## *Roll No. : …………………………*

**Bharati Vidyapeeth’s**

**Institute of Computer Applications and Management (BVICAM)**

**A-4, Paschim Vihar, New Delhi-63**

**Second Semester [MCA] Reappear Examination, June 2023**

**Paper Code: MCA-102 Subject: Data and File structures**

**Time: 2 Hours Maximum Marks: 45**

**Note: Attempt THREE questions in all. Question No. 1 is compulsory, and attempt one question from each unit.**

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| 1. | Answer all the following questions briefly: - 1.5 × 10 = 25 |
|  | (a) | Formulate address of the element in ith row and jth column of a 2 dimensional array both row-wise and column-wise. Describe sparse matrix and give linked list representation to depict the sparse matrix. | CO1 |
|  | (b) | Write the routine to convert a singly link list into circular link list. | CO1 |
|  | (c) | Describe an algorithm of insertion sort. | CO2 |
|  | (d) | Apply quick sort on following data 12,56,78,9, 50, 2,67, 43,2,100. | CO3 |
|  | (e) | Convert following expression to postfix operation (a+b/d)/(e-f)+g | CO3 |
|  | (f) | Differentiate between complete Binary tree and extended binary tree.  | CO2 |
|  | (g) | Given Prefix expression: ABLMKNPQ and InfixOrder expression: LBMANKQP. Draw the tree | CO2 |
|  | (h) | Create an function in ‘C’ for finding successor of node in BST | CO3 |
|  | (i) | Elaborate M way search tree. Write the value of max children, min children, min keys, max keys of a node if order of tree is 6 | CO2 |
|  | (j) | Give an algorithm for reversing a queue . | CO2 |
| **UNIT – I** |
| 2. | (a) | Compare and contrast linear list with linear arrays. Given a singly linked list, write a function to swap elements pair wise. Eg. Convert 1,2,3,4,5,6 to 2,1,4,3,6,5 | 7.5 | CO3 |
|  | (b) | Formulate an algorithm that detects and removes a cycle in link list**.** | 7.5 | CO5 |
| 3. | (a) | Given a linked list and two integers M and N. Traverse the linked list such that you retain M nodes then delete next N nodes, continue the same till end of the linked list. Eg. Convert 1,2,3,4,5,6,7, 8 to 1,2,5,6 if M=2 and N=2 | 7.5 | CO3 |
|  | (b) | Create functions in C language for Insertion and deletion in circular queue. When would a circular queue be full? | **7.5** | CO3 |
| **UNIT – II** |
| 4. | (a) | Construct a binary search tree with following numbers that are inserted in an empty binary search tree 30, 40, 35, 25. 50, 45. Formulate an algorithm to insert a new node in binary search tree. | 7.5 | CO3 |
|  | (b) | Describe B + trees? Write the steps to create a B-tree. Construct an B-tree of order 4 and insert the values 34, 45, 98, 1, 23, 41, 78, 100, 234, 122, 199, 10, 40. The delete the keys 41, 45, 122 | 7.5 | CO4 |
| 5. | (a) | Compare AVL trees with binary tree. Construct an AVL tree by inserting following elements one by one and count the total number of left and right rotations after inserting all the elements 16, 27, 9, 11, 36, 54, 81, 63, 72, 78 | **7.5** | CO5 |
|  | (b) | Create a function that deletes a node in BST. Create one function that implements for all 3 cases. | **7.5** | CO3 |