

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 0322**

Roll No.

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### B. Tech.

(SEM. IV) THEORY EXAMINATION 2011-12

## COMPUTER ARCHITECTURE AND ORGANIZATION

Time : 3 Hours

Total Marks : 100

**Note :-** (1) Attempt all questions.

(2) All questions carry equal marks.

(3) Make suitable assumptions wherever required.

1. Attempt any **two** parts of the following : (10×2=20)
- (a) (i) Define an abstract computer. Also list down the limitations of computers.
- (ii) What do you mean by the structure and behaviour of a system ? Give the behavioural VHDL description of half adder.
- (b) (i) Define gate level design process. Also give the logic structure of Four-bit ripple-carry.
- (ii) What are the components at processor design level in a computer system ? Discuss various design issues at processor level.
- (c) Design a two-level combinational circuit in the sum-of-products style that computes the 3-bit sum of two 2-bit binary numbers. The circuit is to be implemented using AND and OR gate.



2. Attempt any **two** parts of the following : (10×2=20)
- (i) Give the overview of CPU behaviour using a flow-chart. Also draw the block diagram for processor-memory communication with and without cache.
  - (ii) Differentiate between RISC and CISC based microprocessors.
- (i) What do you understand by error detection and error correction ? Explain its logic with block diagram.
  - (ii) How fixed point numbers are represented in a computer system ? Explain.
- (i) Write a short note on RISC based instruction format.
  - (ii) Define addressing mode. Discuss relative addressing mode with suitable example.

3. Attempt any **two** parts of the following : (10×2=20)
- Draw the data-path of the twos-complement multiplier. Give the Robertson multiplication algorithm for twos-complement fractions. Also illustrate the algorithm for twos-complement fractions by a suitable example.
- (i) Write a short note on pipeline processing.
  - (ii) Give an algorithm for floating-point addition. Illustrate it with an example.
- Write a short note on sequential arithmetic and logic unit (ALU) using proper diagrams.

4. Attempt any **two** parts of the following : (10×2=20)
- What is hardwired control ? List various design methods for hardwired control. Discuss in detail using diagram any one of the method for designing GCD processor.
- (i) Define a micro-program sequencer. Draw the micro-programmed CPU employing a micro-program sequencer.
  - (ii) Write a short note on multiplier control unit.
- How pipeline performance can be measured ? Discuss. Give a space-time diagram for visualizing the pipeline behaviour for a four-stage pipeline. Also discuss some way to control a pipeline for collision-free operations.

5. Attempt any **two** parts of the following : (10×2=20)
- (i) Give the structure of a commercial 8M × 8-bit DRAM chip.
  - (ii) What do you understand by multilevel memories ? Explain using suitable diagrams.
- (i) Discuss the various types of address mapping used in cache memory.
  - (ii) A moving-arm disk-storage device has the following specifications :
 

Number of tracks per recording surface	200
Disk-rotation speed	2400 rev/min
Track-storage capacity	62500 bits.

 Estimate the average latency and the data-transfer rate of this device.
- (i) Write a short note on DMA controller.
  - (ii) Write a short note on interrupt mechanism used in 8085.

