17330

21415

3 Hours/100 Marks

Seat No. | | | | | | | | |

Instructions *: (1)* ***All*** *questions are* ***compulsory****.*
(2) ***Illustrate*** *your answers with neat sketches* ***wherever*** *necessary.*
(3) Figures to the ***right*** *indicate* ***full*** *marks.*
(4) ***Assume*** *suitable data,* ***if necessary****.*

MARKS

1. A) Attempt **any six** : **12**
   a) Define primitive and non-primitive data structure.
   b) Enlist the operations on data structure.
   c) Define sorting and give its type.
   d) Give the principal of bubble sort.
   e) Define stack.
   f) List operations on trees.
   g) What is Binary tree ?
   h) Explain term weighted graph.

   B) Attempt **any two** : **8**
   a) Explain different approaches to design an algorithm.
   b) Explain the linear search algorithm. Also give its limitations.
   c) Draw and explain circular queue.

2. Attempt **any four** : **16**
   a) Sort the given no. in ascending order using radix sort.

      Numbers : 348, 14, 614, 5381, 47

   b) Convert the following arithmetic expression P written in postfix notation into infix.

      P : 5, 6, 2, +, *, 12, 4, /, –

      also evaluate P for final value

P.T.O.

MARKS

c) Define the term :

i) Node

ii) Address

iii) Null pointer

iv) Next pointer for linked list.

d) Explain the terms with the help of diagram :

i) Siblings

ii) Leaf Node

e) Distinguish between stack and queue with minimum 4 points.

f) Write a 'C' program for the selection sort.

3. Attempt **any four** : **16**

a) Define recursion.Write a 'C' program for multiplication of natural numbers using recursion.

b) Describe priority queue and list its advantages.

c) With suitable diagram, explain 'searching' of a node in a linked list.

d) Explain inorder, preorder and postorder traversal.

e) Draw the tree structure for the following expressions :

i) $(2a + 5b)^3 (x - 7y)^4$

ii) $(a - 3b) (2x - y)^3$.

f) What is Hashing ? Give its significance.

4. Attempt **any four** : **16**

a) Explain time and space complexity with example.

b) Explain stack as an abstract data type.

MARKS

c) Write a procedure to insert an element into a queue and to delete an element from a queue.

d) Describe doubly linked list with its node structure.

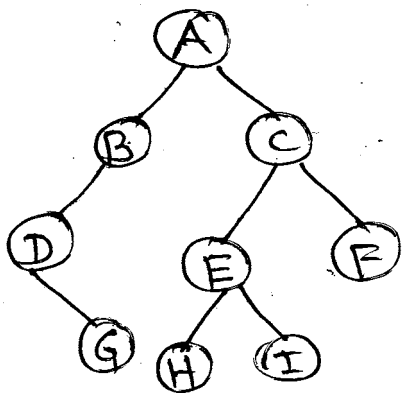
e) Explain insertion of new node at start and at end in singly linked list.

f) Consider the following tree. Write its :

a) In-order traversal sequence

b) Pre-order traversal sequence

c) Post-order traversal sequence.



(fig. Q. 4f)

5. Attempt **any two** : **16**

a) Find the position of element 29 using binary search method in an array 'A' given below :

A = {11, 5, 21, 3, 29, 17, 2, 43}

Write a 'C' program for binary search.

b) Convert the given infix expression to postfix expression using stack and the details of stack at each step of conversion

Expression : $a \uparrow b * c - d + e / f / (g + h)$

Note : ↑ indicates exponent operator.

c) Explain DFs with suitable example.

MARKS

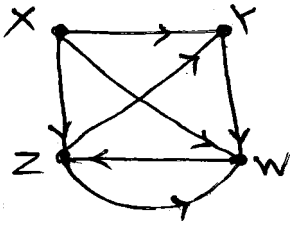
6. Attempt **any two** : **16**

a) Explain push and POP operation on stack with algorithm and example.

b) What is tree ? Define any four terminologies related to tree and draw the tree structure for following expression

$(11a^2 + 7b^3 + 5c)^4 + (3a^3 + 4b^2 + 8c)^3$.

c) Consider the graph 'G' in fig.



i) Find all the simple paths from X to Z

ii) Find all the simple paths from Y to Z.

iii) Find indeg (Y) and out deg (Y).

iv) Find the adjacency matrix A of the graph G.

v) Find the path P of G using powers of the adjacency matrix A.
