

B.E./B.TECH. Degree Examination, December 2020

Semester - VIII

**CS16801-MULTICORE ARCHITECTURES AND PROGRAMMING**

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

1. If P is the parallel region in a program, serial region is
  - a.  $1/P$
  - b.  $1-P$
  - c.  $1*P$
  - d. 1
2. Lock that traps the threads in an unending loop releasing and acquiring locks is
  - a. Mutex lock
  - b. Semaphore lock
  - c. Dead lock
  - d. Live lock
3. Assume the following data for the integer a and the distributed integer array b on different processors. For the entire array b,  $b[i] = i$ .  
P0: a=0, b = [0, 1, 2, 3]  
P1: a=1, b = [4, 5, 6, 7]  
P2: a=2, b=[8, 9, 10, 11]  
P3: a=3, b=[12, 13, 14, 15]  
Find the type of schedule followed in b array
  - a. Static scheduled
  - b. Dynamic scheduled
  - c. Guided scheduled
  - d. Runtime scheduled
4. The rank id for the master process in MPI is
  - a. 4
  - b. 2
  - c. 0
  - d. 1
5. Why a distributed shared memory multiprocessor is called as non uniform memory access (NUMA) multiprocessor?
6. Distinguish deadlock and livelock.
7. Mention the purpose of single directive in OpenMP.
8. List any two MPI reduction operators.

**PART B - (4 X16 = 64 marks)**

09. (a) Analyze and recommend the suitable architecture for implementing (16) parallelism? Justify your answer.

**(OR)**

- (b) Identify the different types of interconnection networks for distributed and shared memory systems and illustrate with suitable example. **(16)**

10. (a) Discuss how producer - consumer problem can be solved using synchronization mechanism. **(16)**

**(OR)**

- (b) Identify the suitable mechanism for communicating between threads or processes and explain it with suitable code. **(16)**

11. (a) Analyze the serial code of Matrix Multiplication and identify the suitable OpenMP mechanism to parallelize the code. **(16)**

**(OR)**

- (b) Write the OpenMP program to evaluate the given expression  $a^2+b^2+2ab$  with a suitable OpenMP construct. **(16)**

12. (a) Discuss Trapezoidal Rule and implement serial and parallel code in MPI. **(16)**

**(OR)**

- (b) Use MPI Programming to implement the histogram for the data {1.3, 2.9, 0.4, 0.3, 1.3, 4.4, 1.7, 0.4, 3.2, 0.3, 4.9, 2.4, 3.1, 4.4, 3.9, 0.4, 4.2, 4.5, 4.9, 0.9.}. Have process 0 for reading the input data and distribute it among the processes. Also have process 0 to print out the histogram. **(16)**