Printed pages: 02 **Sub Code: NCS505**

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BTECH
(SEM V) THEORY EXAMINATION 2018-19
COMPUTER ARCHITECTURE

Time: 3 Hours *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x10 = 20**

a. What do you understand by Locality of Reference?
b. What is the need of Bus Arbitration?
c. What do you understand by displacement addressing?
d. What is the difference between RAM and DRAM?
e. Write short notes on Arithmetic Micro Operations.
f. Give some examples of software interrupts.
g. List three types of control signals.
h. Give the examples of RISC and CISC instruction set architectures?
i. What are the different types of mapping techniques used in Cache memory?
j. What are the conditions for divide overflow?

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a. Write a program to evaluate the expression :

$$X = \frac{A - B + C * (D - E)}{C + G * H}$$

i) Write a program by two-addressing format to evaluate.
ii) Using an accumulator type computer with one address instructions.

b. Perform the division process of 10100011 by 1011(use a dividend of 8 bits).

c. A Computer uses a memory unit with 256K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers and an address part.
(i) How many bits are there in the operation code, the register code part and the address part?
(ii) Draw the instruction word format and indicate the number of bits in each part.
(iii) How many bits are there in the data and address inputs of the memory?

d. A two way set associative cache memory uses blocks of 4 words. The cache can accommodate a total of 2048 words from memory. The main memory size is 128K X 32.
i. Formulate all pertinent information required to construct the cache memory.
ii. What is the size of cache memory?

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) Design 4-bit carry look ahead adder.

(b) Explain the difference between vectored and non-vectored interrupt. Explain stating examples of each.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Draw the flow chart of Booth's Algorithm for multiplication and show the multiplication process using Booth's Algorithm for (+15) X (-13).

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

$$P = \frac{(X - Y = Z) * (M * n - o)}{Q + R * S}$$

By using
(i) Two address instructions
(ii) One address instructions
(iii) Zero address instructions

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) A computer employs RAM chips of 256 x 8 and ROM chips of 1024 x 8. The computer system needs 2K bytes of RAM, 4K bytes of ROM and 4 interface units, each with 4 registers. A memory mapped configuration is used. The two highest order bits of the address bus are assigned 00 for RAM, 01 for of the 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) Draw a flowchart for adding and subtracting two fixed point binary numbers where negative numbers are signed 1's complement presentation.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Define interrupts. When a device interrupt occurs how the processor does determine which device has issued the interrupt?

(b) Explain all the phases of instruction cycle.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain the basic concept of Hardwired and Software control unit with neat diagrams.

(b) Give the block diagram of DMA controller. Why are the read and write control lines in a DMA controller bidirectional?