

**MASTER OF COMPUTER
APPLICATIONS (MCA) (REVISED)**

Term-End Examination

June, 2023

MCSE-011 : PARALLEL COMPUTING

Time : 3 Hours

Maximum Marks : 100

Note : *Question No. 1 is compulsory. Attempt any
three questions from the rest.*

1. (a) What is Bitonic Sequence ? Write the algorithm to sort the Bitonic sequence and analyse the complexity of this algorithm. 8

- (b) What is grain size ? What are the different categories of grain size ? How do we classify parallelism on the basis of grain size ? 8

- (c) Compare Flynn's classification and structural classification on relevant attributes. 8
- (d) Why are array processors called as SIMD array computers ? Explain the architecture of SIMD array processors using a block diagram. 8
- (e) Explain the algorithm for Matrix Multiplication using CRCW and CREW. 8
2. (a) Discuss VLIW architecture. Explain how the problems of superscalar architecture are addressed and resolved in VLIW architecture. 10
- (b) Compare cluster computing and grid computing. Explain the memory organisation in cluster computing. 10
3. (a) List the techniques for the optimization of parallel code. Explain at least *two* techniques with suitable example for each.

- (b) Differentiate between the following (Give example for each) :
- (i) Instruction Pipelines and Arithmetic Pipelines 5
 - (ii) Thread and Process 5
4. (a) Explain Gustafson's law. How is it different from the Amdahl's law and Sun-Ni's law ? 10
- (b) Discuss the following parallel programming models :
- (i) Shared memory model 2
 - (ii) Thread model 2
 - (iii) Message passing model 2
- (c) Elaborate the following performance analysis tools :
- (i) Visualization 2
 - (ii) Communication matrix 2

5. Write short notes on the following : $4 \times 5 = 20$

- (a) Master Slave kernel
- (b) System deadlock
- (c) Instruction level and loop level parallelism
- (d) CLOS networks
- (e) Speedup in pipeline architecture