

**MEERUT INSTITUTE OF ENGINEERING AND TECHNOLOGY**

NH-58, Delhi-Roorkee Highway, Baghpat Road, Meerut – 250 005 U.P.

**Sessional Examination – II : Odd Semester 2022-23**

Course/Branch : B Tech - CSE/IT/CSIT/CSAI/CSAIML/CSDS/CSIOT Semester: III  
 Subject Name : Data Structure Max. Marks: 60  
 Subject Code : KCS301 Time : 120 min

CO-3 : On completion of this course, the student will be able to implement the concept of stack and queues using array and linked list and use of stacks to solve various problems.

CO-4: On completion of this course, the student will be able to apply the concepts of searching, sorting and hashing.

**Section – A (CO - 2 ) # Attempt both the questions # 30 Marks**

**Q.1:** Attempt any SIX questions (Short Answer Type). Each question is of two marks.

(2 x 6 = 12 Marks)

- What do you mean by stack ? Explain all its operation with suitable example. .(K2 Level)
- Consider the following stack of characters where STACK is allocated N=8 memory cells.

(K3 Level)

STACK : A, C, D, F, K, \_, \_, \_

Describe the STACK for following operations :

- POP(STACK,ITEM)
- POP(STACK,ITEM)
- PUSH(STACK,L)
- PUSH(STACK,P)

- What is Tail recursion. (K2 Level)
- Write a recursive solution of tower of Hanoi problem. Show all the moves for N=4.

(K3 Level)

- Differentiate recursion and iteration. (K2 Level)
- Discuss DQUEUE. Also describe its types. (K2 Level)
- Write Overflow and Underflow condition for a circular queue data structure. (K2 Level)

**Q.2:** Attempt any THREE questions (Medium Answer Type). Each question is of 6 marks.

(3 x 6 = 18 Marks)

- Consider the following infix expression and convert into reverse polish notation(Post fix) using stack.  $A + (B * C - (D/E \wedge F) * H)$  (K3 Level)
- Solve the following :  $7\ 5\ 2\ +\ *\ 4\ 1\ 5\ -\ /\ -$  [Evaluate the given postfix expression using STACK] (K3 Level)
- Define the recursion. Write a recursive and non-recursive program to calculate the factorial of the given number. (K3 Level)
- Write the procedures for insertion, deletion and traversal of a queue using Linked list. (K3 Level)
- What is circular queue?. Write all the condition for overflow. Write a C program to implement the array representation of circular queue. (K3 Level) HOT

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Q.3: Attempt any SIX questions (Short Answer Type). Each question is of two marks.

(2 x 6 = 12 Marks)

- a) What is difference between sequential (linear) search and binary search technique? (K2 Level)
- b) Write a short note on indexed sequential search. (K2 Level)
- c) What do you mean by hashing? (K2 Level)
- d) Explain process of radix sort with example. (K2 Level)
- e) Differentiate between linear and quadratic probing techniques. (K2 Level)
- f) Explain any two type of hash function. (K2 Level)
- g) Write down the complexity of bubble, quick and merge sort. (K2 Level)

Q.4: Attempt any THREE questions (Medium Answer Type). Each question is of 6 marks.

(3 x 6 = 18 Marks)

- a) Write a C program for merge sort and apply on following elements 45, 32, 65, 76, 23, 12, 54, 67, 22, 87 for sorting the elements in ascending order. (K3 Level)
  - b) What is selection sort? Sort the given values using selection sort; present all steps/iterations: 38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79, 72. (K3 Level)
  - c) A hash function H defined as  $H(\text{key}) = \text{key} \% 7$ , with linear probing, is used to insert the key 37, 38, 72, 48, 98, 11, 66 into a table indexed from 0 to 6. What will be the location of key 11? Justify your answer, also count the total number of collisions in this probing. (BKL :K3 Level)HOT
  - d) Write a program for binary search using recursion. (BKL :K3 Level)
  - e) Write a C program for Quick sort. (BKL :K3 Level)
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