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

2018-19

Max. Marks: 20 **Duration: 60 Min**

Class: M.Tech. (1^{st} Year) **Semester: II**

Course Code: CE922 **Branch: Computer Engineering**

Name of the Course: High Performance Computing

Instruction:

(1) All questions are compulsory

(2) Draw neat diagrams

(3) Assume suitable data if necessary

Q No.	Question	Max. Marks	CO
Q.1	Exemplify Latency (L), Asymptotic Bandwidth (B), Throughput (T) and end-to-end Delay (D) for evaluation of Communication Performance in High Performance Computing System.	05	CO2
Q.2	Illustrate an implementation of send-receive messaging protocol for large messages using Active Messages Programming Model.	05	CO1
Q.3	Find and Justify the values of Node degree, Network diameter, Number of links, Bisection width and Symmetry for 2D–Mesh, if $N > 0$ is the number of nodes of 2D–Mesh and is a perfect square.	05	CO2
Q.4	Let $O(n)$ be the total number of unit operations performed by an n-processor system and $T(n)$ be the execution time in unit time steps. Prove that $1/n \leq E(n) \leq U(n) \leq 1$ using the relations among Speedup $S(n)$, Efficiency $E(n)$, Quality $Q(n)$, Utilization $U(n)$ and Redundancy $R(n)$ of a parallel computation.	05	CO1
	OR		
	Give a hypercube algorithm to compute prefix sums of n numbers if p is the number of nodes and n/p is an integer greater than 1. Assuming that it takes time t_{add} to add two numbers and time t_s to send a message of unit length between two directly-connected nodes, give an exact expression for the total time taken by the algorithm such that t_s is the latency or the startup time for the data transfer and t_w is the per-word transfer time.	05	CO1