

NOTE: 1. Figure should be neat and labeled
2. All questions are compulsory
3. Right side indicates marks

Q.1 Answer the following. (Attempt Any 4)

[20 marks]

- Explain problem, problem size terms related to algorithm?
- Write short note on constant and logarithm function
- Write short note on Omega (Ω) notation?
- Explain in detail asymptotic analysis?
- Write a program to implement ADTS as python class and their operation as methods.
- Write short note on Divide and Conquer algorithm?
- Explain in detail concept of stack?
- Explain measuring running time as function of n using wall clock?

Q.2 Answer the following. (Attempt Any 4)

[20 marks]

- Explain following methods of queue
 - Enqueue()
 - Dequeue()
 - First()
 - Last()
 - Len(q)
- Write a program to maintain set of data in sorted order?
- Explain in detail Single Linked List?
- Write short on trees?
- Explain properties of binary tree?
- Write an algorithm for insertion of element at the head of a Double Linked List?
- Explain insertion operation in Linked List?
- Write a program to simulate Queue using Linked List?

Q.3 Answer the following. (Attempt Any 4)

[20 marks]

- Explain in order traversal with its algorithm?
- Write short note on Depth First traversal of tree?
- Explain in following terms
 - Edge list
 - Adjacency list
 - Adjacency map
 - Adjacency matrix
- Write an algorithm for Depth First Search?
- Explain any five functions of Maps?
- Write a program to find shortest path in a graph?
- Explain following terms:

- i. Vertices
- ii. Edges
- iii. Directed graph
- iv. Outgoing edges
- v. Mixed graph

h) Write a program to implement post order traversal of tree?

[15 marks]

Q.4 Answer the following. (Attempt Any 3)

- a) Explain growth of the function as n grows?
- b) Write a program to implement reverse a string using stack?
- c) Write a program for linear search in Linked List?
- d) Write a short note on Binary trees?
- e) Write output for following code snippet
 - i. `M['H']=2`
 - ii. `M['B']=8`
 - iii. `M['X']`
 - iv. `Len(M)`
 - v. `M.items()`
- f) Explain concept of graph traversals?

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