

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions  
(10 X 10 = 100 Marks)

1. a) Define the necessity of Asymptotic notation in the study of an algorithm. [8]  
Describe commonly used Asymptotic notations and give their significance.
- b) Analyse the time complexity of the following code snippet. [2]

```
#include<stdio.h>
int power(int x, int y)
{
    if (y == 0)
        return 1;
    else if (y%2 == 0)
        return power(x, y/2)*power(x, y/2);
    else
        return x*power(x, y/2)*power(x, y/2);
}
int main()
{
    int x = 2; int y = 3;
    printf("%d", power(x, y));
    return 0;
}
```

2. Prove that the average case time complexity of Quick sort algorithm is  $T(n) = O(n \log n)$ .
3. Inscribe infix to postfix conversion algorithm and apply the same to convert the given infix expression to a postfix expression. Show the stack trace for the given Infix expression.  
 $((a + b) * c - (d - e)) / (f + g)$
4. Write an algorithm for inserting elements at all possible positions in a Doubly Linked List. Substantiate your answer using an example.

5. Consider the below elements.

12	31	25	8	32	17	40	42
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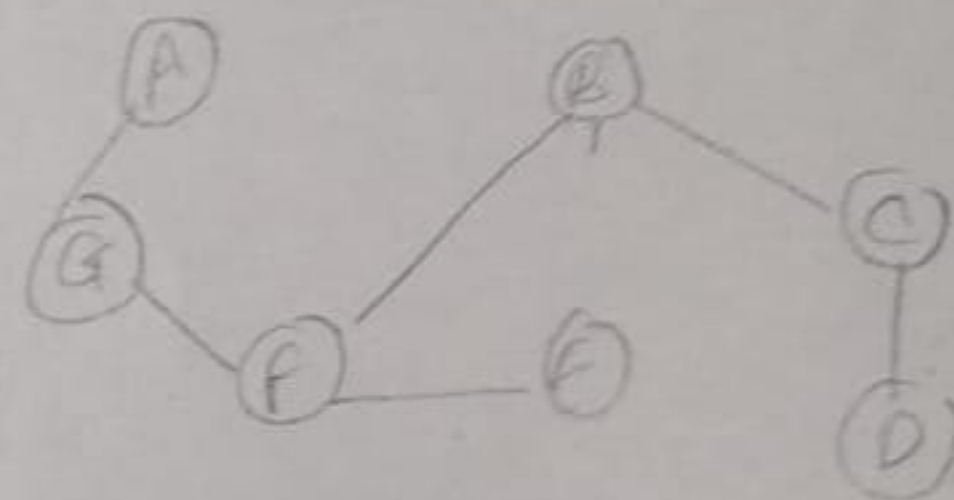
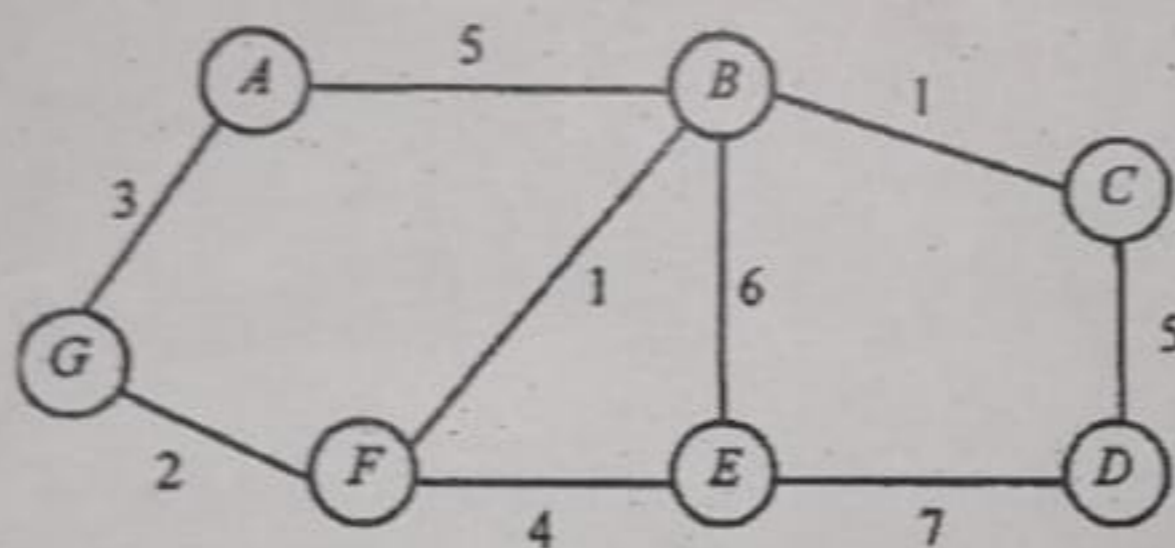
- Write down the merge sort algorithm for sorting the above mentioned elements and explain each step.
- Give the time complexity of Merge sort algorithm.

6. Represent the following expression using a binary tree and write the pseudocode also.

ABC/DE+\*+F-

What is the Preorder traversal of expression tree constructed above?

7. Use Kruskal's algorithm to extract the minimum spanning tree of the graph given below.



8. Draw the 11 item hash table resulting by hashing the keys: 12, 44, 13, 88, 23, 94, 11, 39, 20, 16 and 5 using the hash function  $h(i) = (2i+5) \bmod 11$ . Resolve the collisions using quadratic probing and double hashing techniques.

9. Discuss in detail height balanced BST and show how the height is balanced while inserting the following data:

41, 21, 12, 25, 32, 22, 63

10. What are the two phases in heap sort algorithm? Sort the following data using heap sort and show all the intermediate steps:

78, 11, 5, 57, 17, 23, 64, 92, 30, 47, 86