Total No. of Questions : 8]

SEAT No. :

PD-4076

[Total No. of Pages : 2

[6402]-36

S.E. (Computer Engineering/Computer Science & Design/AI & DS)

FUNDAMENTALS OF DATA STRUCTURE

(2019 Pattern) (Semester - III) (210242)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Draw neat & labelled diagrams if necessary.***

Q1) a) Discuss an algorithm for sentinel search. Compare linear search & sentinel search. Comment on time & space complexity of both. **[7]**

b) Explain quick sort & sort the given list using quick sort. **[7]**

54, 26, 93, 17, 77, 31, 44, 50, 20. Analyze time complexity of quick sort.

c) Differentiate between internal and external sort. **[3]**

OR

Q2) a) Sort the following numbers using insertion sort : **[7]**

4, 3, 2, 10, 12, 1, 5, 6, 76, 36

Comment on efficiency, stability, in-place characteristics of insertion sort.

b) Enlist non-comparison based sorting techniques. Explain bucket sort with suitable example. Comment on time and space complexity of it. **[7]**

c) Apply sentinel search to find key = 39. **[3]**

34, 52, 78, 33, 67, 12, 45, 23

Q3) a) Represent following polynomial using generalized linked list $((x^{12} + 2x^9) y^4 + 4x^9y^2) z^3 + ((x^5 + 6x^3) y^5 + 3y) z$ **[8]**

b) Write an algorithm to perform following operations on singly linked list. **[9]**

i) Reverse ii) Merge

P.T.O.

OR

Q4) a) What is linked list? Enlist different types of linked list. Write pseudo C/C++ code to insert a node in a doubly linked list (3 cases). **[8]**

b) Explain polynomial addition using SLL with suitable example and write pseudo C/C ++ code for polynomial addition using singly linked list. **[9]**

Q5) a) How to convert infix expression into postfix expression using stack & convert following expression into postfix form. (Show all intermediate steps) A * (B - C) / E ^ F + G **[9]**

b) Write an algorithm for converting prefix expression into postfix expression. Convert following expression into postfix. (A + B) - (C/D-E) + (F + G/K) **[9]**

c) Write an algorithm for converting prefix expression into postfix expression. Convert following expression into postfix. **[4 + 5 = 9]**
(A + B) - ((C/D-E) + (F + G/K)

OR

Q6) a) What is stack? Write an ADT for stack and its implementation using array. **[6 + 3 = 9]**
What are different applications of stack?

b) What are polish notations? What is need of it?
Evaluate below prefix and postfix expression for a = b = c = 2 and d = 1
Prefix Expression = - + a * bcd
Postfix Expression = abc * + d- **[3 + 6 = 9]**

Q7) a) What is queue? How they are represented in memory?
write a pseudocode to implement insert & delete operation in a linear queue using array. **[3 + 6 = 9]**

b) What is linked queue?
Write a function for inserting & deleting a node in a linked queue. **[3 + 6 = 9]**

OR

Q8) a) Explain the concept of linear queue and circular queue. Give the advantages of circular queue over linear queue.
Write C/C++ code to implement enqueue & dequeue operation on cicular queue. **[4 + 5 = 9]**

b) What is Deque? Explain operations of Deque.
Write C/C++ code for insertion & deletion operations of it using array. **[4 + 5 = 9]**