(Time: 3 Hours)   **[Total Marks 80]**

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)	Discuss in detail SISD, SIMD, MISD, MIMD, SIMT, SPMD, MPMD.	(10)
b)	Write a MPI program to find sum of N numbers.	(10)
Q. 2 a)	Derive the expression for speedup and efficiency by Amdahl's law and comment on the same. Assume suitable data if required.	(10)
b)	Discuss different levels of parallel processing.	(10)
Q. 3 a)	Explain about process synchronization mechanism with Semaphore.	(10)
b)	Define MPI. Explain in detail principles of Message Passing Programming.	(10)
Q. 4 a)	Explain in brief Quantum Computers.	(10)
b)	Define CUDA? Explain in CUDA processor architecture.	(10)
Q. 5 a)	Explain speedup, efficiency and scalability with suitable example.	(10)
b)	Explain in detail Architecture of NVIDIA GPU.	(10)

Q. 6   Write short note on the following:
1. Nanotechnology
2. Grain packing and scheduling in parallel processing   (20)
3. Data Race
4. OpenMP

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