No. of Printed Pages : 4

MCS-012

00074

MCA (Revised)

Term-End Examination
June, 2010

MCS-012 : COMPUTER ORGANISATION & ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage 75%)

Note : *Question no. **1** is **compulsory** and carries **40** marks. Attempt any **three** questions from the rest.*

1. (a) How does the cache memory improve the overall processing speed of a computer system ? Explain. **5**

(b) Explain the differences between DRAM and SRAM. Draw a cell of SRAM. **5**

(c) What is an Interrupt ? What happens on the occurance of an interrupt ? **5**

(d) Simplify the following boolean function in SOP and POS forms by means of K-Maps. **5**

$F(A, B, C, D) = \Sigma (0, 2, 8, 9, 10, 11, 14, 15)$.

(e) A machine supports 30 operations and 12 addressing modes. The machine has 128 registers and the size of its main memory is 1 MB. Design a simple instruction format for the machine. You may assume that all the instructions in this machine have one register and one memory operand. 5

(f) Draw a block diagram to illustrate the operation of micro - programmed control unit. 5

(g) Explain the differences between FAR and NEAR procedures with the help of an example each. 5

(h) Write a program in 8086 assembly language that reverses a string stored in the data segment. 5

2. (a) Explain the working of JK flip flop with the help of suitable diagrams. Discuss its application in designing of a synchronous counter. 10

(b) Explain the following instructions of 8086 microprocessor with the help of an example each : 10

(i) XLAT (ii) DAS

(iii) CMPS (iv) ROL

3. (a) What are the various addressing schemes used for memory references ? Give an example of each. 9

(b) Can we store control and status information in the memory. Justify your answer. 3

(c) Represent 23.125_{10} as single and double precision IEEE 754 format/standard. 4

(d) Explain the functioning of a DMA controller with the help of a suitable diagram. 4

4. (a) What is a segment in 8086 microprocessor ? Can these segments overlap ? Explain. What are the default pointers to these segments ? 5

(b) Explain any two cache mapping schemes with the help of suitable diagrams. 8

(c) Write a 8086 assembly language program to implement the following nested loop : 7

```
for (i=1 to 10)
        {
        for (j=1 to 10)
          add 1 to Ax.
        }
```

5. Explain the following with the help of suitable example/diagram if needed. **20**

(a) Instruction cycle

(b) Quine Mckluskey method

(c) RISC and CISC Architecture

(d) Register Transfer Micro operations

(e) Liquid Crystal Displays (LCD^s)

No. of Printed Pages : 3

MCS-012

00748

MCA (Revised)

Term-End Examination

December, 2010

MCS-012 : COMPUTER ORGANISATION & ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage 75%)

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*Note : Question no. **1** is **compulsory** and carries **40** marks. Attempt any **three** questions from the rest.*

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1. (a) Add the following numbers using signed 2's complement representation for 8 bit numbers. Indicate overflow/underflow if any **5**

(i) +75 and −58

(ii) −75 and −52

(b) Design and draw a 3 × 8 decoder using NOT gates and AND gates and explain its working. **7**

(c) Explain the following 8086 microprocessor instructions with the help of an example each. 5

(i) DAS (ii) XOR

(iii) SHL (iv) ROR

(v) RCL

(d) Discuss the operation of Programmed I/O and Interrupt driven I/O technique using flow chart. Compare them briefly. 8

(e) Write a program in 8086 assembly language that adds two five byte numbers, use arrays. 5

(f) Design and draw a Binary Adder-Subtractor logic circuit. 5

(g) Explain Register relative and Index addressing scheme. 5

2. (a) Write an assembly language program for 8086 microprocessor to sort a given list of 5 numbers in ascending order and explain its logic. 10

(b) List all the features of RISC architecture. 5

(c) Explain LCDs. 5

3. (a) Simplify the following function in SOP and POS forms by means of K-map. Also draw the logic diagram. 10

$F(A,B,C,D) = \Sigma\ (0,2,5,7,8,10,13,15)$

(b) What is Interrupt ? Briefly explain the four interrupt conditions. 5

(c) Discuss the difference between SDRAM and RDRAM. 5

4. (a) Construct a 5 to 32 line decoder with four 3 to 8 line decoders with enable and one 2 to 4 line decoder. 10

(b) What are program visible and program invisible registers. Explain flag register in 8086. 5

(c) Write a program in assembly language for 8086 microprocessor that compares a pair of characters entered through keyboard. 5

5. (a) Represent a binary number 1101011 in floating point representation using 32 bit word length (24 bit mantissa and 8 bit biased exponent). 6

(b) Explain 8

(i) Associative Mapping.

