

Printed Pages : 3

Roll No.

Questions : 7

Sub. Code :

6	8	0	1
---	---	---	---

Exam. Code :

9	1	5
---	---	---

B.Egg. Computer Science & Engg. 3rd Semester
1124

DATA STRUCTURES**Paper – CSE-311****Time Allowed : Three Hours]****[Maximum Marks : 50**

Note : Attempt five questions in all, including Q 7 in Section C, which is compulsory and taking two each from Section A and Section B.

SECTION—A

1. (a) Consider two-dimensional integer array `int a[5][4]` declared in C program. If the base address is 510, find the address of the element `a[3][2]` both with the row major and column major representation respectively.
- (b) Write the steps in Pseudo code to insert an item in doubly linked list.
- (c) What is a queue? How is it represented in 'C' using array? What are the operations to be performed to implement a queue using array? 3,4,3
2. (a) When is the binary search technique used for searching in a list? Write a recursive algorithm for binary search. Compare the performance of binary search with linear search.
- (b) Write an algorithm for push, pop and empty operations on stack. 5,5

6801/BDF-24644

1

[Turn over

(b) Design a universal
facilities.

Section –
5. (a) Describe the working of CMOS NAND gate. What are the precautions in handling CMOS gates? What are the precautions in handling CMOS gates? Write a program table that squares a

3. (a) Which of the algorithms out of *insertion sort* (c) *selection sort* would you prefer to use on random data? Justify your answer.

- (b) Write an algorithm to implement bubble sort, and sort the following list in ascending order by using Bubble Sort algorithm.

14, 11, 3, 15, 18, 9

3,7

SECTION—B

4. (a) Define height of the binary tree. Define height balanced tree with its advantages. Construct a height balanced binary tree (AVL tree) for the data :

42, 06, 54, 62, 88, 50, 22, 32, 12, 33

- (b) What is graph? How it can be represented using adjacency matrix?

5,5

5. (a) Discuss problem of collision in Hashing. The integers given below are to be inserted in a hash table with 5 locations using chaining to resolve collisions. Construct hash table and use simplest hash function :

1, 2, 3, 4, 5, 10, 21, 22, 33, 34, 15, 32, 31, 48, 49, 50

- (b) List various fundamental file organization techniques and explain each in brief.

5,5

6. (a) Compare the efficiencies of BFS and DFS as searching algorithms used for graphs and trees.

- (b) Construct binary search tree for the data :

10, 3, 15, 22, 6, 45, 65, 23, 78, 34, 5

What are the advantages of tree indexing on flash disks?
Construct B-tree of order 5 for the data :

1, 7, 6, 2, 11, 5, 10, 13, 12, 20, 16, 24, 3, 4, 18, 19, 14, 25.

4, 2, 4

SECTION— C (Compulsory Question)

7. (a) What are the advantages of circular linked list ?
(b) Give any four applications of stack as a data structure.
(c) What are the characteristics of a good hash function ?
(d) Why is Threaded binary tree required ?
(e) What is an inverted file ?

5×2=10

Printed Pages : 3

Roll No.

Questions : 7

Sub. Code :

6	8	0	1
---	---	---	---

Exam. Code :

9	1	5
---	---	---

B.Engg. (Computer Science and Engg.) 3rd Semester

1125

DATA STRUCTURES

Paper-CSE-311

Time Allowed : Three Hours]

[Maximum Marks : 50

Note :— Attempt **five** questions in all, including Q. No. 7 in Section C, which is compulsory and taking **two** questions each from Sections A and B.

SECTION-A

1. (a) What are the parameters to judge the efficiency of an algorithm? Explain various notations for representation of time complexity of an algorithm.
- (b) What is Data Structure? What are the factors that influence the choice of a particular data structure? 5,5
2. (a) Write an algorithm for matching different parenthesis such as {, [, (in an algebraic expression.
- (b) Write an algorithm that reverses the order of elements on stack using one additional stack and some additional variables. 5,5
3. (a) Develop an algorithm to delete a specific element in a singly linked list.

6801/BHJ-32744

1

[Turn over

Question IV (a) Determine the eigen values and corresponding eigen

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

- (b) Doubly linked list takes more space than singly linked list by storing one extra address. In what condition a doubly linked list could be more beneficial than singly linked list?

SECTION-B

4. (a) What are the different ways in which the graph is represented in computer memory?
- (b) What is Minimal Spanning Tree (MST)? Write an algorithm to find the MST.
5. (a) Perform Heap sort on the following list of integers :
23, 5, 47, 58, 4, 52, 15, 48, 26, 3, 11, 4, 7.
- (b) What is hash table? How using hash table is beneficial for us? Explain collision resolution strategies used in hash table.
6. (a) What is tree data structure? Explain the different ways of traversing a tree.
- (b) Define AVL tree. Explain the different types of rotation done in AVL tree.

SECTION-C

(Compulsory Question)

7. (a) Differentiate between iteration and recursion giving suitable example. Recursion takes more execution time when compared to iteration? Give reason.

