

- (i) How many RAM and ROM chips are needed ?
- (ii) Draw a memory address map for the system.
- (iii) Give the address range in hexadecimal for RAM, ROM and interface.
- (b) Explain the direct mapping technique. Consider a digital computer has a memory unit of $64\text{ K} \times 16$ and a cache memory of 1 K words. The cache uses direct mapping with a block size of four words :
- (i) How many bits are there in the tag, index, block and word fields of the address format.
- (ii) How many blocks can the cache accommodate?
- (c) Write short note on the virtual memory and $2^{1/2} D$ memory organization.



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

PAPER ID : 1067

Roll No.

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B.Tech.

(SEM. IV) EXAMINATION, 2007-08

COMPUTER ORGANIZATION

Time : 3 Hours]

[Total Marks : 100

Notes : Attempt all questions.

- 1 Attempt any **four** parts of the following : **4×5=20**
- (a) The following transfer statements specify a memory operation. Explain the memory operation in each case :
- (i) $R2 \leftarrow M[AR]$
- (ii) $M[AR] \leftarrow R3$
- (iii) $R5 \leftarrow M[R5]$
- (b) An 8 bit register contains the binary value 10011100. What is the register value after an arithmetic shift right ? Starting from the initial number 10011100, determine the register value after an arithmetic shift left and state whether there is an overflow.
- (c) What is wrong with the following register transfer statements ?



(i) $x T : AR \leftarrow \overline{AR}, AR \leftarrow 0$

(ii) $y T : R1 \leftarrow R2, R1 \leftarrow R3$

(iii) $z T : PC \leftarrow AR, PC \leftarrow PC + 1$

- (d) Illustrate the booth multiplication algorithm with an example. (Do not write the algorithm)
- (e) Discuss the bus arbitration.
- (f) Describe the design of 4-bit carry look ahead adder.

2 Attempt any **two** parts of the following : **10×2=20**

- (a) What is the difference between hard wired control and micro programmed control ? What are the advantages and disadvantages in each control ?
- (b) (i) Define the following :
- (1) Micro operation
 - (2) Microinstruction
 - (3) Micro program
 - (4) Micro code.
- (ii) Explain the different cycles of an instruction execution.
- (c) (i) Give the block diagram of the microprogram sequence for a control memory.
- (ii) What are the basic differences between a branch instruction, a call subroutine instruction and a program interrupt ?

3 Attempt any **two** parts of the following : **10×2=20**

- (a) Write a program to evaluate the arithmetic statement.

$$X = (A + B) * (C + D)$$

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(i) Using an accumulator type computer with one address instruction.

(ii) Using a state organized computer with zero address instructions.

- (b) Give the different characteristics of the RISC and CISC computers.
- (c) Discuss the various inter-segment addressing modes with examples.

4 Attempt any **two** parts of the following : **10×2=20**

- (a) (i) What is the difference between isolated I/o and memory mapped I/o ? What are the advantages and disadvantages of each ?
- (ii) What is the main advantage of using interrupt initiated data transfer over transfer under program control without an interrupt ?
- (b) Give the block diagram of DMA controller. Why are the read and write control lines in a DMA controller bidirectional ? Under what condition and for what purpose are they used as input ? Under what condition and for what purpose are they used as output ?
- (c) Discuss the working principle of I/o processors. (IOP). Illustrate the CPU-IOP communication with help of flow chart.

5 Attempt any **two** parts of the following : **10×2=20**

- (a) A computer employs RAM chips of 256×8 and ROM chips of 1024×9 . The computer system needs 2 k bytes of RAM, 4 K bytes of ROM and four interface units, each with four registers. A memory mapped configuration is used. The two highest-order bits of the address bus are assigned 00 for RAM, 01 for ROM and 10 for interface registers :

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