

Total No. of Questions : 8]

SEAT No. :

P-558

[Total No. of Pages : 2

[6004]-493

**B.E. (Computer Engineering)**  
**High Performance Computing**  
**(2019 Pattern) (Semester - VIII) (410250)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

**Q1) a)** Explain with diagram One-to-all broadcast on an eight-node ring with recursive doubling technique. Node 0 is the source of the broadcast. Also Explain all to one reduction with node 0 as destination. [7]

b) Explain in detail Blocking and Non-Blocking Communication Using MPI. [6]

c) Write a short note on prefix-sum operation. [4]

OR

**Q2) a)** What is all to all broadcast communication operation? Explain all to all broadcast on an eight node ring with step wise diagrams. (Show first two steps and last communication step). [7]

b) Explain scatter and gather communication operation with diagram. [6]

c) Explain circular shift operation? [4]

**Q3) a)** Explain parallel Matrix —Matrix multiplication algorithm with example? [7]

b) Explain different performance Metrics for Parallel Systems. [6]

c) Explain Minimum Execution Time and Minimum Cost Optimal Execution Time. [4]

OR

*P.T.O.*

- Q4)** a) What is granularity? What are effects of granularity on performance of parallel systems? [7]
- b) Explain various sources of overhead in parallel systems? [6]
- c) Explain “Scaling Down (downsizing)” a parallel system with example. [4]

- Q5)** a) What is CUDA? Explain different programming languages support in CUDA. Discuss any three applications of CUDA. [8]
- b) Describe processing flow of CUDA-C program with diagram. [6]
- c) Explain the following terms in CUDA: device, host, device code, Kernel. [4]

OR

- Q6)** a) Explain CUDA memory model. Discuss thread hierarchy. [8]
- b) What is block dimension and grid dimension in CUDA? Write a CUDA kernel for addition of two vectors and explain how it will calculate addition using threads. [6]
- c) What is a Kernel in CUDA? What is kernel launch? Explain arguments that can be specified in a Kernel launch. [4]

- Q7)** a) Explain odd-even transportation in bubble sort using parallel formulation. Give one stepwise example solution using odd-even transportation. [8]
- b) Explain Parallel Depth First Search algorithm in detail? [6]
- c) What is Kubernetes? Explain its features and applications. [4]

OR

- Q8)** a) Write short notes on : [8]
- i) Parallel Merge sort
- ii) GPU applications
- b) What are the issues in sorting on parallel computers? Explain with appropriate example? [6]
- c) Explain parallel BFS algorithm in brief. [4]

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