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MCSE–011

MASTER OF COMPUTER APPLICATIONS (MCA)

(REVISED)

Term-End Examination

June, 2025

MCSE-011 : PARALLEL COMPUTING

Time : 3 Hours *Maximum Marks : 100*

Note : *Question No.* ***1*** *is compulsory. Attempt any* ***three*** *questions from the rest.*

1. (a) Explain the concept of Temporal Parallelism with a suitable example. 5

   (b) Briefly discuss the classification of parallel computers on the basis of how the memory is accessed. 5

   (c) Differentiate between Blocking and Non-blocking networks. 5

(d) What are instruction pipelines ? How do they differ from arithmetic pipeline ? 5

(e) Briefly discuss the expression for total cost of any parallel algorithm and its role in calculating the efficiency of any parallel algorithm. 5

(f) Describe linked list as a data structure for parallel algorithms, with a suitable example. 5

(g) Compare parallel programming based on message passing with the parallel programming based on Data Parallelism. 5

(h) List the various dependencies for synchronization of various processors involved in multiprocessing. Briefly discuss any *one* of the listed dependencies. 5

2. (a) List and explain the factors causing the parallel overheads in parallel computers, leading to performance degradation. 8

(b) Write and explain Amdahl's law. 7

(c) Briefly discuss the term 'Grid Computing'. 5

3. (a) Draw process state transition diagram and describe the role of each state, mentioned in process state transition diagram. 7

(b) What are Tightly Coupled Systems ? How do they differ from Loosely Coupled Systems ? Briefly discuss the various types of Tightly Coupled Systems. 8

(c) Briefly discuss the concept of Permutation network. 5

4. (a) Write Bernstein conditions for Detection of Parallelism. Consider the following instructions of sequential program : 7

$I_1 : x = (a + b) / (a * b)$ and $I_2 : y = x^2 + (a * e)$

Apply Bernstein conditions and check whether I_1 and I_2 are parallelizable or not.

(b) Explain the algorithm for matrix multiplication using Concurrently Read Concurrently Write (CRCW) and Concurrently Read Exclusively Write (CREW). 8

(c) Briefly discuss the superscalar processors. 5

5. Write short notes on the following : 4×5=20

(a) Parallel Random Access Machines (PRAM)

(b) Merits and demerits of shared memory programming

(c) Hypercube Network

(d) Parallel Virtual Machine (PVM)

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