BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: B.TECH **SEMESTER: V**
BRANCH: ALL **SESSION: MO/2022**

SUBJECT: CS275 FUNDAMENTALS OF DATA STRUCTURES

TIME: 2 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data handbook/Graph paper etc. to be supplied to the candidates in the examination hall.

				CO	BL
Q1	(a)	What are the differences between linear array and linked list	[2]	1	2
Q1	(b)	What is a doubly linked list? How can it be memory efficient?	[3]	3	4

Q2	(a)	int i, j, k = 0;
		for (i = n / 2; i <= n; i++) {
		for (j = 2; j <= n; j = j * 2) {
		k = k + n / 2;
		}
		}
		What is the time complexity of this code?
			[2]	1	4

Q2	(b)	Solve the recurrence relation T[n]=n^0.5T[n/6]	[3]	4	4
Q3	(a)	How a prefix expression can be converted to a postfix expression. Explain with a pseudocode.	[2]	3	5
Q3	(b)	Given a linked list and a value *x*, write an algorithm to partition it such that all nodes less than *x* come before nodes greater than or equal to *x*.	[3]	3	5
Q4	(a)	How to implement a queue using a minimal number of stacks.	[2]	3	5
Q4	(b)	Consider a rat in a maze problem with this matrix {1, 1, 1, 1, 1 }, { 1, 0, 1, 0, 0 }, { 1, 0, 1, 1, 1 }, { 1, 0, 0, 1, 1 } Rat is at (0,0) and has to reach (3,4). The rat can move to the down and right in this order. Explain the rats movement using a stack. (0 -> can not move. 1 -> can move)	[3]	4	4
Q5	(a)	In a circular queue, explain how the rear and front changes?	[2]	2	2
Q5	(b)	What kind of ADT can be suitable for making a music player of a playlist (consider that jumping to random locations is not allowed). Write a pseudocode for any insertion possible.	[3]	5	6

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