

Number of Printed Pages—5

**CS-401****B. TECH.**

FOURTH SEMESTER EXAMINATION, 2001-2002

**COMPUTER ORGANISATION***Time : Three Hours**Total Marks : 100*

- Note :** 1. Attempt ALL questions.  
2. All questions carry equal marks.

**1.** Answer any FOUR of the following :— (5×4)

(a) Convert the following :

(i)  $(43.125)_{10} \rightarrow ( )_2$

(ii)  $(6B.28)_4 \rightarrow ( )_2$

(iii)  $(76A)_{16} \rightarrow ( )_8$

(iv)  $(11001010)_2 \rightarrow ( )_{\text{Gray}}$

(b) Perform the following arithmetic operations in 8-bit registers. Use signed 2's complement notation. Indicate overflow/underflow, if any :—

(i)  $-28 - (-100)$

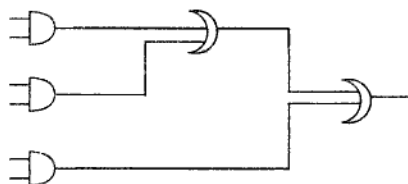
(ii)  $-28 - 100$

(iii)  $78 - (-49)$

(iv)  $+50 - 5$

(c) Describe process of error-detection and correction. Give an example of error-detection code. Explain how it detects error.

- (d) Transform the following logic ckts (without expressing its switching function) into an equivalent logic circuit that employs only 6NAND gates each with 2 inputs.



- (e) Prove by Boolean Algebra :

$$(1) A + (BC) = (A+B)(A+C)$$

$$(2) (A + B)(\bar{A} + C)(B + C) = (A + B)(\bar{A} + C)$$

- (f) Simplify the following Boolean function in product-of-sums form by means of a Four Variable map. Draw logic diagram with NOR gates.

$$F(w, x, y, z) = \Sigma (2, 3, 4, 5, 6, 7, 11, 14, 15)$$

2. Attempt any FOUR of the following :— (5×4)

- (a) What is an ALU (Arithmetic Logic Unit) ? Draw logic diagram of ALU that performs AND, OR logic operations and ADD, SUB arithmetic operations.
- (b) What is the purpose of counters ? How is ripple counter different to that of synchronous counter ? Draw logic diagram of 3 bit synchronous counter.
- (c) Design a single 4 bit shift register which can be loaded parallel and serial, and read in parallel using R-S flip flop.

- (d) What is the need of having many addressing modes in your machine ? Discuss Indirect and Displacement addressing in detail.
- (e) What is a microoperation ? How can microoperation be used for execution of an instruction ? Explain with the help of an example.
- (f) What is the meaning of the term one-address instruction ? How can an instruction which requires three operands be in such machine ? Explain with the help of an example.

3. Attempt any FOUR of the following :— (5 x 4)

- (a) Give classification of Memory based on the method of access. Also discuss construction and working of Magnetic disk and various components of disk access time.
- (b) What is the purpose of DMA module ? How can a DMA module be used for doing Input/Output from devices like Hard disks ? How is DMA different from that of Input/Output processor ?
- (c) What is meant by the term 'BUS arbitration' ? Why is it needed ? How can bus arbitration be implemented is Daisy Chaining Scheme ?
- (d) Describe any two mapping procedures for organisation of cache memory with example.
- (e) Discuss various Semiconductor Memory cells. Also discuss a RAM organisation.

16 Kx 8 memory chips are used to construct 64 Kx16 memory :

- (1) Find how many chips will be needed ?
- (2) Draw block diagram showing connection of chips to address lines.
- (f) What are the reasons for having interrupts in computers ? How can the interrupt be handled in the computers ? Suggest a scheme that can handle multiple interrupts at a time.

4. Attempt any FOUR of the following :— (5 x 4)

- (a) Classify computers on the basis of Flynn's architectural scheme.
- (b) Explain differences between parallelism and pipelining by implementation point of view.
- (c) What are the various Branch handling mechanisms in pipelined processor ? Explain Delayed Branch and Branch Prediction mechanism.
- (d) Write an Assembly language program to replace a capital letter by lower case letter. Make suitable assumption, if any.
- (e) Describe Strobe control, Handshaking for Asynchronous data transfer. What are advantages and disadvantages of both the methods ?
- (f) What do you mean by procedure call & return in the assembly language ? How is it different from interrupt service routine ?

2.

5. Write short notes on any FOUR of the following :— (5 x 4) **101**
- (a) Static RAM and Dynamic RAM
  - (b) Write through and Write block cache
  - (c) Memory mapped Input/Output and I/O mapped input/output
  - (d) Programmed Input/Output and Interrupt driven Input/Output *100*
  - (e) RISC and CISC computers
  - (f) Hardwired and microprogrammed implementation *× 4)*
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