Reg. No.										

MANIPAL UNIVERSITY
SCHOOL OF INFORMATION SCIENCES

SECOND SEMESTER MASTER OF ENGINEERING - ME (EMBEDDED SYSTEMS)
DEGREE EXAMINATION – APRIL / MAY 2016

SUBJECT: ESD 616.6 (ELECTIVE 2) – MULTICORE PROGRAM OPTIMIZATION

Wednesday, April 27, 2016

Time: 10.00 – 13.00 Hrs. Max. Marks: 100

1. Explain the following DLX instructions. Also provide their instruction formats. Give one example for each instruction.
   (i) LOAD (ii) STORE (iii) BRANCH (iv) ADD

   (2.5x4 = 10 marks)

2. What is meant by a data hazard? Explain. Also explain RAW, WAW and WAR hazards.

   (5+5=10 marks)

3. List and explain the 3 address mapping techniques. Provide one common example to illustrate all the 3 techniques.

   (10 marks)

4. Given the following data, determine the **average memory access time** and **miss rate** in each case? Which one has the **lower miss rate**? A split 8 KB instruction cache with a 8 KB data cache? Or a 16 KB unified cache? Assume a **hit takes 1 clock cycle** and a miss penalty is **50 clk cycles.** Also a **load or store takes 1 extra clk cycle** on a unified cache. For the 8 kB instruction, cache miss rate is 0.64% and for the 8 KB data cache it is 6.47% and for the unified cache it is 1.99%.

   (10 marks)

5. List all the 7 miss rate reduction techniques and explain any 2 compiler optimization techniques in detail.

   (2+8=10 marks)

6. What is meant by parallel computing? Explain. List and explain Flynn's classification of computers.

(2+6=10 marks)

7. Write the complete **state transition table** for **MSI** protocol. Let the table have the following columns:-
   i. Current state of the cache block
   ii. Transaction generated or observed by the controller
   iii. Action by the controller
   iv. New state of the cache block
   v. Data supplied by

(2x5=10 marks)

8. Explain the following openmp constructs with examples
   i. #pragma omp parallel
   ii. #pragma omp for
   iii. #pragma omp parallel shared(n) private (i)
   iv. #pragma omp single
   v. #pragma omp section

(2x5=10 marks)

9. What is a hotspot? With diagram explain how hotspots are identified?

(2+8=10 marks)

10. Describe comprehensively the concept of writing and using benchmarks.

(10 marks)

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