Course/Branch : B Tech - CSE/IT/CSIT/CSAI/CSAIML/CSDS/CSIOT
Subject Name : Data Structure
Subject Code : KCS 301

Semester : III
Max. Marks : 60
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 - 3) # 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)

a) Discuss recursion and its principle
b) Explain the overflow condition for circlular queue.   (BKL: 2)
c) Write a short note on stack.   (BKL: 2)
d) Differentiate between simple queue and circular queue.   (BKL: 2)
e) Explain double ended queue.   (BKL: 2)
f) Covert the infix expression $(A+B) * (C/D) \wedge E * F$ into postfix   (BKL: 2)
g) Differentiate between infix, postfix and prefix expressions.   (BKL: 2)
                                                                         (BKL: 2)

Q.2: Attempt any THREE questions (Medium Answer Type). Each question is of 6 marks. (3 x 6 = 18 Marks)

a) Evaluate the following postfix expression using stack.
   $2\ 3\ 9 * + 7\ 3 \wedge - 6\ 5 / +$, show the contents of each and every steps. also find the equivalent prefix form of above expression. Where $\wedge$ is an exponent operator.   (BKL : 3)
b) Write a C program to implement queue using single linked list.   (BKL : 3)
c) For the given infix expressions find its prefix and postfix notation by using Stack: (BKL : 3)
   (i) $(A+B)/C*D-E$ (ii) $A+B/C-D*E+F$
d) What is a priority Queue? Write a C function for inserting & deleting an element from the priority queue.   HOT
   (BKL : 3)
e) Write implementation of a stack using array.   (BKL : 3)

Section – B (CO - 4) # Attempt both the questions # 30 Marks

Q.3: Attempt any SIX questions (Short Answer Type). Each question is of two marks. (2 x 6 = 12 Marks)

a) Differentiate between linear and binary search?   (BKL: 2)
b) Define collision in hashing.   (BKL: 2)
c) Explain index sequential search?   (BKL: 2)
d) What is the basic difference between quick sort and merge sort. (BKL: 2)
e) What is the best case, average case and worst case complexity of binary search? (BKL: 2)

Q.4: Attempt any **THREE** questions (Medium Answer Type). Each question is of 6 marks. (3 x 6 = 18 Marks)

a) Write a C implementation of selection sort. Also calculate its complexity. (BKL: 3)

b) Use quick sort algorithm to sort **15,22,30,10,15,64,1,3,9,2.** Is it a stable sorting algorithm? – Justify. .   (BKL: 3)

c) Write a C implementation of Merge sort. .   (BKL: 3)

d) The keys **12, 17, 13, 2, 5, 43, 5 and 15** are inserted into an initially empty hash table of length 15 using open addressing with hash function h(k) = k mod 10 and linear probing. What is the resultant hash table? (ii) Differentiae between linear and quadratic probing techniques. (BKL: 3)

e) Write a recursive C Program for binary search. .   (BKL: 3)