**CROSS RIVER UNIVERSITY OF TECHNOLOGY (CRUTECH) CALABAR**

**DEPARTMENT OF COMPUTER SCIENCE**

**CSC 2202 - FUNDAMENTALS OF DATA STRUCTURES**

**Instruction: answer any four questions.**

1. (a) What is Data structure? Explain six basic operations that are performed on data structures.

(b) Distinguish between: (i) Primitive and Abstract data structures (ii) Linear and Non-linear data structures

(c) What is the benefit of using Abstract data type (ADT) in data structure

2.(a) State the difference between a stack and a queen

(b) what are the basic function of the following queen operations? (i) enquene (x) (ii) dequene (x) (iii) front (), (iv) empty ()

© show the result of the following operations on a queen Q.

Enquene (Q, 33)

If not empty (Q) dequene (Q)

enqueue (Q 40)

enqueue (Q, 18)

if not empty (Q), dequeue (Q)

3. (a) What are linked lists? Name and explain three types of linked lists

(b) What are Arrays? Write a program to read and print the elements are 2, 5, 7, 8, 0, 5.

4. (a) what is a Record Structure? Declare a record structure to store the title, author, ISBN number and price of a book.

(b) Write a program to fill and output the details of the record structure in (a) above.

5.(a) What is the maximum number of nodes in a binary tree having 5 level?

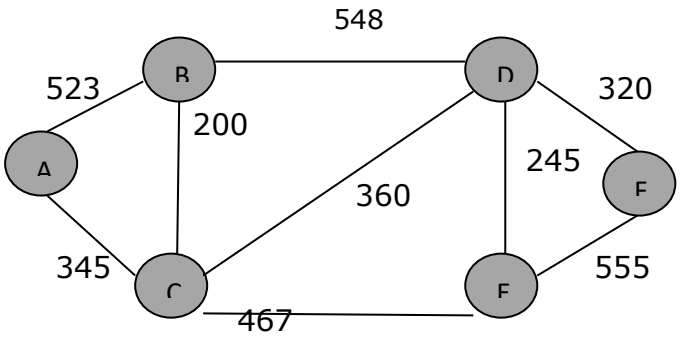
(b) calculate the total number of leaf nodes in a full binary tree with a height of 3. Sketch the binary tree.

© Draw the expression tree for the expression: (a – b)/ (c * d) + e).

Hence, perform the pre-order, in –order, post-order and breadth-first traversals of the tree?

6. (a) What is a graph?

(b) Examine the weighted graph below and answer the questions that follows.




(i) Determine the adjacency matrix representation

(ii) Find the corresponding adjacency lists representation

(iii) Find the degree of each node of the simple graph

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**SECOND SEMESTER EXAMINATION 2018/2019**

**CSC 2202 - FUNDAMENTALS OF DATA STRUCTURES**

**Instruction: answer any four questions.**

1. **(a)** Briefly explain how data structures are useful in the following situation: (i) Real world data storage (ii) programming tools (iii) Modeling

   **(b)** What is a constructor in java programming?

   **(c**) With illustrations/diagrams, write an algorithm to add a node in the beginning of a doubly linked list.

2. **(a)** With illustrations/diagrams, write an algorithm to insert a new node at the beginning of singly linked lists.

   **(b)**(i)Explain inheritance and polymorphism in OOP. (ii) What is the function of the public and private keyword in java.

   **(C)** Given the following statement in java, explain the meaning and how the program handle the statement during execution: int intArray[]= new int [50];

3. **(a)** Write down and explain the working of the simple insertion-sort algorithm.

   **(b)**Write down the simple java code to perform insertion-sort on an array of characters.

   **(c)**With illustration/diagrams, write an algorithm to remove a node in the beginning of a singly linked lists.

4. **(a)** With an illustration/example explain what a linked list is.

**(b)**With illustration/diagrams, write an algorithm to insert a new node at the end of a singly linked lists.

**(c)**(i)Using an appropriate illustration show how to access array elements in java. (ii) With an example, explain the function of the following java methods: (i) new String (A) (ii)S.toCharArray,(). (iii) toString()

**5. (a)** With an illustration/diagram describe an doubly linked list.

**(b)**With illustration/diagrams, write an algorithm to remove the last node of a doubly linked list.

**(c)**State the characteristics of the following data structures in terms of their advantages and disadvantages: stack, binary tree, hash table, and 2-3-4 tree

**6.** Write an algorithm to sum the elements of an array recursively.

**(a)**(i)Describe a stack data structure (ii)What is the function of the following stack methods in java: Push(e) and pop()

**(b)**(i)Describe the Queue abstract data type. (ii)What is the function of the following stack methods in java: enqueuer(e), and dequeuer()

**(c)**with illustrations/diagrams, write an algorithm to remove a node in the middle of a doubly linked lists.