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Department of Computer Science & Engineering
Motilal Nehru National Institute of Technology, Allahabad
End Semester (Theory) Examination (ODD-Semester) 2016-17
Class: MCA First Semester 2016-17
Subject: Digital Computer Organization(Code:CA-3103)

M.M. : 60

Time: 3 Hrs

Note: 1. Attempt any FIVE(05) questions including Q.No.(1) which is COMPULSORY to ALL.
2. All parts of a question should be answered in one attempt SEQUENTIALLY.
3. Write to the point, exactly what is asked.
4. Make & State necessary Assumptions clearly.

Q.No. 1 (A) Define the following terms in brief:
(i) OS (ii) Cross Assembler (iii) Loader (iv) Linker (v) Macro processor (vi) Microprocessor (vii) Address (viii) ASCII Code (ix) I/O Controller (x) BIOS Program (xi) Mother Board (xii) Universal Gates (xiii) Lan Card (xiv) Power Card

(B) Write down the program for division of two 1-Byte numbers A & B (A div B : A>B) as discussed in the Class.

(C) What is Cache Memory? What do you mean by levels of cache? Is the cache memory also Expandable as RAM? Justify.

(D) A CPU needs 512 X 8 RAM & 512X8 ROM with the help of available 128X8 RAM & 512X8 ROM. Trace a neat diagram for the following:
(i)Block diagram of the RAM chip (ii) Block diagram of the ROM chip
(iii) Relevant Memory Address Map for the CPU (iv) Memory connection to the CPU

(07+03+02+(1+1+2+4)=20)

Q.No. 2 (A) Simplify the function $F(A,B,C,D)=\sum(0,1,2,5,8,9,10)$ using K-Map in SOP & POS forms.

(B) What is a Multiplexer? Trace Logic Diagram & Function Table for 4-to-1-Line Multiplexer.

(C) Define a "BUS". Construct a BUS System using 4X1 MUX for 4 Registers, each with Size of 4 bits.

(D) Convert $(9AFC)_{16}$ to binary & find it's 2's Complement.   (03+03+03+01=10)

Q.No. 3 (A) Construct the following:
(i) 4-bit Adder – Subtractor using Full Adder.
(ii) 4-bit Binary Incrementer using Half Adder.

(B) A digital Computer has a Common BUS System for 16 Registers of 32 bits each. The BUS is constructed with Multiplexer. Answer the followings:
(i) How many selection inputs are there in each Multiplexer?
(ii)What size of Multiplexer are needed?
(iii)How many multiplexers are there in the BUS.

(C) What is "Negative Logic"?   ((03+03)+03+1=10)

Q.No. 4 (A) Classify 8085 Instructions according to following (**with one example in each**):
    (i) Functions performed by the Instructions.
    (ii) Size of Instructions
  (B) Write down an Assembly Language program with proper comments for the followings:
    (i) Sum of a Series of 8-Bit Numbers; SUM is also 8-Bit.
    (ii) Product of two 8-Bit Numbers; Product is 8-Bit.   **(04+(03+03)=10)**

Q.No. 5 (A) What do you understand by **"Addressing Modes"** ? Discuss various Addressing Modes of **INTEL 8085** Microprocessor with Example.
  (B) Trace a Logic for setting the bits of **Status Register** of a CPU.
  (C) What is an **Instruction Cycle?** Explain properly.
  (D) What is **Interrupt & PSW** ? Explain.   **(03 + 02 +03 +02=10)**

Q.No. 6 (A) Define the Followings in reference to **Control Memory**:
    (i) Control Word (ii) Microinstruction (iii) microprogram (iv) Control Memory (v) Control Address Register (vi) Sequencer (vii) Pipe line Register (viii) Hard wired Control
  (B) Explain properly **the Selection of Addresses for Control Memory**.
  (C) Is it possible to design a Microprocessor without a microprogram? Are all microprogrammed Computers also Microprocessors.   **(04+04+02 = 10)**

Q.No. 7 (A) What is **Associative Memory?** Explain its organization using Block diagram. What is role of **Argument, Key & Match Registers?** Explain with a simple example.
  (B) Explain in brief **Match Logic** for **one word** of **Associative Memory** with relevant associated derivations.
  (C) How **write operation** is performed in **Associative Memory?**   **(04+04+02=10)**

Q.No. 8 (A) Explain the followings in brief:
    (i) Set Associative Mapping (ii) Writing into Cache
  (B) What is Virtual Memory, Address & Memory Space?
  (C) Explain in brief Address Mapping using Pages.   **(04+03+03=10)**

Q.No.9 Write Short Notes on any **FIVE** of the followings:
  (A) Computer Generations (B) Flip-Flops (C) Stack Organized CPU
  (D) Decoders (E) Counters (F) Booting steps of an IBM PC
  (G) Hard Disk (H) Optical Disks   **(2 X 5 =10)**

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