MCSE-011 Ⓢ

MCA (Revised)

Term-End Examination

June, 2007

MCSE-011 Ⓢ : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question number 1 is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Define Array processing. Why are array processors called as SIMD array computers ? With the help of a block diagram, explain the architecture of an SIMD array processor. *10*

(b) State and explain Gustafson's law for measuring speedup performance of parallel systems. Explain with the help of an example *10*

(c) Elaborate the concept of permutation network. What is butterfly permutation ? How is it implemented ? Discuss. *10*

(d) Define cluster computing. Explain the memory organisation in a cluster computing. Give details of any of the important projects based on cluster computing. *10*

2. (a) With the help of suitable example, explain control dependence. 5

(b) List any three scientific applications and engineering applications of parallel computing. 6

(c) With the help of an example for each, explain the following parallel programming models : 9

(i) Message passing

(ii) Data parallel programming

3. (a) What are Bernstein conditions ? Show the operation of Bernstein conditions on the following code :

I1 : $x = (a + b) / (a * b)$

I2 : $y = (b + c) * d$

I3 : $z = x^2 + (a * e)$ 10

(b) "Flynn's classification discusses the behavioural concept for classifying the parallel computers and doesn't take into consideration the computer's structure." Discuss the parallel computers classification depending on their structure. 10

4. (a) What is Synchronization Latency problem in multithreaded processors ? How can it be handled ? 6

(b) Define following asymptotic notations used for analysing functions : 6

(i) Theta notation

(ii) Big-O notation

(iii) Ω notation

(c) Describe the property of the bitonic sequence and sort out the following list of values in ascending order using a combinational circuit consisting of a set of comparators.

3, 5, 18, 29, 10, 2, 14, 0, 21, 4, 9

Ahso show the intermediate steps. *8*

5. (a) Write short notes on the following : *10*

(i) Parallel virtual machine

(ii) Data parallel programming

(b) Draw the structure and explain the following interconnection networks : *10*

(i) Fat tree

(ii) Systolic array