



17330

15162

3 Hours / 100 Marks

Seat No.

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- 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. Attempt any five :

20

- a) State the need of data structure. Write the operations performed using data structures.
- b) Differentiate between Binary Search and Sequential Search.
- c) Write the procedure for implementing stack using arrays.
- d) Explain 'Queue Full' and 'Queue Empty' condition with suitable example.
- e) Define dynamic memory allocation. State its importance.
- f) Define the following with respect to tree :
 - i) Ancestor
 - ii) Depth
 - iii) Degree
 - iv) Path
- g) Write algorithm to traverse graph using Depth First Search (DFS).

2. Attempt any four :

16

- a) Write a program in 'C' to sort the given numbers in descending order using selection sort.
- b) Explain how stack can be used to reverse a list using suitable example.
- c) State the disadvantage of linear queue. How to overcome disadvantage of linear queue ?
- d) Write an algorithm to count number of nodes in singly linked list.
- e) Draw binary search tree using following elements :
35, 15, 40, 7, 10, 100, 28, 82, 53, 25, 3
- f) Define collision. How it is resolved ?

P.T.O.



3. Attempt any two :

- a) Define internal and external sorting. Sort the following elements in descending order using radix sort.

7, 103, 15, 10, 3, 25, 28, 67, 304, 36, 49, 84

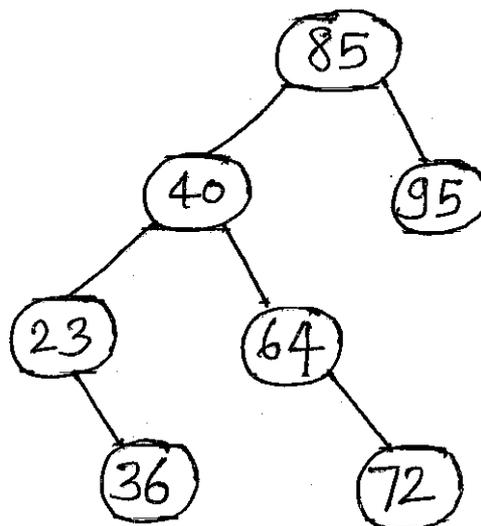
- b) Translate the following infix expression to its equivalent prefix expression.

$(x + y) * (p - q)$.

Evaluate the above prefix expression with following values

$x = 2, y = 3, p = 6, q = 2$.

- c) Differentiate between tree and graph. Traverse the following tree in Inorder, Preorder and Postorder.



4. Attempt any four :

- a) Define an algorithm. How it is analysed ?
- b) Find location of element 'H' by using binary search algorithm in the given list.
B F D A C E I G H J
- c) Explain the terms front and rear with relevance to queue. List the operations to be performed at these ends.
- d) Write the procedure to implement stack using linked list.
- e) Describe binary tree representation.
- f) Define the following terms in graph :
- i) Source ii) Isolated node iii) Sink iv) Articulation point

**5. Attempt any four :**

16

- a) Define computational complexity. Give complexity for the following :
 - i) Binary search
 - ii) Bubble sort
 - iii) Quick sort
 - iv) Linear search.
- b) Explain working of quick sort with a suitable example.
- c) State importance of top pointer in stack. Explain stack overflow and underflow.
- d) With a neat sketch explain working of priority queue.
- e) Give node structure for doubly linked list. Write advantages of doubly linked list over singly list.
- f) What is hashing ? Explain mid square method using suitable example.

6. Attempt any two :

16

- a) Explain operations on singly linked list.
- b) Draw expression tree for the following :
 - i) $(6a^3 - 4b^2)^3 * (4c^2 + 7b^3 + 9c)^4$.
 - ii) $(a^2 + 2ab + b^2)^3 + (c^2 - 2cd + d^2)^3$.
- c) For the following graph :
 - i) Give adjacency matrix representation.
 - ii) Give adjacency list representation.

