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SEAT No. : B190954274

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[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 Kubernets? 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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