = k \bmod m$. [5]
(B) Write a short note on sequential file organization. [5]

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester-III C.E./I.T.

Subject Code:-CE 304

Date:-27/11/2013

Subject name:-DATA STRUCTURE AND ALGORITHMS

Time:- 10:00 am TO 1:00 pm

Total Marks:-70

Instruction:

1. Answer each section in separate Answer sheet.
2. Use of Scientific Calculator is permitted.
3. All questions are **Compulsory**.
4. Indicate **Clearly**, the options you attempt along with its respective question number.
5. Use the last page of main supplementary of **rough work**.

Section-I

Q-1 (All compulsory)

- (A) Define data structure. Briefly explain linear and non linear data structures [5]
With their applications.
- (B) What is sparse matrix? Explain memory representation of sparse matrix. [5]
- (C) What are the advantages and disadvantages of stack and queue [5]
implemented using linked list over array?

OR

- (C) Convert following infix expressions to the postfix expressions. Shows stack [5]
trace. $(A + B) * D + E / (F + G * D) + C$

Q-2 Answer the following Questions.

- (A) Write an algorithm/program to implement insert operation into a Circular [5]
Queue using array representation of Queue.
- (B) Write an algorithm to insert a new node into doubly linked list. [5]

OR

- (A) What is Tower of Hanoi? Explain it with $n=3$. [5]
- (B) Write an algorithm to delete a node from doubly linked list. [5]

Q-3 Answer the following Questions.

- (A) Explain Priority Queue. [5]
- (B) What is the meaning of height balanced tree? How rebalancing is done in [5]
Height balanced tree?

OR

- (A) Write a short-note on threaded binary tree. [5]
- (B) Describe advantages and disadvantages of linked list over array. [5]

Section-II

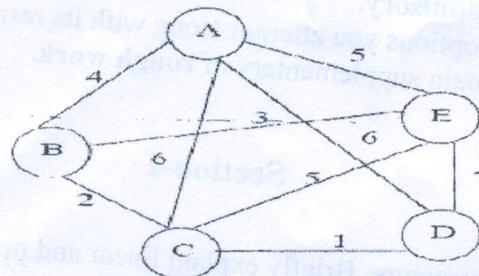
Q-4 (All compulsory)

- (A) Construct a tree for the given inorder and postorder traversals. And also find [5] preorder traversal for that tree.

Inorder:- DGBAHEICF

Postorder:- GDBHIEFCA

- (B) Define spanning tree and minimum spanning tree. Find the minimum [5] Spanning tree of the graph shown in fig.



- (C) Create a binary search tree for the following data : [5]
50, 25, 75, 22, 40, 60, 80, 90, 15, 30

OR

- (C) Explain BFS (Breadth First Search) with example. [5]

Q-5 Answer the following Questions.

- (A) Explain Selection sort using example. [5]

- (B) Sort the following data using heap sort method. [5]
21, 34, 12, 67, 98, 67, 44, 81.

OR

- (A) Explain quick sort with example. [5]

- (B) Explain DFS (Depth First Search) with example. [5]

Q-6 Answer the following Questions.

- (A) What do you mean by hashing? Which is various hash function? Explain [5] each one in brief.

- (B) Write a short note on indexed file organization. [5]

OR

- (A) The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty [5] hash table of length 10 using open addressing with hash function $h(k) = k \bmod 10$ and linear probing. What is the resultant hash table?

- (B) Write a short note on inverted key file organization. [5]

KADI SARVA VISHWAVIDHYALAYA**B.E. SEMESTER-III EXAMINATION (DECEMBER - 2015)****SUBJECT CODE: CE 304/IT 304 SUBJECT NAME: Data Structures and Algorithms****DATE: 5/12/2015****TIME: 10:30 a.m. TO 1:30 p.m.****TOTAL MARKS: 70****Instructions:**

1. Answer each section in separate Answer Sheet.
2. Use of scientific Calculator is permitted.
3. All questions are compulsory.
4. Indicate **clearly**, the options you attempted along with its respective question number.
5. Use the last page of main supplementary for rough work.

