CRAWFORD UNIVERSITY FAITH CITY IGBESA
SCHOOL OF PART-TIME STUDIES
DEPARTMENT OF COMPUTER AND MATHEMATICAL SCIENCES
COURSE CODE: CSC 305 COURSE TITLE: DATA STRUCTURE AND ALGORITHMS
SESSION: 2021/2022 TIME: 2 1/2 HOURS FIRST SEMESTER

Instructions:

- **Use your matriculation number as the only means of identification on your answer script.**
- **ANSWER FOUR (4) QUESTIONS IN ALL.**

Question One

a. What is an Algorithm? 1mark

b. Why is it necessary to analyse algorithms? 2marks

c. The running time of an algorithm is analysed using asymptotic notations. Enumerate on the concepts of this notations and how they work 9marks

d. Identify the following growth rates in the analysis of algorithms 3marks

SN	Time Complexity	Name
1	1	
2	Log n	
3	n	
4	nlogn	
5	n^2	
6	2^n	

Question Two

a. Define the term Array and give a graphical representation of an array. 3marks
b. Mention two advantages and disadvantages of array data structure 4marks
c. Why do we need linked list? 2marks
d. Expatiate on the various types of linked lists that exists 6marks

Question Three

a. Explain the operation of a stack data structure using a diagrammatic illustration 5marks
b. State the basic operations performed on stack 3marks
c. How does a stack differ from a queue? 3marks
d. Using pseudo code, explain the two basic types of operations performed in a queue data structure4marks

Question Four

a. Define Searching? 2marks
b. What do you understand by a binary search? What is the best scenario of using it? 3marks
c. i. Define Hashing 1mark
ii. What problem can be encountered using hash functions and how can it be solved? 2marks

iii. Given the size of an hash table to be 20 the following items are to be stored on the hash table (0,10), (12,67), (5,87), (3,40), (16, 98), (32, 56), (22, 12), (73, 23),(46, 13), (34,34), (98, 37), (21, 56), (23, 108). Construct a hash table and use linear probing where necessary 7marks

Question Five

a. An algorithm is designed to achieve optimum solution for a given problem. Explain the concept of the following algorithms

i. Greedy Algorithms
ii. Divide and Conquer
iii. Dynamic Programming 6marks

b. There is no fit all algorithm for all problems, hence the need for optimal solutions. State two greedy algorithms and one divide and conquer algorithms , and explain their mode of finding optimal solution 9marks

Question Six

a. What is sorting? 2marks

b. Describe the algorithm for carrying out two out of the following 6marks

i. bubble sort.
ii. Insertion sort
iii. Quick sort
iv. Merge sort
v. Bucket sort

c. Explain the term Graph 2marks

d. Mention the various operations performed on a Graph 3marks

e. Differentiate between directed and undirected Graph 2marks