

Total No. of Questions : 8]

SEAT No. :

PB3634

[6261]-41

[Total No. of Pages : 2

S.E. (Computer Engineering) (Artificial Intelligence & Data Science)

FUNDAMENTALS OF DATA STRUCTURES

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

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt question Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data if necessary.
- 4) Neat diagrams must be drawn wherever necessary.

**Q1)** a) Sort given array by using bubble sort method: 64, 34, 25, 12, 22, 11, 90. Show step by step execution for all the passes highlighting “swap” and “No Swap” situations. How many passes are required to sort an array of N elements using bubble sort? [9]

b) Write an algorithm to search an element in array A using binary search technique. Show stepwise search of Key 10 in 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11. Is there any pre-processing of data required before starting binary search or what is its precursor requirement? [9]

OR

**Q2)** a) Enlist different searching methods. Write short note on [9]

- i) Fibonacci Search
- ii) Index Sequential Search

b) Sort given array by using selection sort method 50, 23, 03, 18, 9, 01, 70, 21, 20, 6, 40, 04. Show step by step execution of all passes. What is the best and worst case time complexity of selection sort? [9]

**Q3)** a) Write pseudo code for following function using Doubly Linked List of integer numbers [9]

- i) Insert given value as last value in the list. Draw diagram of operation.
- ii) Delete first node from the list. Draw diagram of operation.
- iii) Delete last node from the list. Draw diagram of operation.

b) Write and explain node structure of [9]

- i) Generalized linked list.
- ii) Circularly Singly Linked List.

Draw and explain insertion of value in Circularly Singly Linked List with example.

OR

P.T.O.

- Q4) a)** Write pseudocode to perform merging of two sorted singly linked lists of integers into third list. Write complexity of it. [9]
- b) Write and explain node structure of Generalized linked list for representing multiple variable polynomial. Represent given polynomial graphically using Generalized Linked List:  $5x^4 + 7xy^6 + 11xz$ . [9]

- Q5) a)** Write rules to convert given infix expression to postfix expression using stack. Convert expression  $(A * B - (C + D * E) ^ (F * G / H))$  stepwise using above rules.  
Where ^ is - exponential operator. [8]
- b) Explain with example three different types of recursion. [9]

OR

- Q6) a)** What is infix, prefix and postfix expression? Give example of each. Explain evaluation of postfix expression with suitable example expression and assume values for variables used to solve it. [8]
- b) Write pseudo-C/C++ code to implement stack using array with overflow and underflow conditions. [9]

- Q7) a)** What are advantages of Circular Queue over Linear Queue using static memory allocation? Write pseudocode to add and remove element from Circular Queue along with Queue Full and Empty condition. [8]
- b) Draw and explain implementation of Linear Queue using Singly Linked List. Explain Add, Remove, Queue Full and Queue Empty operations. [9]

OR

- Q8) a)** What is Doubly Ended Queue? Draw Diagram with labelling four basic operations at appropriate places. Which two data structures are combined in it and how? [6]
- b) Draw and explain Priority Queue? State any real life application. [6]
- c) Write pseudocode for Linear Queue Implementation using array. [5]

