Sardar Patel Institute of Technology

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

(Autonomous College Affiliated to University of Mumbai)

End Semester Examination

2017-18

Max. Marks: 100 | **Duration: 180 Min**

Class: M.Tech. (1st Year) | **Semester: II**

Course Code: CE922 | **Branch: Computer**

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 (a)	State Bernsteins's three conditions with example.	05	CO1
Q.1 (b)	State Amdahl's Law and Gustafson-Barsis's Law.	05	CO1
Q.1 (c)	List any five static network topologies.	05	CO3
Q.1 (d)	List any five performance metrics for Parallel Systems.	05	CO1
Q.2 (a)	Compare Kernel-Level and User-Level Lightweight Communication Systems.	10	CO3
Q.2 (b)	Exemplify *Recursive Decomposition* technique.	10	CO1
Q.3 (a)	Discuss Agglomeration and Mapping in the design of Floyd's All-Pair Shortest-Paths Parallel Algorithm.	10	CO4
Q.3 (b)	Discuss Data Decomposition options in the design of Sieve of Eratosthenes Parallel Algorithm.	10	CO3
Q.4 (a)	Describe a typical zero-copy protocol of transferring a large message using Active Messages. **OR** Derive the equations for Speedup and Isoefficiency in Parallel Systems.	10 10	CO2 CO2
Q.4 (b)	Discuss the impact of location of Network Interface on the performance and usability inside the System. **OR** Discuss the various fields in ServerNet address space.	10 10	CO3 CO3
Q.5 (a)	Discuss any five MPI functions with arguments. **OR** Differentiate Rowwise and Columnwise Block-Striped design of parallel Matrix-Vector Multiplication.	10 10	CO3 CO3

Q.5 (b)	Suppose we have chosen a block agglomeration of n elements (labeled $0, 1, \ldots, n-1$) to p processes (labeled $0, 1, \ldots, p-1$) in which process i is responsible for elements $\lfloor in/p \rfloor$ through $\lfloor (i+1)n/p \rfloor - 1$. Prove that the last process is responsible for $\lceil n/p \rceil$ elements.	10	CO1
	OR		
	Prove that there exists a p_0 such that $p > p_0$ implies $\Psi(n,p) < \Psi(n,p_0)$ using the definition of speedup $\Psi(n,p) \leq \frac{\sigma(n)+\varphi(n)}{\sigma(n)+\varphi(n)/p+\kappa(n,p)}$. Assume $\kappa(n,p) = C \log p$	10	CO1