

**Bharati Vidyapeeth's
Institute of Computer Applications and Management
A-4, Paschim Vihar, New Delhi-63
Model Question Paper - II [MCA - II Sem.]**

Paper Code: MCA-102	Subject: Data and File Structures
Time: 3 Hours	Maximum Marks: 75
Note: Attempt five questions in all. Question no. 1 is compulsory and attempt one question from each unit.	

1. Answer the following questions, briefly:- (2.5×10 = 25)
- (a) Iterate to the last element of a circular linked list, assuming that we are maintaining pointer to the first node only.
 - (b) A N×N diagonal matrix is mapped to a 1D array, give an expression to access M[i][j].
 - (c) How can a deque be used as a stack as well as a queue in different situations?
 - (d) What is the advantage of maintaining arithmetic expressions in polish form?
 - (e) Which property of an array is used to map two stacks into a single array without any storage overhead?
 - (f) If a singly linked list is to be used as a queue, on which end would you perform insert and delete operations to get the best time efficiency?
 - (g) Explain the need for m-way trees.
 - (h) What is slack period in critical path analysis? What is its significance?
 - (i) A glossary of references is to be built for a project in a new domain. It is required that no term is listed before the ones it depends upon get list. How would you generate the sequence of terms?
 - (j) For what kind of a dataset is insertion sort most suitable? Why?

UNIT - I

2. (a) Explain how you would provide LIFO access using queues only. (6)
- (b) A set of 100 elements, divided into three flexible sized categories, is to be processed category-wise, in FIFO order. Implement initialize and delete operation for the required data structure. (6.5)
3. (a) Assume there are two polynomials, P1 and P2, implemented using Linked List sorted on their powers. Write a function, which takes P1 and P2 as arguments, in C to calculate the P=P1-P2. The function should return the polynomial P. (6)
- (b) Assume we have to implement double stack. Write function for PUSH and POP. The function should accept the stack as an argument. (6.5)

UNIT - II

4. (a) Demonstrate stack based non-recursive in-order traversal for the tree built using the key sequence: J, S, A, N, Q, L, P, S, U (6)
- (b) Write a C function for implementing deletion of a node from a BST. (6.5)

5. (a) Design a B-Tree of order 3 for following key sequence: 1, 6, 9, 2, 45, 36, 15, 7, 20, 25, 30. (6)
- (b) Construct a function to implement Heap using linked list. (6.5)

UNIT - III

6. (a) Write a 'C' function to implement quick sort. Make sure that your choice of pivot avoids the worst-case when the input is already sorted. (6)
- (b) Explain hashing? What are the different mechanisms to handle collision? (6.5)
7. (a) Explain Graph coloring. Illustrate the working of radix sort on following list: 21, 5, 21, 40, 350, 37, 230, 33, 57, 30. (6)
- (b) Construct an algorithm to implement DFS. Also, write its worst-case complexity. (6.5)

UNIT - IV

8. (a) Explain the working and advantage of poly-phase merge sort with the help of an example. (6)
- (b) Write a C function to insert a record at location N in a binary file. (6.5)
9. (a) Write two functions to append and search a record in a sequential file. (6)
- (b) Explain the different techniques of error detection. (6.5)