**Registration No.:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**PNR No:: 512132CSE2586**

**Course: CSE205::DATA STRUCTURES**

***Time Allowed: 03:00 hrs Max.Marks: 100***

*1. This paper contains 8 questions.*

*2. Question number 1 is compulsory.*

*3. Attempt any 5 questions from Q2 to Q8.*

*4. Attempt all the parts of the question chosen.*

*5. The marks assigned to each question are shown at the end of the question in square brackets.*

*6. Do not write anything on the question paper except your registration number at the designated space.*

*7. Answer all the questions in serial order.*

Q1(a) Explain the meaning of 'Little o' Notation? [2 Marks]

(b) Find where the indicated elements of an array A are stored, if the base address of A is 200 and LB=0.

a) double A[6]

b) int A[28]Assume that int(s) are stored in 4 bytes and doubles(s) in 8 bytes. [2 Marks]

(c) What is Sparse Matrix . Explain with example. [2 Marks]

(d) What do you mean by garbage collection? [2 Marks]

(e) Write recursive procedure to calculate nth term of Fibonacci Sequence. [2 Marks]

(f) Differentiate Adjacency Matrix and Path Matrix. [2 Marks]

(g) Write an algorithm for evaluation of a postfix expression using stacks. [2 Marks]

(h) What are left and right skewed BSTs? State their disadvantage. [2 Marks]

(i) What are Hash addresses? [2 Marks]

(j) Compare the worst and average case complexity of Bubble, Quick and Heap Sort [2 Marks]

(k) Explain application of Double Ended Queues. [2 Marks]

(l) Construct AVL search treeS for A, B, C, D, E, F and for F, E, D, C, B, A. [3 Marks]

Q2. How multi dimensional arrays are stored in memory of system.Write an algorithm to print both diagonals of a nXn matrix and to find whether it is sparse matrix or not.[Hint: Sparse matrix contain more number of 0's entries than 1's] [15 Marks]

Q3. Write an algorithm to sort an array with the help of Quick Sort.(You have to write both main sorting and partition algorithms) [15 Marks]

Q4. Write a recursive algorithm to find Greatest Common Divisor of two numbers.Write a recursive algorithm to solve Towers of Hanoi problem and also generate moves for moving four disks. [15 Marks]

Q5. How you can represent polynomials by linked lists. Write algorithm to perform addition of two polynomials if each polynomial is represented by using linked list. [15 Marks]

Q6. a) Explain how BFS (breadth first search) Traversal is performed on a graph taking an example? [5]

b) What is path matrix? Discuss the Warshall algorithm for generating the path Matrix? [10] [15 Marks]

Q7. (a) Build a Heap for 4, 3, 5, 2, 6, 5, 7,8. Redraw the tree after deleting root node. [10]

(b) Suppose the following sequences list the nodes of a binary tree T in preorder and inorder. Draw the diagram of tree

Preorder: G, B, Q, A, C, K, F, P, D, E, R, H

Inorder : Q, B, K, C, F, A, G, P, E, D, H, R [5] [15 Marks]

Q8. (a)The keys 12,18,13,2,3,23,5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k)=k mod 10 and linear probing . What is the resultant hash table? [5 Mark]

(b)What is linear probing and how it is different from quadratic probing? How can we resolve the collision (Explain with the help of an example)? [(3+7)Marks] [15 Marks]

*-- End of Question Paper --*