Roll No…….. **Total No. of Printed Pages: 01**
Total No. of Questions: [09]

B. Tech CSE (Semester – 6th)
PARALLEL PROCESSING
Subject Code: BCSED1-623
Paper ID: [18111137]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:
   a. Define Parallel Processing. Explain Pipelined processor in detail.
   b. What is implicit parallelism, and how does it relate to parallel computing performance?
   c. Explain the limitations of memory system performance in parallel computing.
   d. Compare explicit and implicit parallelism. Explain methods of explicit parallelism
   e. Describe the concept of communication models in parallel computing. How do they impact the overall system?
   f. What is the role of mapping techniques in parallel computing, and how do they contribute to load balancing?
   g. Explain the concept of decomposition techniques in parallel algorithm design.
   h. Define parallel algorithm models. What are their applications in parallel computing?
   i. What is the use of Interconnection Networks?
   j. What do you mean by parallel reduction algorithm?

Section – B **(5 marks each)**

Q2. Discuss the analytical modeling of parallel programs. How do performance metrics like granularity, scalability, and execution time impact parallel algorithms?

Q3. What is the message passing paradigm in parallel programming? Describe its principles, building blocks, and the importance of MPI in distributed memory systems.

Q4. Explain the concept of shared address space platforms in parallel computing. Discuss POSIX threads, synchronization primitives, mutex, and condition variables.

Q5. a) What are line architectural methods to improve the speed of computer?
b) For a pipeline with n stages what is the ideal throughout.
c) Explain difference between uniform and Non-uniform memory access

Q6. Discuss various algorithms for Multiprocessor system with detail.

Section – C **(10 marks each)**

Q7. Discuss dense matrix algorithms in parallel computing. How are matrix-vector multiplication, matrix-matrix multiplication, and solving systems of linear equations parallelized for performance optimization?

Q8. Describe various sorting algorithms used in parallel computing, including bubble sort, quicksort, sand bucket sort. How do sorting networks contribute to efficient parallel sorting?

Q9. Discuss graph algorithms in parallel computing. How are algorithms like Minimum Spanning Tree (MST), single-source shortest paths, all-pairs shortest paths, and transitive closure implemented in parallel?