[Total Marks 80]

(3 Hours)

N. B:
1. Question **No. 1 is Compulsory**.
2. Solve any **THREE** from Question No. 2 to 6.
3. Draw neat well labeled diagram wherever necessary

Q. 1 a)	What are the different network topologies? Explain in detail.	**(10)**
b)	Compare and contrast loosely coupled and tightly coupled multiprocessors.	**(10)**
Q. 2 a)	Write a MPI program to find factorial of given number.	**(10)**
b)	What is a Data Race? Why Data-Races are Undesired? How Data-Races Can be Prevented?	**(10)**
Q. 3 a)	Explain Flynn's classification in detail.	**(10)**
b)	Explain Granularity, Concurrency and Dependency Path.	**(10)**
Q. 4 a)	Explain various levels of parallel processing.	**(10)**
b)	What is OpenMP? Explain OpenMP compiler directives? What are the Pros and Cons of OpenMP.	**(10)**
Q. 5 a)	Draw and explain NVIDIA GPU architecture.	**(10)**
b)	What are the different Performance metrics?	**(10)**
Q. 6	Write short notes on any **FOUR**:	
	1. Quantum Computers	**(20)**
	2. Data flow computers	
	3. Memory organization.	
	4. Message passing interface	
	5. Non-uniform memory access model.	

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