SECTION-1

Q.1 (a) Discuss best case, average case and worst case time analysis with example. [5]

(b) Translate the following string into Polish notation and trace the content of stack [5]
 $A - (B / C + (D \% E * F) / G) * H$

(c) Explain the application of stack, queue, and linked list in detail. [5]

OR

(c) $((A/(B^C))+(D*E))-(A*C))$. Convert from infix to postfix form by showing [5]
 stack implementation and then put the values A=27, C=2, E=17, D=3, B=3

Q.2 (a) What is Tower of Hanoi? Explain it with n=3. [5]

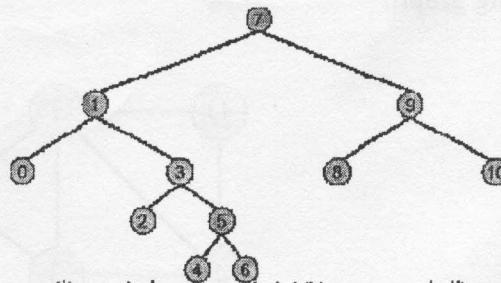
(b) Given the following traversals create a binary tree from that. Also give the [5]
 postorder traversal for the same.

preorder = {7,10,4,3,1,2,8,11}

inorder = {4,10,3,1,7,11,8,2}

OR

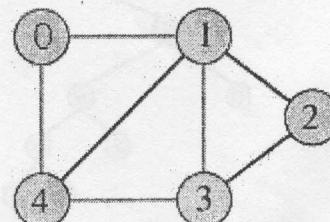
Q.2 (a) Give traversal order of following tree into inorder, preorder and postorder. [5]



- (b) Write an algorithm to insert node in a linear singly link list. [5]
- Q.3 (a)** Sort the list 35, 20, 40, 100, 3, 10, 15 using insertion sort method. [5]
- (b) Consider inserting the keys 76, 26 37, 59, 21, 65, 88 into a hash table of size $m=11$ using linear probing. Illustrate the result of inserting of these keys using linear probing method. The hash function for linear probing is given below.
 $h(k, i) = [h'(k) + i] \text{ mod } m$ for $i=0,1,2,3,\dots,m-1$.
Further consider that the primary hash function is $h'(k) = k \text{ mod } m$.
- OR**
- Q.3 (a)** Demonstrate the insertion of keys 28, 5, 19, 15, 33, 12, 12, 17, 77, 20 into a hash table with 9 slots and collision resolved by synonym chaining. Let the hash function be $h(k) = k \text{ mod } 9$. [5]
- (b) $A = (38\ 81\ 22\ 48\ 13\ 69\ 93\ 14\ 45\ 58\ 79\ 72)$. Sort the given array by using Quick Sort algorithm. [5]

SECTION-2

- Q.4 (a)** Insert the following nodes in AVL (Height Balanced) tree. [5]
55, 66, 77, 15, 11, 33, 22, 35, 25, 25, 44, 88, 99.
- (b) Define the following terms (any five) : Path, Cycle, Degree of vertex, Sibling, Height Balanced Tree, Strictly binary tree, in degree [5]
- (c) What do you mean by Hashing? Explain any THREE hashing techniques [5]
- OR**
- (c) Write a short note on Breadth First Search and Depth First Search in graph. [5]
- Q.5 (a)** Insert the following nodes in the AVL tree. [5]
January, February, March, April, May, June, July, August, September, October, November, December.
- (b) Explain insert and delete function of circular queue. [5]
- OR**
- Q.5 (a)** Write an algorithm to perform Binary Searching. [5]
- (b) Show the possible adjacency matrix and adjacency list representation for the following graph: [5]



Q.6 (a) Define data structure. List the various linear and non-linear data structures and [5]
explain them in brief.

(b) Explain following (any two): (i) DQUEUE (ii) Priority Queue (iii) Circular [5]
Queue.

OR

Q.6 (a) Write a short note on Time Complexity of an algorithm. [5]

(b) Write an advantage of link list, doubly link list and circular link list. [5]

*******BEST OF LUCK*******