Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India

(Autonomous College Affiliated to University of Mumbai)

Mid Semester Examination

March 2018

Max. Marks: 30

Class: M.Tech. (1st Year)

Course Code: CE922

Name of the Course: High Performance Computing

Duration: 90 Min

Semester: II

Branch: Computer

Instruction:
  (1) **All questions are compulsory**
  (2) **Draw neat diagrams**
  (3) **Assume suitable data if necessary**

Q No.	Question	Max. Marks	CO
Q.1 (a)	How memory reads and writes are handled in four variants of PRAM model?	04	CO1
Q.1 (b)	Define *Data Dependence* and then exemplify its any five types.	06	CO1
Q.2 (a)	Let d be the maximum degree of concurrency in a task-dependency graph with t tasks and a critical-path length l. Prove that $\lceil t/l \rceil \leq d \leq t - l + 1$	04	CO2
	OR		
	The bubblesort algorithm sorts an array of keys $a[0], a[1], \ldots, a[n-1]$ by repeatedly comparing adjacent keys. If $a[i] > a[i+1]$, it exchanges the keys. The process continues until $a[0] < a[1] < \ldots < a[n-1]$. Using the task/channel model, design a parallel version of bubblesort. Draw two task/channel diagrams for the parallel bubblesort as follows. The first diagram should show primitive tasks and its complexity. The second diagram should show agglomerated tasks and its complexity.	04	CO2
Q.2 (b)	Consider a simple block allocation of n data items to p processes in which the first $p-1$ processes get $\lceil n/p \rceil$ items each and the last process gets what is left over. i) Find any three pairs of n and p such that the last process does not get any elements. ii) Find any three pairs of n and p such that $\lfloor p/2 \rfloor$ processes do not get any values. Assume $p > 1$.	06	CO2
	OR		

	Brandon's parallel program executes in 242 seconds on 16 processors. Through benchmarking he determines that 9 seconds is spent performing initializations and cleanup on one processor. During the remaining 233 seconds all 16 processors are active. What is the scaled speedup achieved by Brandon's program?	06	CO2
Q.3 (a)	List any six MPI functions along with the summary of its input parameters.	06	CO3
Q.3 (b)	Define the following terms: i) Amdahl's Law, ii) Gustafson-Barsis's Law, iii) Karp-Flatt Metric iv) Isoefficiency Metric	04	CO1