ROYAL UNIVERSITY OF BHUATAN
GYALPOZHING COLLEGE OF INFORMATION TECHNOLOGY
GYALPOZHING : BHUTAN

MID SEMESTER EXAMINATION (AUTUMN 2020)

Class : **Bachelor of Science in Information Technology (Year II, Semester I)**

Module Title : **Algorithms and Data Structures**

Module Code : **ITS202**

Serial No. : **BSc(IT)/2020/Sem III/M/ITS202**

Max. Marks : **50**

Max. Time : **1 Hour, 30 Minutes**

General Instructions:

1. Question paper has written component.
2. In no circumstances may you remove Answer Books, used or unused, from the Examination Room.
3. If the answer book is torn or folded or without Exam Cell's seal, report the matter to the Invigilator and get a new one.
4. Enter the required details such as Reg. Number, Module and other information as prescribed.
5. Do not write your name on any part of the Answer Book.
6. Number your answer according to the number assigned in the Question Paper.
7. Do not skip any pages when writing answers. Any rough sketches/calculations must be shown on the same page.
8. Do not fold or tear off any pages from the Answer Book. Any answer crossed by you will not be evaluated.
9. You may request for the supplementary Answer sheets only after the main answer Book is completely used.
10. A candidate who is found to have unauthorised materials in his /her possession, copying, talking or exchanging any material with others will be dealt with as per the Wheel of Academic Law.
11. No paper other than Admit Card will be allowed in the Examination Hall/Room unless otherwise specified in the Question Paper.

PART - I [10 Marks]

Answer all the questions

Multiple Choice Questions **[5 x 1 = 10]**

Q1) The upper bound of mergesort algorithm is

A. θ(nlogn) B. θ(n) C. ω(nlogn) D. O(nlogn)

Q2) What is the return type of enqueue in Queue Data Structure?

A. void B. int, the enqueued element C. Zero D. One

Q3) Time complexity(Upper bound) to insert an element in an array.

A. θ(n) B. θ(log n) C. ω(n) D. O(n)

Q4) The running time of an algorithm in O (n^2) is said to be

A. Linear B. Quadratic C. Exponential D. Logarithmic.

Q5) How many times must you tear a 1,024- page phonebook in half in order to whittle it down to a single page?

A. 8 B. 10 C. 32 D. 512

Fill in the blanks **[5 x 1 = 5]**

Q5) A Node class has ..... and ..... data members in Linkedlist.

Q6) ..... is the time complexity, when deleting a node from the head of LinkedList.

Q7) ..... sorts strings which are not of same length.

Q8) ..... is the process of visiting every node in a singly LinkedList atleast once.

PART - II [15 Marks]

Answer all the questions

Q1) What does it mean if some algorithm is in θ (n)? Give example or scenerio of such time complexity. **[2]**

Q2) Can we delete a node from the tail of a linkedList? Why or Why not? **[2]**

Q3) What are the drawbacks of Arrays? **[2]**

Q4) Explain the principle used in Queue Data Structure? **[2]**

Q5) What are the two important conventions of Symbol Table data structure? **[2]**

Q6) Write down the Psuedocode of Binary Search Algorithm? **[2]**

Q7) Consider the remarks below, each of which sounds like an advantage but is not without an underlying disadvantage too. Complete each of the remarks, making clear the price paid (i.e., tradeoff) for the advantage. **[3]**

i) Merge sort tends to be faster than bubble sort. Having said that ...

ii) A linked list can grow and shrink to fit as many elements as needed. Having said that ..

iii) Binary search tends to be faster than linear search. Having said that ..

PART - III [25 Marks]

Answer all the questions

Q1) Fill the table with the appropriate algorithms: **[5]**

Algorithms	ω	**O**
	n^2	n^2
	nlogn	nlogn
	n	n^2
	1	log n
	1	n

Q2) Find the number of exchanges/swaps and the number of comparisons done while sorting the characters in the String "EXAMQUESTION" using insertion sort. **[5]**

Q3) List down the Abstract Data Type of Stack and Queue data structure with its role and return types **[5]**

Q4) Perform MergeSort on the given array. Show the working in the form of recursion including the sort and merge function. **[10]**
[10,5,7,3,4,5,9,8,4,2,7,2]

$---------- BESTWISHES ----------$