**B.N.M. Institute of Technology**

An Autonomous Institution under VTU

**Department of Information Science & Engineering**

**Special Continuous Internal Assessment - I**

**Sem: IV Date: 11/07/2024**

**Sub: Design and Analysis of Algorithms Time: 2:30-3:45 PM**

**Sub code: 22ISE144 Max Marks: 30**

**Note: Answer FOUR full questions selecting one full question from each part.**

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|  |  | **Marks** | **COs** | **POs/PSOs** | **Bloom’s Cognitive Levels** |
| **PART A** | | | | | |
| 1 | Analyze different Basic efficiency classes | 7 | CO1 | PO1, PSO1 | Analyze |
| **(OR)** | | | | | |
| 2 | Analyze the general plans of Non recursive and Recursive algorithms | 7 | CO1 | PO1, PSO1 | Analyze |
| **PART B** | | | | | |
| 3 | Construct a sequential search algorithm using Brute force technique and build the time complexity for Selection sort. | 8 | CO2 | PO1, PO3, PSO1 | Apply |
| **(OR)** | | | | | |
| 4 | Build a Merge sort algorithm to sort a given set of element using Divide and Conquer technique. | 8 | CO2 | PO1, PO3, PSO1 | Apply |
| **PART C** | | | | | |
| 5 | Develop a Quick Sort Algorithm. Solve for the below given list of elements using quick sort.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | M | E | R | G | E | S | O | R | T | | 7 | CO2 | PO1, PO3, PSO1 | Apply |
| **(OR)** | | | | | |
| 6 | Apply the DFS-based algorithm to solve the topological sorting problem for the following digraphs | 7 | CO2 | PO1, PO3, PSO1 | Apply |
| **PART D** | | | | | |
| 7 | Solve the following knapsack problem using greedy method. M = 30, n = 4, {w1, w2, w3, w4} = {10, 15, 20, 5} represents weights of 4 objects, {p1, p2, p3, p4} = {30, 40, 35, 10} represents profits of 4 objects. | 8 | CO3 | PO1, PO2, PO3, PO4, PSO1 | Apply |
| **(OR)** | | | | | |
| 8 | Solve the following knapsack problem using greedy method. M = 40, n = 4, {w1, w2, w3, w4} = {25, 18, 12, 15} represents weights of 4 objects, {p1, p2, p3, p4} = {40, 30, 55, 20} represents profits of 4 objects. | 8 | CO3 | PO1, PO2, PO3, PO4, PSO1 | Apply |

CO1: Apply and Analyze the asymptotic runtime complexity of algorithms by using mathematical relations that helps to identify them in specific instances.

CO2: Apply and solve problems using brute force, divide and conquer techniques.

CO3: Apply various problem-solving methodologies such as greedy, decrease and conquer to solve a given problem