CLASS: BE   SEMESTER: VII/ADD
BRANCH: CSE   SESSION : MO/2018

SUBJECT : CS8029 PARALLEL AND DISTRIBUTED SYSTEMS

TIME: 1.5 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1 (a) Explain the need of parallel processing.   [2]
    (b) Prove that a K-stage linear pipeline can be at most K-time faster than that of non-pipeline   [3]
        serial processor.

Q2 (a) A sequential implementation of the Sieve of Eratosthenes marks about 2.2 million cells   [2]
        in order to compute all primes less than 1 million. Estimate the maximum speedup
        achievable by the control-parallel version of the Sieve of Eratosthenes as it finds all
        primes less than 1 million.
    (b) Consider a parallel pipelined widget-assembly machine with 3 pipelines, each pipeline has   [3]
        3 segments. If this set-up has produced 10 widgets, then what speedup would have been
        achieved after producing each of the widgets?

Q3 (a) Summarize the similarities and differences between RAM model of serial computation and   [2]
        PRAM model of parallel computation.
    (b) Prove that a p-processor PRIORITY PRAM can be simulated by a p-processor EREW PRAM   [3]
        with the time complexity increased by a factor of $\Theta(\log p)$.

Q4 (a) Given a one-way linked list with 15 nodes, each containing either 0 or 1, if suffix sum is to   [2]
        be performed on it so as to rank the nodes, how many processors will be required?
        Estimate the number of iteration that each of these processors will undergo while
        completing the task.
    (b) Given two sorted arrays with $n/2$ disjoint values, how will you merge them using CREW   [3]
        PRAM model? Present an algorithm to achieve the goal.

Q5 (a) What do you mean by prescheduled and self-scheduled data-parallel algorithms?   [2]
    (b) Given a set of 16 integers which is to be reduced using 16 node suffle-exchange SIMD   [3]
        system, how many iterations will be required? Show the trace of computation iteration-
        wise.

Q6 (a) Show the illustration of multiplying two 2 × 2 matrix by a 2-D wraparound mesh.   [2]
    (b) Write an algorithm to multiply two $n \times n$ matrix for a UMA multiprocessor. What is the   [3]
        complexity of this algorithm?

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