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Paper Name: Data Structures & Algorithms

Paper Code: MCA 202

Time : 3 Hours

Maximum Marks : 75

Section A

All Questions are Compulsory in this section

Each question is of five marks

7*5=35 Marks

S.No	Question	Marks	CO	BL
1.	How can we implement stack using Queue?	5	CO2	L2
2.	What is binary search of an element? Write a Program to find an element in an array using binary search.	5	CO4	L1
3.	What is mergesort algorithm. Explain	5	CO4	L3
4.	What are multidimensional arrays? Consider a 20x10 2D array which has its base address = 100 and the size of an element = 3. Now compute the address of the element, A [10][4]. Assume that elements are stored in row major order.	5	CO1	L5
5.	Explain ADT of a queue with an example. Implement queue using C. Also Explain Applications of a queue.	5	CO2	L6
6.	Explain heap as a data structure. Build a Max Heap by investing the following data arriving as a sequential set 23, 7, 92, 6, 12 14, 40, 44, 20, 21. Show the heap after deleting 2 elements.	5	CO3	L4
7.	What is a linked list? Explain its types and creation.	5	CO4	L3

Section B

Attempt any four

Each question is of 10 Marks

4*10=40 marks

S.No	Question	Mar ks	CO	BL
1)	(a) Convert the following infix expression to postfix expression: A + (B * C - (D / E ^ F) * G) * H (b) Evaluate the following postfix expression:	10	CO2	L5

	623+-382/+*2^3+ (NOTE: Write intermediate steps of conversion)			
2)	What is searching? Write a C program to perform searching operations using linear and binary search	10	CO4	L6
3)	You are given a set of n types of rectangular 3-D boxes, where the ith box has height h(i), width w(i) and depth d(i) (all real numbers). You want to create a stack of boxes which is as tall as possible, but you can only stack a box on top of another box, If the dimensions of the 2-D base of the lower box are each strictly larger than those of the 2-D base of the higher box. Of course, you can rotate a box so that any side functions as its base. It is also allowable to use multiple instances of the same type of box.	10	CO2	L6
4)	Explain how shortest path is calculated using Dijkstra's algorithm.	10	CO5	L4
5)	Define M-way trees. Build a B-tree of order 4 by inserting data in the sequence given below: 92, 24, 6, 7, 11, 8, 22, 4, 5, 16, 19, 20, 78	10	CO3	L2
6)	What is a minimum spanning tree? Give Kruskal's algorithm to find a minimum spanning tree. Determine the minimum spanning tree of the following graph:-	10	CO3	L4

BL-Bloom's Taxonomy Levels (1-Remembering, 2- Understanding, 3-Applying, 4 - Analysing, 5- Evaluating, 6 – Creating)