

Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Computer Science and Technology
300 level 2nd Semester Examination – Dec. - 2017/Jan. - 2018
CST342-3 Parallel and Distributed Computing



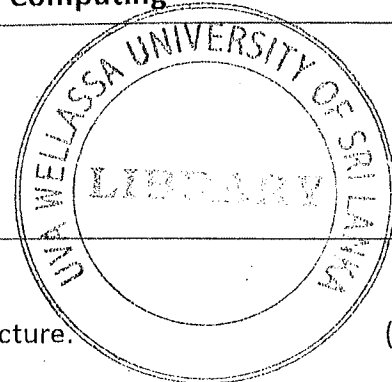
Instructions to candidates

Duration: Two (02) hours

Number of questions: Four (04)

Answer all questions

Mark allocation: 100



1.
 - a. Explain the FLYNN's taxonomy of computer architecture. (5 mark)
 - b. Differentiate Uniform Memory Access vs. Non-Uniform Memory access using figures. (5 mark)
 - c. Describe domain decomposition and functional decomposition in terms of designing parallel programs. (5 mark)
 - d. List advantages and disadvantages of Fine-gran parallelism and Coarse-grain parallelism. (5 mark)
 - e. How to calculate the average degree of concurrency using a task-dependency graph? (5 mark)

2.
 - a. Explain static task generation and dynamic task generation with examples. (6 mark)
 - b. Discuss the problem in incoherent caches in multiprocessor system and how to overcome it. (5 mark)
 - c. Explain hardware cache coherent protocols; Snoopy and Directory based systems. (5 mark)
 - d. Describe the following array distribution schemes using block diagrams.
 - i. Block Distributions
 - ii. Block-cyclic Distribution
 - iii. Randomized Block Distributions(3x3 = 9 mark)

- 3.
- a. Explain the mapping between logical view and hardware view of CUDA programming in terms of thread, thread block, grid, CUDA core, streaming multiprocessor and the device. (6 mark)
 - b. What is meant by Warp and Warp scheduler in GPU architecture? (5 mark)
 - c. Discuss the problem warp divergence in GPU computing. (5 mark)
 - d. Write a pseudo code for parallel matrix multiplication using GPGPU with shared memory capability. (9 mark)
- 4.
- a. Explain steps for doing parallel scan with the aid of block diagrams. (6 mark)
 - b. What is meant by distributed memory model? (4 mark)
 - c. Write all-to-one reduce pseudo code in distributed memory model by explaining each steps and using the following point-to-point communication primitives.
 - handle \leftarrow sendAsync(buf[1:n] \rightarrow destination)
 - handle \leftarrow recvAsync(buf[1:n] \leftarrow source)
 - wait(*)(10 mark)
 - d. Depict block diagrams to explain scatter vs. gather and all-gather vs. reduce-scatter. (5 mark)

