

Name :

Roll No. :

Invigilator's Signature :

CS/M.Tech(ECE-VLSI)/SEM-2/MVLSI-201/2013

2013

PROCESSOR ARCHITECTURE FOR VLSI

Time Allotted : 3 Hours

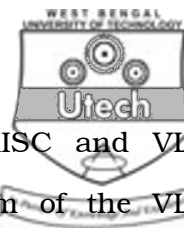
Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer any seven of the following : $7 \times 2 = 14$

- a) Draw the structure of 4*4 Braun multiplier. Illustrate a 4 bit right shift barrel shifter.
- b) Draw the outline structure of memory TMS320C5416 both in microprocessor and microcomputer mode.
- c) Illustrate the bus structure in TMS320C54xx DSP Processor.
- d) Give the chart to overview the ARM instruction set.
- e) Draw the structure of the Von Neumann architecture.
Design a Single Instruction Multiple Data stream (SIMD) unit.



- f) Give the difference between CISC, RISC and VLIW architectures. Draw the block diagram of the VLIW architecture.
- g) Give the difference between hard wired and micro-programmed control unit. Draw the structure of the distributed memory architecture.
- h) Give the difference between vector and scalar architecture.
- i) Define the computer architecture. Illustrate the sub-categories of the computer architecture.

2. Answer any *four* questions of the following : $4 \times 14 = 56$

- a) Define the ARM processor and give the special features of this processor. Draw the block diagram of ARM processor with the different ARM register configuration. Define the software interrupt, data processing, data transfer, swap, multiply, THUMB and branching instruction. $2 + 4 + 8$
- b) Give the special features of the TMS320C54xx digital signal processor. Draw the functional block diagram of the C54xx. Define the function of ALU, accumulators, barrel shifter, multiplier/adder CSSU. $1 + 8 + 5$



- c) Give the difference between fixed point and floating point digital signal processors. Design MAC and ALU unit. A system is given by $y(n) = \sum_{i=0}^E h(i) x(n-i)$. Draw the single MAC, eight MAC and two MAC structure to compare the area required and throughput.

3 + 4 + 7

- d) What do you mean by the control unit ? Draw the block diagram of the hard wired control unit. Illustrate the functionality of each block in hard wired control unit. Draw the block diagram of micro-programmed control unit. Illustrate the functionality of each block in micro-programmed control unit.

2 + 2 + 4 + 2 + 4

- e) What do you mean by instruction set architecture ? Illustrate the Complex Instruction Set Computer (CISC). What are the characteristics, advantage and disadvantage of CISC design ? Illustrate the Reduced Instruction Set Computers (RISC). What are the characteristics, advantage and disadvantage of RISC design ?

2 + 2 + 4 + 2 + 4



- f) Define the Flynn's taxonomy. Illustrate the four classifications of Flynn's taxonomy. What do you mean by pipeline ? Define the five stages of the pipeline instruction. Illustrate the execution of two instruction ADD R_1, R_2, R_3 , and SUB R_4, R_1, R_5 using the pipeline technique. What are the advantages and disadvantages of pipeline operation ?

1 + 4 + 1 + 5 + 2 + 1
