Printed Page:- Subject Code:- ACSBS0203

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - CARRY OVER THEORY EXAMINATION - SEPTEMBER 2022

Subject: Data Structures & Algorithms

Time: 3 Hours Max. Marks: 100

General Instructions:

1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.
2. Section A - Question No- 1 is 1 marker & Question No- 2 carries 2 mark each.
3. Section B - Question No-3 is based on external choice carrying 6 marks each.
4. Section C - Questions No. 4-8 are within unit choice questions carrying 10 marks each.
5. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A 20

1. Attempt all parts:-

1 Which of the following is incorrect? Algorithms can be represented: (CO1) 1

(a) as pseudo codes

(b) as syntax

(c) as programs

(d) as flowcharts

1 A function in which f(n) is $\Omega(g(n))$, if there exist positive values k and c such that f(n)>=c*g(n), for all n>=k. This notation defines as: (CO1) 1

(a) Worst Case

(b) Best Case

(c) Average Case

(d) None of the above

1-c. Consider an array A[20, 10], assume 4 words per memory cell and the base address of array A is 100. What is the address of A[11, 5]. Assume row-major address? (CO2) 1

(a) 560

(b) 660

(c) 760

(d) 860

1-d. In a stack, if a user tries to remove an element from empty stack it is called _____. (CO2) 1

(a) Overflow

(b) Over sized

(c) Data Flow

(d) Underflow

1-e. Suppose a complete binary tree has height h>0. The minimum no of leaf nodes possible in term of h is: (CO3) 1

(a) 1

(b) 2

(c) 3

(d) 4

1-f. In which traversal root node is visited at the last? (CO3) 1

(a) In-Order Traversal

(b) Post-Order Traversal

(c) Pre-Order Traversal

(d) None

1-g. A sort which iteratively passes through a list to exchange the first element with any element less than it and then repeats with a new first element. (CO4) 1

(a) Insertion sort

(b) Quick sort

(c) Selection sort

(d) Heap sort

1-h. How many comparisons are needed to sort an array of length 5 if selection sort is used to sort the array? (CO4) 1

(a) 5

(b) 20

(c) 10

(d) 1

1-i. What is the number of edges present in a complete graph having n vertices ? CO5 1

(a) n*(n-1)

(b) (n*(n-1))/2

(c) n*(n+1)

(d) n

1-j. For a given graph G having v vertices and e edges which is connected and has no cycles, which of the following statements is true? (CO5) 1

(a) Multi Graph

(b) Open Graph

(c) Simple Graph

(d) Complete Graph

2. Attempt all parts:-

2.a. How an algorithm can be robust? (CO1) 2

2.b. What do you mean by linked list? (CO1) 2

2.c. How many null nodes will a binary tree with 20 nodes have? 2

2.d. Define hashing. (CO5) 2

2.e. What is a directed graph? (CO5) 2

SECTION B 30

3. Answer any five of the following:-

3-a. What is a data structure? Why do we need to study data structures? (CO1) 6

3-b. What is recursion? Indicate its properties? (CO1) 6

3-c. What are the applications of stack? (CO2) 6

3-d. State the advantages and disadvantages of Circular Link List over Doubly Linked List and Singly Linked List. (CO2) 6

3.e. Explain Inorder, Preorder and Postorder Traversal operation on Binary tree with example.m (CO3) 6

3.f. Sort the given values using Quick Sort. 65, 70, 75, 80, 85, 60, 55, 50,45,77,22,10. (CO4) 6

3.g. Explain Breadth First Search traversal of Graph using an example. (CO5) 6

SECTION C 50

4. Answer any one of the following:-

4-a. Explain Abstract Data Types in detail. Also mention the features of ADT. (CO1) 10

4-b. Define various asymptotic notations in detail. (CO1) 10

5. Answer any one of the following:-

5-a.	Discuss Infix and Postfix expression. Write an algorithm for converting Infix expression into Postfix expression. (CO2)	10
5-b.	How the queue is implemented by linked list? Explain with help of a program. (CO2)	10

6. Answer any one of the following:-

6-a.	Create a Binary Search Tree for the following data and do in-order, Preorder and Post-order traversal of the tree. 50, 60, 25, 40, 30, 70, 35, 10, 5 (CO3)	10
6-b.	Construct a tree for the given inorder and postorder traversals. (CO3) Inorder : DGBAHEICF	10

7. Answer any one of the following:-

7-a.	What is insertion sort and what is its complexity? Explain the procedure of insertion sort with an example. (CO4)	10
7-b.	Explain Selection Sort with the help of an example. (CO4)	10

8. Answer any one of the following:-

8-a.	What do you understand by BFS. Discuss with an appropriate example. Differentiate BFS and DFS. (CO5)	10
8-b.	List various fundamental file organization techniques and explain each in brief.m (CO5)	10