Question Bank

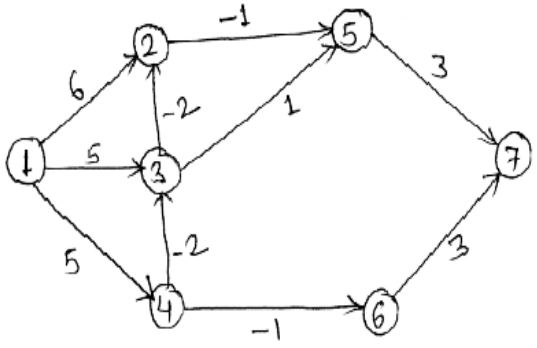
Q. 1. Compare the following complexities and Reorder from the smallest to the largest. Justify your answer.

i) n 2 , 2n , n log2 n, log2 n, n 3 .

ii) nlog2 n, n 8 , n 2 /log2 n, (n 2 – n + 1)

Q. 2. Solve the following instance of job sequencing problem using greedy approach. Let n = 4, profit (1 : 4) = (100, 10, 15, 27) and deadlines d(1 : 4) = (2, 1, 2, 1).

Q. 3. Use Bellman ford algorithm to find shortest path for the following graph.



Q. 4. How we can solve the 8-Queen problem using brute force approach.

Q. 5. Find the time complexity for the recurrence equation as follows:

i) $T(n) = T(n/2) + 1$

ii) $T(n) = 2T(n/2) + n$

iii) $T(n)=7T(n/2)+18n^2$

Q. 6. Solve the following recurrence using Master's theorem. $T(n) = 16T(n/4) + n$

Q. 7. State which algorithm strategy is used by quick sort and merge sort algorithm? Though they follow same algorithmic strategy their worst case complexities are different? Justify your answer. with example. (Ex: 10 16 8 12 15 6 3 9 5)

Q. 8. Consider the job with given profit and deadlines.
Find 1] What Job's are excluded. 2] maximum profit can be earned

Job	J1	J2	J3	J4	J5	J6	J7	J8	J9
Profit	15	20	30	18	18	10	23	16	25
Deadline	7	2	5	3	4	5	2	7	3

Q. 9. Bring out the differences between Prim's and Kruskal's algorithm. Also compare with respect to efficiency analysis.

Q. 10. Given items as {value,weight} pairs {{40,20},{30,10},{20,5}}. The capacity of knapsack=20. Find the maximum value output assuming items to be divisible.

Q. 11. Write down the algorithm for binary search and solve the recurrence relation for it using substitution method.

Q. 12. Analyse and find out the complexity for given algorithm. (Consider n=4)

```
void Test ( int n)
{
    if ( n > 0 )
   {
            printf (" %d ", n);
        Test( n-1 );
}
}
```

Q. 13. Use mathematical induction to show that
$1+2+3+\cdots+n=n(n+1)/2$
all integers $n\geq 1 n\geq 1$.

Q. 14. Show the steps in multiplying the following two integers using efficiency integer mulitplication 2345 and 678. Write the recuurence relation.

Q. 15. Explain the Knapsack problem using mathematical notations. Solve the, above Knapsack problem using Greedy approach. to get optimal solution with maximum profit Items given (I1, I2, I3, I4, I5,) Profit (10, 20,5, 7, 8) Weight (5, 6, 7,8,10) . Max weight = 15.

Q. 16. Find the correct sequence for jobs using following instances,

JobID	Deadline	Profit
1	4	20
2	1	10
3	1	40
4	1	30

Explain General method of Greedy method. Find the greedy solution for following job sequencing with deadlines problem n = 7, (p1,p2,p3,p4,p5,p6,p7) = (3,5,20,18,1,6,30), (d1,d2,d3,d4,…,d7) = (1,3,4,3,2,1,2)

For T(n)=7T(n/2)+18n2 Solve the recurrence relation and find the time complexity.