Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

(Constituent Institute of MANIPAL University)

MANIPAL-576104

SIXTH SEMESTER B.E. (CSE) MAKE UP EXAMINATION

JULY 2013

PARALLEL COMPUTER ARCHITECTURE AND PROGRAMMING (CSE 306)

DATE: 20-7-2013

TIME: 3 HOURS MAX.MARKS: 50

Instructions to the Candidates

- Answer any Five questions.
- Missing data can be suitably assumed.

Q 1. A) Give Handler's Classification of Instruction Pipelining.

B) A bench mark program is executed on a 40 MHz processor. The bench mark program has the following statistics:

Instruction Type	Instruction Count	Clock Cycle Count
Arithmatic	45000	1
Branch	32000	2
Load / Store	15000	2
Floating Point	8000	2.

Calculate average CPI and MIPS rate and execution time for the above problem.

C) With diagrams, explain the different parallel computer structures. (3+3+4)

Q 2. A) Consider a five staged pipeline, specified by the following reservation table:-

	1	2	3	4	5	6	7
S1			X				
S2		X					X
S3	X					X	
S4			X		X		
S5				X			

i) List the set of forbidden and permissible latencies and the collision vector.

ii)Draw a State Transition diagram, showing all possible cycles, without causing collision in pipeline.

iii) Identify all greedy cycles from transition diagram. What is MAL of this pipeline?

B) What are different kinds of data hazards? Explain with an example.

C) Briefly explain simultaneous multithreading. (5+3+2)

Q 3 A) Find the sum of the numbers, given below using an array of 8 PE's. Write the algorithm and masking scheme for the same.

PE0	PE1	PE2	PE3	PE4	PE5	PE6	PE7
1	4	2	5	6	8	7	9.

B) Sort the following numbers in descending order using odd even transposition:

8 7 21 19 17 31 27

C) Briefly explain the functions of each component of a processing element in an array processor with diagram. (4+3+3)

Q 4 A) Write a MPI program which reads a n*n matrix in the root process (Process 0). Using n process's, including root, find the sum of digits of each element. Display the column sum of this result, in the root process.

Sample i/p: 11 12 13 Intermediate o/p: 2 3 4

14 52 67 5 7 13

34 13 25 7 4 7

o/p in root process 14 14 24

B) Briefly explain any three collective communication mechanisms used in MPI.

C) Explain Open CL specification models. (5+3+2)

Q 5 (i) Write an Open CL program to read a string. The program should display the number of digits, alphabets and special symbols in a string.

(ii) Write the Kernel code which performs the above mentioned problem in parallel. (8+2)

Q 6 A) List the factors that make MIMD more popular. Explain the two classes of MIMD multi processors with diagrams.

B) Explain Snooping protocol in multiprocessors. (5+5)