C0-R4.B4 : COMPUTER SYSTEM ARCHITECTURE

DURATION : 03 Hours   **MAXIMUM MARKS : 100**

Roll No. : ☐☐☐☐☐☐   **Answer Sheet No. :** ☐☐☐☐☐☐

Name of Candidate : _____ ; **Signature of Candidate :** _____

INSTRUCTIONS FOR CANDIDATES :

- Carefully read the instructions given on Question Paper, Answer Sheet.

- Question Paper is in English language. Candidate has to answer in English Language only.

- **Question paper contains Seven questions. The Question No. 1 is compulsory. Attempt any FOUR Questions from Question No. 2 to 7.**

- **Parts of the same question should be answered together and in the same sequence.**

- **Questions are** to be answered in the **ANSWER SHEET** only, supplied with the Question Paper.

- **Candidate cannot leave the examination hall/ room without signing on the attendance sheet and handing over his/her Answer Sheet to the Invigilator. Failing in doing so, will amount to disqualification of Candidate in this Module/Paper.**

- After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question Booklet is complete in all respects.

DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

1. (a) Differentiate between logical and physical address representations.

   (b) State the condition in which overflow occurs in the case of addition & subtraction of two signed 2's complement numbers. How is it detected ?

   (c) What do you mean by program control instructions ? With a neat diagram, explain how the status register containing overflow, zero, sign, and carry flags works with the status of the accumulator content obtained from ALU.

   (d) Why is floating point number more difficult to represent and process than an integer number ? State the representation of double precision floating point number.

   (e) An Address space is specified by 24 bits and corresponding memory space by 16 bits. How many words are there in :

   (i) Virtual memory (ii) Main memory

   (f) Compare and contrast hardwired control unit with micro programmed control unit.

   (g) What are the reasons of Pipe-Line conflicts in a Pipe-Lined processor ? How are they resolved ? **(7x4)**

2. (a) Compare and contrast assembly language with high-level language. Write a program using assembly language of 8085 microprocessor to check whether a given number is odd or even. If the given number is even then display '1' on its SOD line.

   (b) Discuss the different addressing modes of an instruction. **(9+9)**

3. (a) Use Booth's multiplication method to multiply (-9) and (-13).

   (b) The 8-bit registers A, B, C & D are loaded with the value (F2) H, (FF) H, (B9) H and (EA)H respectively.

   Determine the register content after the execution of the following sequence of micro operations sequentially.

   (i) $A \leftarrow A + B, C \leftarrow C + Shl(D)$

   (ii) $C \leftarrow C \wedge D, B \leftarrow B + 1$

   (iii) $A \leftarrow A - C$

   (iv) $A \leftarrow Shr(B)XOR\ Cir(D)$ **(9+9)**

4. (a) What do you understand by the term micro-operation ? Explain Register and Arithmetic types of micro-operation. Show the hardware realization of decrement micro-operation. i.e., $T1:X \leftarrow X - 1$

   (b) Explain all the phases of instruction cycle. **(9+9)**

5. (a) Explain with a neat diagram how all the modes of DMA transfer are accomplished.

   (b) How does a basic computer handle an interrupt ? What happens when an interrupt occurs ? Explain with the help of an example. Also, write down different register transfer statements. **(9+9)**

6. (a) Consider a cache consisting of 256 blocks of 16 words each, for a total of 4096 (4 K) words and assume that the main memory is addressable by a 16-bit address and it consists of 4 K blocks. How many bits are there in each of the TAG, BLOCK/SET, and word fields for different mapping techniques ?

   (b) State how different policies of writing into the cache are implemented.

   (c) How is data transmitted in a Synchronous Serial Communication System ?

   (6+6+6)

7. Write short notes on the following :

   (a) Handshaking method of data transfer

   (b) Flynn's Classification

   (c) Programmed I/O and Interrupt driven I/O

   (6+6+6)

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SPACE FOR ROUGH WORK