

AA-2001

Seat No. _____

Second Year B. C. A. (Theory) Examination

April / May – 2003

201 : Computer System Architecture

Time : 3 Hours]

[Total Marks : 50

Instructions : (1) Draw figures wherever required.

(2) Write **new** questions on **new** page.

- 1 (a) Design a 2-bit Arithmetic circuit along with function table and explain. 4
- (b) An 8-bit register contains the binary value 11011001. 3
What is the register value after arithmetic shift right?
Starting from the initial number 11011001, determine the register value after an arithmetic shift left and state whether there is an overflow.
- (c) Explain the Dynamic Arbitration algorithms. 3

OR

- 1 (a) Design a common bus system for 4 registers of 4-bits each using multiplexers. 4
- (b) Draw the block diagram of the hardware that implements the following register transfer statement : 3
 $x + yz : AR \leftarrow AR + BR.$
- (c) Define the following terms associated with multiprocessors : 3
- (1) Mutual Exclusion
- (2) Test and Set instruction
- (3) Critical Section.

2 Answer any **four** : 10

- (a) Draw the flowchart for Interrupt cycle.
- (b) Explain the three basic instruction formats.
- (c) Explain BSA memory reference instruction in detail.
- (d) Draw the control gates associated with AR register, for the given register transfer statements :

$$R'T_0 : AR \leftarrow PC$$

$$R'T_2 : AR \leftarrow IR (0-11)$$

$$D'_7 IT_3 : AR \leftarrow M [AR]$$

$$RT_0 : AR \leftarrow 0$$

$$D_5 T_4 : AR \leftarrow AR + 1.$$

- (e) The content of AC in the basic computer is hexadecimal 509 F and the value of DR is 872 D. The initial value of PC is hexadecimal 035. Determine the contents of AC, PC, E, AR and IR in hexadecimal after the execution of ADD instruction. Show the binary operation.

3 (a) Explain source and destination initiated handshaking methods. 5

OR

3 (a) Explain character oriented protocol. 5

(b) Answer any **two** : 5

- (1) Explain the Micro-instruction format for 20 - bits.
- (2) Write in short about address sequencing.
- (3) Formulate a mapping procedure that provides eight consecutive Micro-instructions for each routine. The operation code has six bits and the control memory has 2048 words.

4 Answer any **four** : **10**

- (a) Explain the different types of Interrupts.
- (b) Explain the memory stack organisation.
- (c) Explain register Indirect and Indexed Addressing mode.
- (d) Write a program to evaluate the arithmetic statement :

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

Using three address instruction.

- (e) A computer uses register window with global registers = 10, local registers = 10, common registers = 6 and the number of windows = 8. Determine the window size and the total number of registers.

5 (a) Answer any **two** : **6**

- (1) Write a short note on cache memory.
- (2) Explain logical to physical address mapping.
- (3) A computer employs RAM chips of 128×8 and ROM chips of 512×8 . The computer system needs 512 bytes of RAM and 512 bytes of ROM :
 - (a) How many RAM and ROM chips are needed ?
 - (b) Draw the memory address map along with address range in hexadecimal for the system.

(b) Write short note on multistage switching network. **4**