Printed Pages : 4 **TCS-401**

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

PAPER ID : 1067 Roll No.

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 progred 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.

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

(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 banz 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 employes 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 :

(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 K × 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 ad 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.
