

Roll No.....

Total No. of Printed Pages: 01

Total No. of Questions: [09]

**B. Tech CSE (Semester – 6<sup>th</sup>)**  
**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?