

Central Institute of Technology Kokrajhar

Computer Science & Engineering Department

END SEMESTER EXAMINATION

Instructions: Attempt any five questions.

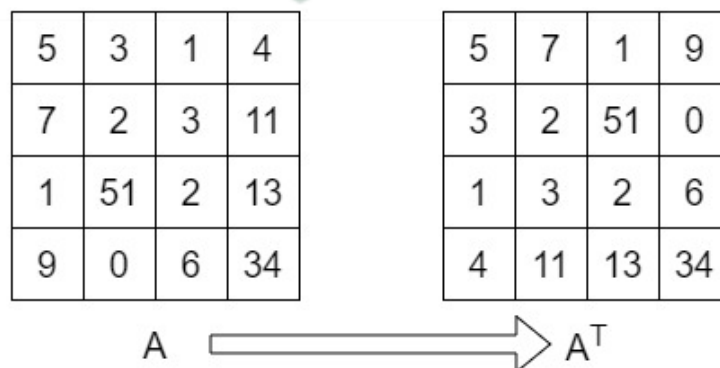
1. a) Write down the *Amdhal's Law* of parallel computation and discuss with an example.
 b) Consider in a machine 5 units of time are required to load 10 processes from disk to RAM. The CPU takes 3 units to execute the first process and 1 unit of time for the subsequent processes. To write back these 10 processes to RAM, the CPU needs another 5 units of time. Compute the time required to execute 200 processes.
 If there are ten processors instead of one, and every instruction can be executed parallelly then what will be the speed up? [8+(6+6) = 20 marks]

2. a) Write down the PRAM algorithm to merge two sorted arrays into a single sorted array. [Clearly mention the number of processors, time required, and mapping]
 b) Consider the following array and apply your algorithm to merge $A[1...4]$ with $A[5...8]$ into a single array as shown in the following diagram.



[(10+10) = 20 marks]

3. a) What are the different types of PRAM algorithms?
 b) Consider the Matrix Transpose operations as shown in the following diagram, where A is the original and A^T is the transpose of the matrix A . A matrix is called symmetric when $A = A^T$. Write a PRAM algorithm to check whether a given matrix is symmetric or not.



[(5+15) = 20 marks]

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4. a) Consider a shuffle exchange network that has 16 nodes. Identify the shuffle and exchange operations of all nodes and draw the network.
b) Compute the diameter of your network.
c) What will be the diameter if a network has N number of nodes?
d) Prove that a binomial tree having a height greater than 4 can not be embedded into a 2D mesh without increasing dilation beyond 1.

[8+3+4+5 = 20 marks]

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5. Consider the following array having eight elements -
 $A = \{5, 3, 7, 1, 2, 8, 4, 9\}$
Convert the sequence to a bitonic sequence.
Use bitonic merge sort to convert to sort the bitonic sequence.

[10+10 = 20 marks]

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6. a) Use hyperquicksort algorithm to sort the following array -
 $A = [3, 1, 5, 7, 93, 91, 90, 9, 2, 4, 6, 8, 89, 87, 85, 83]$.
b) With a clear diagram discuss about *Flynn's Taxonomy*

[12+8 = 10 marks]

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7. Write short notes on (any four)

- a) Pyramid Network
b) Dilation of a Graph
c) Centralized Load Balancing Algorithm
d) Sieve of Eratosthenes
e) Diameter and Bisection width.

[(4 × 5) = 20 marks]