

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 d1, d2, ..., dn are stored in the n nodes. Let X be a pointer to the jth node ($1 \leq j \leq n$) in which dj 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 dj to obtain a list having items d1, d2, ..., dj, d, dj+1, ..., dn 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:

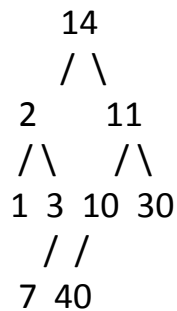
- | | | |
|----|---|-----|
| | 1. Allocate process C of size 90K | |
| | 2. Allocate process D of size 70K | |
| 10 | Write a program in C to concatenate two strings using string function. | (3) |
| 11 | If a full binary tree is of height 5, give the positions of left child and right child of the second 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:
$(300+23)*(43-21)/(84+7)$. 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 | 0 | true | false | true |
| 1 | true | 0 | false | false |
| 2 | false | false | 0 | true |
| 3 | true | false | true | 0 |
- 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)