- (b) What is a sparse matrix ? How sparse matrices can be represented efficiently in memory ?
- (c) Differentiate between primitive data type and abstract data type.
- (d) What is a binary search tree ?
- (e) Give applications of heap data structure. $5 \times 2 = 10$

1	1	1
1	1	1
1	1	1

Exam Code: 0915
Sub. Code: 6801

B.E. (Computer Science and Engineering) Third Semester
1076
CSE-311: Data Structures

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. VII (Unit-III) which is compulsory and selecting two questions each from Unit I - II.

x-x-x

UNIT - I

- I. a) Write an algorithm for the creation, insertion and deletion of elements from a doubly Linked List.
b) Give applications of a Queue. Write a function for adding and removing element from a Queue. (5,5)
- II. a) How is binary search different from linear search? Write the binary search algorithm and compute its time complexity.
b) What is a recursive algorithm? Explain the mathematical analysis of Fibonacci recursive algorithm. (5,5)
- III. a) How are one-dimensional, two-dimensional, and three-dimensional arrays initialized and represented in main memory? Explain with an example program.
b) Give the algorithm for merge sort. Sort the following elements using merge sort:
70, 20, 30, 40, 10, 50, 60 (5,5)

UNIT - II

- IV. a) What is a binary search tree? Explain with the help of an example. What are its advantages?
b) Write an algorithm/C++-program to traverse the graph using the Depth First Search (DFS) traversal method. (5,5)
- V. a) What are the different methods for collision resolution in hashing? Explain Linear Probing.
b) What are B-trees? Construct a B-Tree of order 3 for the following set of input data:
69, 19, 43, 16, 25, 40, 132, 100, 145, 7, 15 (5,5)

P.T.O.

(2)

- VI. a) List various fundamental file organization techniques and explain each in brief. (5, 5)
b) What is an inverted file? Explain its utility with examples.

UNIT - III

VII. Attempt the following:-

- a) What are the parameters to judge the efficiency of an algorithm?
b) What are the factors that influence the choice of a particular data structure?
c) What do you mean by garbage collection?
d) What are the different ways in which the graph is represented in computer memory?
e) What are AVL trees? (5x2)

x-x-x

Exam.Code:0915
Sub. Code: 6776

1127

B.E. (Computer Science and Engineering)
Third Semester
CS-301: Data Structure

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

1.	a.	Differentiate between data type and abstract data type.	2
	b.	What do you mean by balance factor of a node in AVL tree?	2
	c.	Define the degree and height of a node in a tree.	2
	d.	Mention the advantages of representing stacks using linked lists rather than arrays.	2
	e.	What is a minimum spanning tree?	2
UNIT I			
2.		What do you understand by circular linked lists? Write down algorithms for inserting and deleting a node in circular linked list.	10
3.	a	What are stacks? List any two applications of stacks.	4
	b	Write an algorithm to implement stacks using arrays.	6
4.		Write an algorithm to perform Selection Sort. Demonstrate different passes of selection sort using following array: 41, 21, 34, 66, 58. Also, write its best-case runtime complexity.	10
UNIT II			
5.	a	Differentiate between breadth first traversal and depth first traversal with an example.	5
	b	Discuss different ways of representing a graph with an example.	5
6.	a	Write an algorithm to delete a node from a binary search tree.	5
	b	Make a binary search tree for the following sequence of numbers: 46, 35, 23, 42, 89, 56, 69, 75, 100, 20 Traverse the tree in Preorder and Postorder.	5
7.	a	What do you understand by separate chaining? List its advantages and disadvantages.	5
	b	Define heap and discuss its properties. Write its application in implementing priority queue.	5

x-x-x

B. E. (Computer Science and Engineering)
Third Semester
CS-301: Data Structures

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I (Section-A) which is compulsory and selecting two questions from each Section B-C.

x-x-x

SECTION -A

Q1)

- a) Give differences in AVL and B trees.
- b) Compare B tree based and Hash indexing.
- c) Which is best data structure to store records in memory?
- d) Give structure of two way circular header linked list.
- e) Give memory representation for deque.

(5x2=10 marks)

SECTION -B

- Q2) a) Write functions to implement recursive version of Preorder traversal of binary tree. (6 marks)
b) Draw a binary tree for the following algebraic expression: (4 marks)
 $[a + (b - c)] * [(d - e) / (f + s - h)]$
Write pre order and post order traversals of the binary tree (by using example of constructed binary tree for the above expression).

(3 marks)

- Q3) a) What is Big O notation? What is its significance? (3 marks)
b) Apply merge sort on given series and specify its complexity. (7 marks)
44,33,11,55,77,90,40,60,99,22,88,66

- Q4) a) Write an algorithm which reverses the order of elements of stack using one dimensional stack and some additional variables. (5 marks)
b) Write algorithm for insertion in priority queue. (5 marks)

SECTION- C

- Q5) a) Give polish notation representation of the following expressions?
(i) $(a * (b + a)) + (b / d) * a + z$ (4 marks)
(ii) $(a + (b + c * (d + e))) + f$ (6 marks)
b) Explain various operation possible on a doubly link list with algorithm. (10 marks)

- Q6) Write short note on any Two:
(i) Insertion and Deletion in B-trees.
(ii) Huffman's Algorithm
(iii) Collision resolution techniques for hashing.

- Q7) a) What is breadth first search? Write an algorithm with the help of a suitable example for breadth first search. (5marks)
b) Describe an algorithm to find the minimum spanning tree T of weighted Graph G. (5marks)

x-x-x