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**B.Tech. (AI & ML / CE / CSE) / B.Tech CSE (Internet of Things & Cyber  
Security Including Block Chain Technology) / PIT B.Tech CSE  
(Sem.-4)**

**DESIGN & ANALYSIS OF ALGORITHMS**

**Subject Code : BTCS-403-18**

**M.Code : 77629**

**Date of Examination : 09-07-22**

**Time : 3 Hrs.**

**Max Marks : 60**

**INSTRUCTIONS TO CANDIDATES :**

1. **SECTION-A** is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

**SECTION-A**

**Answer briefly :**

1. Give an example of dynamic programming approach.
2. What do you understand by algorithm evaluation?
3. What is NP-complete problem?
4. What is asymptotic time complexity?
5. What is the basic principal of divide-and-conquer?
6. List the various applications of DFS and BFS.
7. How the Prim's algorithm is better in finding the Minimal spanning tree in comparison to the Kruskal's method?
8. What are heuristics? What are their characteristics?
9. What are the various steps in the design of an algorithm?
10. Are the sub solutions overlapping in dynamic programming approach?

## SECTION-B

11. Explain the Big-Oh computation for each of the following control structures:
  - (i) Sequencing
  - (ii) If-then-else
  - (iii) “for” loop
  - (iv) “While” loop
  - (v) Recursion
12. Solve the following instance of the knapsack problem using branch and bound technique (assume  $W = 3$ )

Items	w	v
11	1	2
12	2	3
13	3	4

13. Apply Prim’s Algorithm and Kruskal algorithm to the graph to obtain minimum spanning tree. Do these algorithms generate same output-Justify.
14. Explain the concepts of P, NP and NP completeness.
15. What are NP hard problems? Write short notes on the procedures of the following approximation algorithms to solve TSP using suitable examples.
  - a) Nearest Neighbor algorithm.
  - b) Twice-around-the-tree algorithm.

## SECTION-C

16. Write an algorithm for merging two sorted arrays into one array. Explain with suitable examples.
17. Modify the Dijkstra’s algorithm to solve All-Pairs-Shortest-Path problem.
18. Find the Big-Oh notations for the following functions :
  - (i)  $f(n) = 78889$
  - (ii)  $f(n) = 6n^2 + 135$
  - (iii)  $f(n) = 7n^2 + 8n + 56$
  - (iv)  $f(n) = n^4 + 35n^2 + 84$

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**