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201CS001

# Ph.D./M.S. (Engg.) by Research Degree Examination, December 2022
# Multicore Architecture

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer any FIVE full questions, choosing ONE full question from each module.***

## Module-1

1 a. Discuss classes of computing environments. Explain five implementation technologies, which are critical to modern implementation. **(10 Marks)**

b. Explain following with suitable diagram,
   (i) 1 : 1 mapping of threads to processors.
   (ii) M : 1 mapping of threads to processors.
   (iii) M : N mapping of threads to processors. **(10 Marks)**

**OR**

2 a. Explain system view of threads and flow of threads in an execution environment. **(10 Marks)**

b. Illustrate concept of system virtualization. **(10 Marks)**

## Module-2

3 a. Explain in brief parallel programming pattern and types of problems that each pattern may be applied to. **(10 Marks)**

b. Differentiate Semaphores and locks. Explain different types of locks along with its purpose. **(10 Marks)**

**OR**

4 a. What is error diffusion? Explain error diffusion algorithm steps along with implementation. **(10 Marks)**

b. Illustrate different types of dead locks with suitable diagram. Explain dead lock scenario in a state transition for a thread. **(10 Marks)**

## Module-3

5 a. Illustrate three shared-memory multiprocessor models with appropriate diagrams. **(10 Marks)**

b. What is the main objective of snoopy bus protocols? Explain two approaches which have been practiced for maintaining of cache consistency. **(10 Marks)**

**OR**

6 a. What is the difference between static and dynamic network? Explain following terms with respect to dynamic networks :
   (i) Buses
   (ii) Crossbar switches
   (iii) Multistage networks. **(10 Marks)**

b. Explain three classes of cache directory protocols with suitable diagrams. **(10 Marks)**

## Module-4

7 a. Discuss how loop fails when variable is shared and solution for it, with respect to data race condition along with example. Explain three different ways in which memory can be declared as private. **(10 Marks)**

b. Discuss following scheduling schemes in OpenMP : Static, dynamic, guided, runtime. Explain reduction clause along with an example. **(10 Marks)**

**OR**

**8** a. What is work sharing? What happens when work sharing is used with for construct? Summarize five restrictions on which loops can be threaded. **(10 Marks)**

b. Discuss different clauses with respect to OpenMP used to accomplish Data.Copy-in and Copy-out operation. **(10 Marks)**

## Module-5

**9** a. Describe solutions for heavily contended locks with suitable example. **(10 Marks)**

b. Explain in detail, how 'Volatile' keyword is used in Itanium architecture. **(10 Marks)**

**OR**

**10** a. Explain concept of Priority Inversion Scenario with appropriate diagram. **(10 Marks)**

b. Explain Cache Line Ping Ponging caused by False sharing with neat figures. **(10 Marks)**

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