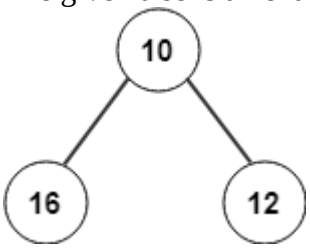
K. J. Somaiya College of Engineering, Mumbai-77
(Autonomous College Affiliated to University of Mumbai)

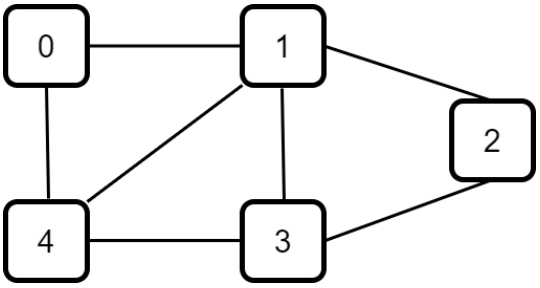
End Semester Exam
MAY-JUNE 2021 (August 2021)

Max. Marks: 50
Duration: 1 Hr. 45 Min.
Class: SY Semester: III
Name of the Course: Data Structures Branch: Comp and IT
Course Code: 2UCC302, 2UIC302

Instructions:
(1) **All questions are compulsory**
(2) **Draw neat diagrams**
(3) **Assume suitable data if necessary**

Question No.		Max Marks
Q1 (A)	Attempt the following multiple choice questions. A. In case you have to implement undo-redo operations in an application, you'd need: a. Two stacks b. Two Queues c. One stack and one queue d. One stack is sufficient to carry out the work B. Which of the following is not a disadvantage to the usage of static memory allocation? a. Fixed memory allocation at compile time b. Possibility of wasting memory c. Deletion creating holes in data structure d. Accessing elements at specified positions C. Which of the following is limitation of a doubly linked list? a. One can traverse data structure in both the directions b. Doubly Linked List needs more memory than a singly linked list c. The insertion and deletion operations are cheaper d. Implementing a doubly linked list is easier than singly linked list D. The depth of the tree is measured as: a. Max number of children of the tree b. Max number of nodes along the path from root to the deepest leaf node c. Number of edges from the root to the node d. Average number of children of the tree E. The given tree is an example of:  a. AVL tree, binary search tree, multiway tree	10

	b. AVL tree, binary tree, graph c. Binary search tree, B-tree d. AVL tree, binary tree F. The properties of good hash function are: a. Less collisions, good randomization b. Simple to compute, less collisions c. Simple to compute, good randomization d. Less time complexity, less space complexity, less collisions G. Which one of the followings is true? a. A graph may have empty set of edges and nonempty set of vertices b. A graph may have nonempty set of edges and empty set of vertices c. A graph may have empty set of edges and empty set of vertices d. A graph may contain empty set of vertices, nonempty set of edges and nonempty set of weights H. A B-tree of order 4 and of height 3 will have a maximum of _____ keys. a. 255 b. 63 c. 127 d. 188 I. Which one of the following is <u>the most appropriate</u> statement for generating the BST from traversals? a. A pair of Preorder and postorder traversal can generate a unique binary search tree b. Only a pair of Preorder and inorder traversal can generate a unique binary search tree c. Only preorder or postorder is sufficient because inorder is always sorted for BST. d. Given any pair of traversals, it's possible to generate more than one BST for the same. J. A queue contains A,B,C,D,E as its data elements with A at the front and E at the rear. What would be the contents of the queue if we execute: pop(), pop(), Push(z),pop(),push(y),pop(),pop(),pop(),pop() a. A,B,C,D,E,Z,Y b. Y,Z,A,B,C,D,E c. Z,Y d. NULL	
Q1 (B)	Attempt any FIVE questions out of the following (any 5 out of 7) A. What is ADT? Comment on significance of ADT in unambiguous understanding of any proposed data structure. B. Explain with a suitable example the problems in implementing circular queue using arrays. State solution(s) to resolve the issue. C. Discuss how stack as a data structure helps in achieving the recursion.	10

	D. Explain the concept of stable sort with a suitable example. E. Consider a game like chess, which is a two-player game with strict alternating turns by both the players. Also for every board position, more than one move is possible for both the players. Suggest and justify the data structure to represent all possible moves by both the players in such a game. F. What are skewed binary tree? Comment on advantages of balanced binary search trees over binary search trees. G. List and explain in brief any four applications of queues	
Q. 2	Answer any TWO A. Convert the given infix expression into postfix using stack, show the step-by-step process of coversion. (a+b^c*d) /(a+b+c) B. Explain with suitable diagram(s) all the cases of insertion into a sorted doubly linked list. C. Consider the following classical problem: There are n people standing in a circle waiting to be executed. The counting out begins at some point in the circle and proceeds around the circle in a fixed direction. In each step, a certain number of people are skipped and the next person is executed. The elimination proceeds around the circle (which is becoming smaller and smaller as the executed people are removed), until only the last person remains, who is given freedom. Given the total number of person = n and a number k which indicates that k-1 persons are skipped and kth person is killed in circle. a. Suggest and justify a data structure to solve this problem. b. Given the people = {Arya, Jon, Robb, Catelyn, Rose, Bran, Tyrion, Cersei, Sansa, Brienne} and k=4, Figure out name of the surviving person assuming that they are standing in the same sequence as given in the set. Show the solution step by step.	10
Q. 3	Answer any TWO A. Show step by step formation of AVL tree for the following numbers 21,34,5,70, 18,55,65, 75 B. Consider the following graph and show how it could be represented in memory in various ways.  C. Explain the concept of multiway tree and threaded binary tree with suitable example and a neat diagram. Comment on their significance too.	10

Q. 4	Answer any TWO A. Define the following terms with respect to map data structure: empty(), erase(), erase(), all,clear(), size(). B. Sort the given numbers using shell sort. Show the output after every pass. 29, 42, 99, 62, 55, 10, 81, 39 C. Store the following numbers in a hash table of size 10. Count the total number of collisions. 29, 42, 99, 62, 55, 10, 81, 39	10