

**Savitribai Phule Pune University**

Dept. of Scientific Computing, Modeling and Simulation

Mid Sem. Exam. Dec. 2022

Course No. **:** SC – 101

**Title :** Programming Languages and Principles – I

#### Date: 23 Dec. 2022 Marks : 30

Time : 3:00pm to 4:30pm

**Q1.** Answer any 5 of the following. (2 marks each.) (10)

1. Compare Flowchart and pseudocode, the two methods for writing algorithms.
2. Write the definition of Big Θ notation
3. Compare quick sort and Merge sort algorithms
4. Compare Greedy and Dynamic programming algorithms
5. For each of the following, what is the time complexity considering the fastest algorithm that can be written?
6. In a sorted array, look for a number
7. Select top 10 numbers from a set of n (n > 10000), unsorted numbers
8. Evaluate the time complexity of this code segment

int myFunction2(int n, int k)

{

int i = (n > k)? n : k;

int CalcVal = i;

while (i > 0)

{

CalcVal = CalcVal -1;

i = i / 2;

}

return CalcVal;

}

**Q2.** For each of the following, is Master Method application? If yes, mention (04)

which case is applicable and solve.(Solve any 2.)

1. T (n) = 4T (n/2)+ n2
2. T (n) = 3T (n/4)+ nlogn
3. T (n) = 2nT (n/2) + nn

**Q3.** Solve the following. (06)

* 1. Write the selection sort algorithm
  2. work out it’s time complexity

**Q4.** The following table gives the frequencies of the characters in a particular text matter to be transmitted using Huffman coding (10)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Letter** | A | C | E | H | I | K | L | S | T | W |
| **Freq** | 13 | 15 | 12 | 20 | 17 | 22 | 11 | 32 | 14 | 16 |
| **Code** |  |  |  |  |  |  |  |  |  |  |

1. Using these, create the Huffman tree and generate Huffman code for each character.
2. Write **CHECK THIS** in the designed code
3. Decode this - 111101101011100110010111100

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