

- Instructions :**
- (1) All questions are compulsory.
 - (2) Make suitable assumptions wherever necessary and state the assumptions made.
 - (3) Answers to the same questions must be written together.
 - (4) Numbers to the right indicate marks.
 - (5) Draw neat labeled diagrams wherever necessary.
 - (6) Use of Non-programmable calculators is allowed.

1. Attempt the following (any THREE) [15]

- (a) What is an algorithm? Write down characteristics of algorithm.
- (b) What are the advantages and limitations of an array?
- (c) What is data structure? Explain different categories/classification of data structure.
- (d) Consider a two dimensional array D [3:7, 2:6]. If the base address of D is 5639 and each element takes 2 memory cells then find the address of D_{4, 0} element assuming that
 - (i) Array D is sorted in column major order
 - (ii) Array D is sorted in row major order
- (e) Differentiate between linear search and binary search.
- (f) Sort the following given elements using Bubble sort. 30, 20, 50, 40, 10, 70, 60, 80

2. Attempt the following (any THREE) [15]

- (a) What is header linked list? Explain different categories of header linked list.
- (b) What is linked list? Write an algorithm to insert an element in the end of linked list.
- (c) What is circular linked list? How to purchase circular linked list?
- (d) What is the need of two way linked list? Write an algorithm to traverse a two linked from end to beginning.
- (e) Explain Reversing a Linked List.
- (f) Explain how memory is allocated and deallocated for linked list.

3. Attempt the following (any THREE) [15]

- (a) Define stack. Write algorithms to perform push and pop operations on stack with array representation.
- (b) Explain with example priority queue.
- (c) Write an algorithm to insert and delete node from a circular queue.
- (d) Write an algorithm to convert infix expression to postfix expression.
- (e) Convert following infix expression into prefix and postfix expressions.
 - (i) $a \times b \times (c - d) - (e \wedge 3 \times f) + g / h$
 - (ii) $(a \times b \times c \wedge 2) + d - (c / d + e)$
- (f) What is recursion? Write and explain an algorithm to find factorial of number (Use recursion)

4. Attempt the following (any THREE) [15]

- (a) Make a binary search tree by inserting the following numbers in sequence
52 36 98 29 123 39 15 56 31 365 278 45 72
- (b) Draw the binary tree whose inorder and preorder traversals are :
In-order : g d b h e i a f c
Pre-order : a b d g e h i c f
- (c) What is AVL tree? How balancing is done in AVL tree? Explain with example.
- (d) Write an algorithm to sort elements in ascending order using insertion sort. Explain with example.
- (e) Sort the following data elements using heap sort algorithm.
22, 35, 17, 8, 13, 44, 5, 28
- (f) Sort the following elements using Merge Sort
23, 56, 13, 34, 78, 62, 98, 63, 49, 82

5. Attempt the following (any THREE)

[15]

- (a) List different hashing methods. Explain with example any two of them.
- (b) Describe following collision resolution techniques.
- (i) Linear probing
 - (ii) Chaining
- (c) Explain with example Prim's algorithm to find the minimum spanning tree (MTS)
- (d) Explain Warshall's algorithm of finding path matrix of graph.
- (e) List graph traversal techniques. Write and explain algorithm for any one. Give suitable example.
- (f) Explain with example Dijkstra's shortest path algorithm.



Paper Discussion Schedule for all Subjects

Date	Day	Timing	Centre
21 Oct. 2018	Sunday	8.00 a.m. to 10.00 a.m.	Dadar
21 Oct. 2018	Sunday	1.00 p.m. to 3.00 p.m.	Andheri
21 Oct. 2018	Sunday	3.30 p.m. to 5.30 p.m.	Borivali
21 Oct. 2018	Sunday	1.00 p.m. to 3.00 p.m.	Thane
21 Oct. 2018	Sunday	3.30 p.m. to 5.30 p.m.	Ghatkopar
22 Oct. 2018	Monday	6.00 p.m. to 8.00 p.m.	Nerul