

International Islamic University Chittagong
Department of Computer Science & Engineering
B. Sc. in CSE Semester, Final Examination, Autumn 2018
Course Code: CSE 2321 Course Title: Data Structures
Total marks: 50 Time: 2:30 hours

[Answer any *two* questions from each **Group-A** and **Group-B**;
Separate answer script must be used for Group-A and Group-B;
Figures in the right hand margin indicate full marks.]

Group-A

1. a) What is queue? Describe the representation of circular queue in memory with example. 3
- b) Why the value of FRONT and REAR are increased during the insertion and deletion element from the queue? (Here queue is represented by linear array). 2
- c) In a circular queue, why does overflow occur when $FRONT = 1$ and $REAR=N$, or $FRONT=REAR+1$? Explain with example. 3
- d) Write the advantages of deque over the queue. 2

2. a) What is linked list, circular linked list, and doubly linked list with figure? 3
- b) What is the space complexity of a linked list, circular linked list, doubly linked list for storing N size items of data? 3
- c) Give an algorithm to copy a link list into an array. 4

3. a) Explain the use of Stack in a recursive function with example. 2
- b) Graphically show each move of disk in Tower of Hanoi problem for $n=4$. 3
- c) When overflow and underflow, are occurred in a linked list. 1
- d) Write an algorithm to insert a node at the end of a given linked list LIST. 4

Group-A

4. a) What do you mean by complexity of an algorithm? How do you calculate the complexity of an algorithm? Describe with example. 3
- b) Find the total number of exchanges when you implement the selection sort algorithm to the following list of numbers. 4
 <77,33,44,11,88,22,66,55>
- c) Analysis the complexity of insertion sort algorithm when the algorithm is implemented in a sorted list of n elements. 3

5. a) Write the difference between binary tree and complete binary tree. 2
- b) Define the following terms of a binary tree with figure. 2
 (i) Branch (ii) Level (iii) Depth (iv) Descendant

- c) Suppose the following sequences list the nodes of a binary tree T in preorder and inorder, respectively; 4
 Preorder: G, B, Q, A, C, K, F, P, D, E, R, H

Inorder: Q, B, K, C, F, A, G, P, E, D, H, R

Draw the diagram of the tree.

- d) When we apply the inorder traversing in a binary search tree, the list of visiting nodes is a sorted list. Do you agree with this statement? Justify your answer. (Note that each node of this binary search tree contains a positive integer) 2
6. a) What is graph? Describe the adjacency matrix representation of graph in memory with example. 3
b) Write the names of data structures used in BFS and DFS. 2
c) Describe the DFS traversing technique in graph with example. 3
d) Define the following term with figure. 2
(i) Simple graph (ii) Complex graph (iii) Isolated vertex
(iv) Complete graph.
- 7.a) What does a hash function do? What are two desirable properties of a hash function? 3
b) What are Heap, Maxheap and Minheap? Give the benefits of Heap Structure. Describe about Heapsort. 3
c) Give the algorithms for DFS and for BFS of a graph. 4