VESIT
ADVANCE DATA STRUCTURE AND ANALYSIS
IA1 QUESTION BANK
2022-2023

1. Compute the worst case complexity of the following program segment:

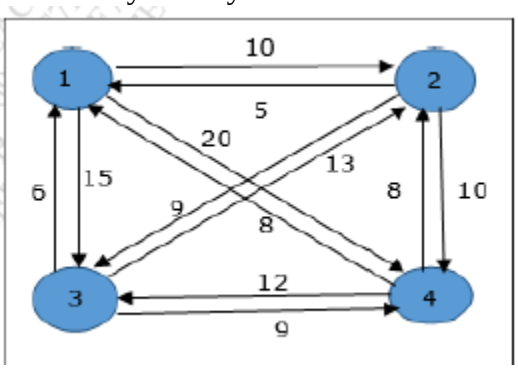
```
void fun(int n, int arr[]){
int i = 0, j = 0;
for(; i < n; ++i)
while(j < n && arr[i] < arr[j])
j++;
}
```

2. Differentiate between greedy method and dynamic programming?

3. Consider the instance of knapsack problem where n=6, M=15, profits are (P1, P2, P3, P4, P5, P6)=(1,2,4,4,7,2) and weights are (W1,W2,W3,W4,W5,W6)=(10,5,4,2,7,3).Find maximum profit using fractional Knapsack.

4. Explain divide and conquer approach. Write a recursive algorithm to determine the max and min from given elements explain with example.

5. A traveler needs to visit all the cities from a list (given figure), where distances between all the cities are known and each city should be visited just once. What is the shortest possible route that he visits each city exactly once and returns to the origin city?



6. What is optimal binary search tree? Explain with the help of example

7. Give asymptotic upper bound for T(n) for the following recurrences and verify your answer using Masters theorem: T (n) = T (n-1) + n

8. Given a set of 9 jobs (J1,J2,J3,J4,J5,J6,J7,J8,J9) where each job has a deadline (5,4,3,3,4,5,2,3,7) and profit (85,25,16,40,55,19,92,80,15) associated to it .Each job takes 1 unit of time to complete and only one job can be scheduled at a time. We earn the profit if and only if the job is completed by its deadline. The task is to find the maximum profit and the number of jobs done.

9. Explain with example how divide and conquer strategy use in binary search

10. Write an algorithm to find the minimum and maximum number from the given set

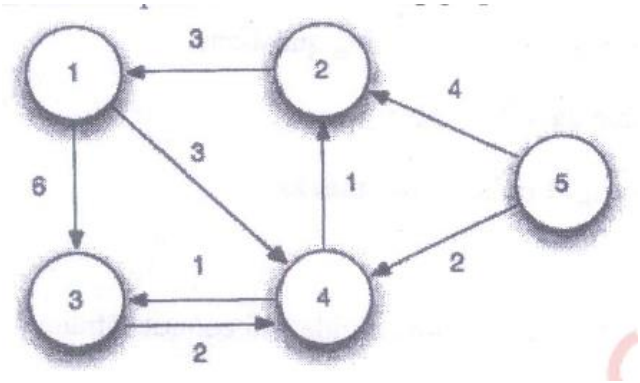
11. Which are the different methods for solving recurrences? Explain with example

12. Compare Greedy and Dynamic approach for an algorithm design? Explain how both can be used to solve knapsack

13. Explain Job Sequencing with deadlines. Let n = 4 (p1,p2,p3.p4) = (100,10,15,27)=(2,1,2,1) find the feasible solution

14. Sort the following numbers using quick sort. Also derive time complexity of Quick Sort 27 10 36 18 25 45

15. Apply the all pain shortest path on the following graph



16. Given a chain of 4 Matrices A1,A2,A3,A4 with p0=5,p1=4, p2=6, p3=4. Find m[1,4] using matrix chain multiplication

17. Write an algorithm for implementing Quick sort. Also, comment on its complexity.

18. Which are the different methods of solving recurrences? Explain with suitable examples.

19. Explain Travelling Salesman Problem with an example.

20. Explain Knapsack Problem with an example.

21. Write Short notes on Merge Sort

22. Write Short notes on Optimal Binary Search Tree (OBST)