

Objective Part (Compulsory)

Q.No.1. Write short answers of the following questions in 2-4 lines only. (16x2=32)

1. What is a linked-list?
2. What is stack?
3. What operations can be performed on Queues?
4. Why we need to do algorithm analysis?
5. What is binary search?
6. What is selection sort?
7. What is a graph?
8. What is a tree?
9. What is shell sort?
10. How breadth first traversal works?
11. What is a heap in data structure?
12. What is a recursive function?
13. What is tower of hanoi?
14. What is fibonacci series?
15. What is adjacency list?
16. What is hashing?

Subjective Part

(4x12=48)

Note: Attempt any four questions.

Q.No.2. The following algorithm is supposed to compute the product of the elements of its input array. Prove that the algorithm is correct.

Input: Array $A[1, \dots, n]$, $n \geq 1$
Output: Product of the array's elements

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PROD(A)
1.  tulo = 1
2.  i = 1
3.  while i <= n
4.      tulo = tulo * A[i]
5.      i = i + 1
6.  return tulo
```

Q.No.3. Depict binary trees with heights 2, 3, 4, 5, and 6. All should be depicted with the following seven keys 1, 4, 5, 10, 16, 17, and 21.

Q.No.4. Given an array $A = \{12, 11, 13, 5, 6\}$. Sort it out using a technique illustrated in insertion sort. You have to discuss only the passes in detail and there is no need to write an algorithm of insertion sort.

Q.No.5. Algorithms A and B sort their input arrays. Algorithm A performs $32 \cdot \lg(n)$ operations and algorithm B performs $3 \times n^2$ operations, when the array is of size n . Figure out, when to use algorithm A and when to use algorithm B if the size of the array is known.

Q.No.6. Write a program to insert or delete item from a circular queue.