

**CSCI 4/5/8145 Parallel Programming**  
**Mid Term Test**  
**Thursday March 16th, 2000, 7:30 pm - 8:50 pm**

THREE pages.

Attempt all questions in the spaces provided.

Name: .....

Use additional paper if necessary.

You may refer to the materials provided with this test. Do not refer to any other materials.

Mark/30

Qu. 1 Answer each of the following briefly:

(a) Name one reason for using parallel computers? 2

(b) Draw a four dimensional hypercube network and label its nodes so the labels of connected nodes differ in one binary digit. 2

(c) What is meant by the term single program multiple data (SPMD) structure for a parallel program? 2

(d) What is the purpose of the message tag attached to a message? 2

- (e) What is the difference between packet switching and worm-hole routing? 2
- (f) What is meant by the term receiver-initiated in decentralized dynamic load balancing? 2
- (g) Under what circumstance can the routine **pvm\_psend()** be used instead of the routine **pvm\_send()**? 2

Qu 2 To send a message from the master process to a specific slave process, it is necessary for the master process to know the TID (task identification) of the slave and for the slave to know the TID of the master. Explain how each process can obtain the TID of the other process in PVM. Give an example.

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Qu. 3 Write a parallel program in PVM to solve the one-dimensional heat distribution problem based upon finite difference equation:

$$x_i = \frac{x_{i-1} + 2x_i + x_{i+1}}{2}$$

for  $0 < i < 100$ , using 10 processes. Assume that  $x_1$  has a fixed value of 25 and  $x_{100}$  has a fixed value of 95. Compute the values of the other points. Provide comments in the program. 10