M.Sc. Examination 2018
Semester-IV
Computer Science
Course : MCSC-43
(Parallel Algorithms)

Time : 3 Hours **Full Marks : 40**

Questions are of value as indicated in the margin

Answer Question No.**1** and **any four** from the rest

1. a) Define work and efficiency of a parallel algorithm.
   b) Show that, minimum time (lower bound of time complexity) required to solve any problem on n processor hypercube is log n.
   c) State and prove Brent's lemma. 2+2+4=8
2. a) Present an optimal parallel algorithm to multiply a matrix $A = (a_{ij})_{n \times n}$ and a vector $x = [x_1, x_2, ...x_n]$ on a PRAM model.
   b) Identify the type of memory access used by the algorithm. 6+2=8
3. a) Describe how two square matrices (for example 4×4) can be multiplied on a systotic MESH.
   b) Obtain the time and processor complexity of the algorithm. Is it optimal? 5+3=8
4. a) Present a parallel algorithm on a PRAM to obtain the tree (root) in which every vertex belongs in a forest.
   b) Present the time, processer complexities of the above algorithm.
   c) What sort of memory access would be required by the above algorithm? Justify. 4+(1+1)+2=8
5. a) Design a parallel algorithm to merge two sorted sequences into a single sorted sequence on a PRAM.
   b) Obtain time and processor complexities of the algorithm. 6+2=8
6. a) Describe how the Euler Tour technique can be used to convert a tree to a rooted tree.
   b) Describe, how Euler Tour technique can be used to obtain a parallel algorithm for computing post order traversal of any rooted tree. Also obtain the time and processor complexities of the algorithm. 4+(3+1)=8

———