Hajee Mohammad Danesh Science and Technology University, Dinajpur.
Department of Computer Science and Engineering
B.Sc. (Engineering) in CSE
Semester Final Examination 2020 (Online)
Level 2   Semester I
Course Code: CSE 203 Credits: 3.0
Course Title: Data Structures (Theoretical)

Time: 1.5 Hours   Total Marks: 90

*[N.B. The figure in the right margin indicates the marks for respective question and
Split answer of any question is unacceptable]*

Section-A
Answer any Three

1. a) What is meant by data structure? Write some names of linear and   3+2
       nonlinear data structures.
   b) In data structure the choice of a particular data model depends on two   2+3
       things: what are they?Briefly describe the space-time tradeoff of
       algorithms.
   c) What does Big O notation do?Give an example.   5

2. a) What is a linked list? Describe the advantages and disadvantages of a   2+5
       linked list.
   b) Write down the insertion algorithm in a linked list.   8

3. a) The following figure pictures a linked list in memory.   11

		INFO	LINK
START	1	A	2
4	2	B	8
	3		6
AVAIL	4	C	7
3	5	D	-100
	6		-100
	7	E	1
	8	F	5

      i)   Find the sequence of characters in the list.
      ii)   Suppose F and C are deleted from the list and then G is
            inserted at the beginning of the list. Find the final structure.
      iii) Suppose G is inserted at the beginning of the list and then F
            and C are deleted from the structure. Find the final structure.
   b) Define header linked list and free storage list with proper example.   4

4. a) Define underflow, overflow and garbage collection.   3
   b) Apply the bubble sort algorithm in the following data set and write down   12
       each comparison and pass separately and sequentially to make them in
       ascending order: 32, 51, 27, 85, 66, 23, 13 and 57.

Section-B
Answer any Three

5. a) Define the terms: data, traversing and merging.   3
    b) What are the limitations of the binary search algorithm?   3
    c) Write an algorithm that finds the product AB of matrices A and B,   9
        which are stored as two-dimensional arrays.

6. a) Define priority queue. Show the link representation of a priority queue.   7
    b) Suppose we have an empty queue with 5 memory locations. At first we   8
        want to insert the elements A and B in the queue. Then we delete the
        element a. Then again we insert the elements C and D. Then we delete the
        element B. And last of all we insert an element E in the queue. Show the
        values of front and rear in every step.

7. a) Write a preorder traversal algorithm for binary tree.   7
    b) With an example explain the Huffman Coding schema.   8

8. a) Suppose Bestway Airways has nine daily flights, as follows: 5
        103 Atlanta to Houston, 203 Boston to Denver, 305 Chicago to Miami,
        106 Houston to Atlanta, 204 Denver to Boston, 308 Miami to Boston,
        201 Boston to Chicago, 301 Denver to Reno, 402 Reno to Chicago.
        Show its linked representation.
    b) Briefly describe the Breadth-First search algorithm with proper example.   10