

GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. - SEMESTER – VIII EXAMINATION – OCTOBER 2012

Subject code: 180702**Date: 29/10/2012****Subject Name: Parallel Processing****Time: 02.30pm - 05.00pm****Total Marks: 70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain message passing and shared-address-space computers with neat sketches. Also state the differences between these two computers. **07**
- (b) Explain recursive decomposition technique in detail and draw task dependency graph for the following sequence using quick sort with recursive decomposition and choose '9' as pivot element initially.
9, 5, 10, 23, 6, 1, 2, 3, 7, 15 **07**
- Q.2** (a) Describe the following for one-to-all broadcast and all-to-one reduction communication operations: **07**
- Linear Array
 - Mesh
 - HyperCube
- (b) Enlist and discuss different parallel algorithm models in detail. **07**
- OR**
- (b) (1) Enlist and explain the various forms of PRAM in brief. **04**
- (2) How do you hide memory latency by using prefetching and multithreading? Discuss in brief. **03**
- Q.3** (a) (1) Explain scatter and gather in basic communication operations. **03**
- (2) Write the functionality of the following MPI primitives or routines: **04**
- MPI_Init
 - MPI_Sendrecv
 - MPI_Isend
 - MPI_Reduce
- (b) Discuss different performance metrics for parallel systems. **07**
- OR**
- Q.3** (a) What is meant by granularity of the decomposition of a given problem? Discuss the effect of granularity on performance of parallel systems. **07**
- (b) Discuss buffered non-blocking and non-buffered non-blocking send/receive message passing operations with neat sketches. **07**
- Q.4** (a) (1) State the advantages of threaded programming model. **03**
- (2) Discuss the following terms in brief: **04**
- mutex locks
 - Attribute objects

- (b) What do you mean by deadlocks in blocking non-buffered message passing operations? Explain the same in brief. Is there any possibility for deadlock occurrence in the following code segments for process P1 and process P2 with blocking non-buffered send/receive message passing operations? Support your answer with proper justification. **07**

P1	P2
1. send(&a, 1, 2)	1. send(&a, 1, 1)
2. receive(&b, 1, 2)	2. receive(&b, 1, 1)

OR

- Q.4 (a)** Explain thread creation, termination and cancellation in detail in shared-address-space supported parallel systems. **07**
- (b)** Explain matrix-vector multiplication using row-wise 1-D partitioning with appropriate example. **07**
- Q.5 (a)** Write two rules for bitonic sequence in bitonic sorting network, explain the same with example. Briefly discuss bitonic sort and trace the following sequence using the same. **07**
- 6, 8, 10, 12, 17, 16, 21, 24, 50, 45, 40, 35, 30, 25, 15, 13
- (b)** Explain parallel formulation of Dijkstra's algorithm for single source shortest path with an example. **07**

OR

- Q.5 (a)** Discuss the shared-address-space parallel formulation of quick sort in brief. Explain the same with the following sequence of numbers with total number of elements $n = 16$ and number of processes $p = 4$. Initially choose '8' as pivot element and subsequently you can choose it randomly from the computed sequence after each step. **07**
- 4, 13, 2, 18, 14, 1, 17, 20, 6, 10, 15, 9, 3, 12, 8, 19
- (b)** Discuss the parallel formulation of Prim's algorithm for finding minimum spanning tree. **07**
