

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

**Course Code: CS205**

**Course Name: DATA STRUCTURES (CS, IT)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 3 marks.*

- |   |   | Marks |
|---|---|-------|
| 1 | Differentiate between abstract and concrete data structure. | (3)   |
| 2 | $N^2 + N = O(N^3)$ Justify your answer.                     | (3)   |
| 3 | What is frequency count? Explain with an example.           | (3)   |
| 4 | How can we represent a linked list in memory using arrays?  | (3)   |

**PART B**

*Answer any two full questions, each carries 9 marks.*

- |   |  |     |
|---|--|-----|
| 5 | Describe Big O notation used to represent asymptotic running time of algorithms. Give the asymptotic analysis of any one iterative algorithm.  | (9) |
| 6 | a) Consider a singly linked list having n nodes. The data items $d_1, d_2, \dots, d_n$ are stored in the n nodes. Let X be a pointer to the jth node ( $1 \leq j \leq n$ ) in which $d_j$ is stored. A new data item d stored in a node with address Y is to be inserted in the list. Give an algorithm to insert d into the list after $d_j$ to obtain a list having items $d_1, d_2, \dots, d_j, d, d_{j+1}, \dots, d_n$ in that order without using the header. | (5) |
|   | b) Explain about the use and representation of header node in linked list  | (4) |
| 7 | a) What are the application of vectors.  | (3) |
|   | b) Write an algorithm for deleting a node from a specified position in a circular queue  | (6) |

**PART C**

*Answer all questions, each carries 3 marks.*

- |   |   |     |
|---|---|-----|
| 8 | How will you check the validity of an arithmetic expression using stack | (3) |
| 9 | Let take initial memory as -  | (3) |

0	150	200	300	410	500K

Do the following things with first fit approach and show the memory status:

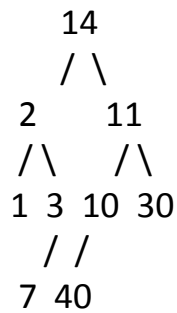
1. Allocate process C of size 90K
  2. Allocate process D of size 70K
- |    |   |     |
|----|---|-----|
| 10 | Write a program in C to concatenate two strings using string function.  | (3) |
| 11 | If a full binary tree is of height 5, give the positions of left child and right child of the second node in level 2. | (3) |

**PART D**

*Answer any two full questions, each carries 9 marks.*

- |    |   |     |
|----|---|-----|
| 12 | Convert the following expression into its corresponding post fix form using the prescribed algorithm:<br>$(300+23)*(43-21)/(84+7)$ . Do the evaluation of resultant postfix expression. | (9) |
|----|---|-----|

- 13 a) Here is a small binary tree: (4.5)



What is the output obtained after preorder, inorder and postorder traversal of the following tree.

- b) Write the non-recursive algorithm for post order traversal of tree. (4.5)  
 14 a) Write a function( C/ pseudo code ) to insert an element into BST. (4)  
 b) Write a program in C to check a particular sub string is present in a given string or not? If found print its location. (5)

### PART E

*Answer any four full questions, each carries 10 marks.*

- 15 a) Draw the directed graph that corresponds to this adjacency matrix: (5)
- |   | 0     | 1     | 2     | 3     |
|---|-------|-------|-------|-------|
| 0 | true  | false | true  | false |
| 1 | true  | false | false | false |
| 2 | false | false | true  | true  |
| 3 | true  | false | true  | false |
- b) Give the algorithm for BFS graph traversal. (5)
- 16 a) Show all the passes using insertion sort for the following list (5)  
 54,26,93,17,77,31,44,55,20
- b) Write a function (C/ pseudo code) of heap sort using min heap. (5)
- 17 Write a program to do the partition of a list using quick sort and then use insertion sort for sorting sub lists. Explain it with example. (10)
- 18 a) Write a program of binary search which tells how many comparisons it did to search an element given as user input. (7)
- b) Do the performance comparisons of Linear search and Binary search. (3)
- 19 Consider a hash table of size 7 and hash function  $h(k) = k \bmod 7$ . Draw the table that results after inserting in the given order, the following values. 19,26,13,48.17 for each of the three scenarios. (4)
- a) When collisions are handled by separate chaining. (3)  
 b) When collisions are handled by linear probing. (3)  
 c) When collisions are handled by double hashing using second hash function  $h' = 5 - (5 \bmod k)$ . (4)
- 20 a) Get the hash index in table of size 7 for the following list. 56,43,27,32,3. (3)  
 b) Do the rehashing when the inserted elements are more than 4. (3)  
 c) Briefly explain any 2 hashing functions. (4)

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