AMRITA VISHWA VIDYAPEETHAM
AMRITA SCHOOL OF ENGINEERING
Department of Computer Science and Engineering
15CSE360 - Parallel and Distributed Computing
Assignment 1
Submission Date: 23. 09. 2021

| CO | Statement |
|---|---|
| 15CSE360 - CO1 | Understand the algorithms available for performing parallel computing |
| 15CSE360 - CO2 | Understand the Models and design aspects for distributed Algorithms with MPI |
| 15CSE360 - CO3 | Understand the different primitives available for Group communication using synchronization criteria |
| 15CSE360 - CO4 | Analyze approaches for Thread representation and recognition |
| 15CSE360 - CO5 | Identify, Analyze and apply algorithms for Load Distribution and scheduling for different applications. |

Question 1: CO1

Explain Amdahl's Law and explain its application using an example.

Question 2: CO1

What does is a symmetric multiprocessor architecture? What are the uniform and non-uniform memory access computers? Do a symmetric multiprocessor architecture provide uniform or non-uniform memory access? Why?

Question 3: CO1

Explain work - depth model for parallel Quicksort algorithm given below

**Input:** An array $A$
**Output:** Sorted $A$
1 $p \leftarrow$ element of $A$ chosen uniformly at random
2 $L \leftarrow [a | a \in A \text{ s.t. } a < p]$
3 $R \leftarrow [a | a \in A \text{ s.t. } a > p]$
4 **return** $[\mathsf{QuickSort}(L), p, \mathsf{QuickSort}(R)]$

Question 4: Probe/Echo Algorithm - CO2

Traverse probe/echo algorithm mentioned in Figure 13 from the document Paradigms for Process Interaction in Distributed Programs for an undirected acyclic graph.

Question 5: Distributed Semaphores - CO3

Trace the distributed semaphores algorithm of Figure 15 from the document Paradigms for Process Interaction in Distributed Programs and simulate the algorithm diagrammatically based on the message passing done in the algorithm. (Assume P or V operation for the processes involved in the system)