(ii) Set Associative Mapping.

(c) Explain the concept of FAT and Inode. 6

No. of Printed Pages : 3

MCS-012

MCA (Revised)

Term-End Examination

June, 2011

10259

MCS-012 : COMPUTER ORGANISATION & ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage 75%)

Note : *Question no. **1** is **compulsory** and carries **40** marks. Attempt any **three** questions from the rest.*

1. (a) Add the following numbers using signed 2's complement representation for 8 bit numbers. Indicate Over flow/Under flow if any : **5**

(i) +82 and −63 (ii) −85 and −40

(b) Design and draw a 8×1 multiplexer using AND and OR gates and explain its working. **7**

(c) Explain the following 8086 microprocessor instruction with the help of an example each. **5**

(i) DAA

(ii) PUSH

(iii) LDS

(iv) STD

(v) XCHG

(d) Explain the DMA. How it has advantage over Interrupt driven and programmed I/O ? 8

(e) Write a program in 8086 assembly language that prints the alphabets from A to Z. 7

(f) Design and draw a Bidirectional shift register with parallel load. 8

2. (a) Write a program in assembly language for 8086 microprocessor to search an element from a list of 5 number using Binary search method. Explain its logic. 10

(b) Explain the concept of virtual memory. 5

(c) What are the functions of I/O Interface ? 5

3. (a) Simplify the following function in SOP and POS forms by means of K-map. Also draw the logic diagram. 10

$F(A, B, C, D) = \Sigma(0, 2, 5, 7, 8, 10, 11, 12, 14)$

(b) What is a Device driver ? Differentiate between Device Controllers and Device drivers. 5

(c) A set associative cache consists of a total of 64 blocks divided into sets with 4 blocks/ set. The main memory contains 4k blocks, each block consisting of 128 words. 5

(i) How many bits are there in main memory address.

(ii) How many bits are there in each Tag, Set and word fields.

4. (a) Give simplified boolean expressions using three inputs x, y, z and three outputs A, B, C. When binary input is 0, 1, 2 or 3 the binary output is one greater than the input. When the input is 4, 5, 6, or 7 the binary output is one less than the input. 8

(b) Discuss the difference between SIMM and DIMM. 5

(c) Discuss the fetch and decode phase of Instruction cycle. 7

5. (a) Write an assembly language program for 8086 microprocessor to convert BCD number into its binary equivalent. 8

(b) Explain the following : 3x4=12

(i) Instruction pipelining.

(ii) Direct Mapping.

(iii) QIC Tapes.

No. of Printed Pages : **4**

MCS-012

MCA (Revised)

07367

Term-End Examination

June, 2012

MCS-012 : COMPUTER ORGANISATION & ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : **100***

(Weightage 75%)

Note : *Question no. **1** is **compulsory** and carries **40** marks. Attempt **any three** questions from the rest.*

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1. (a) Perform the following operations using 2's complement notation . You may assume the length of register / operand to be maximum of 8 bits. Also indicate the overflow condition, if any: **5**

(i) $-27 + (-101)$

(ii) $-59 + 75$

(iii) $+27 + 101$

(iv) $-75 + 69$

(b) A combinational circuit takes four bit input and output an odd parity bit for the input bits. For example, if input is 0001, the output is 0 as the number 1's in the input string is odd; whereas for an input 0101, it output 1. 7

(i) Draw the truth table for the proposed circuit.

(ii) Use K-map to find the optimal expression for the output.

(iii) Draw the resultant circuit using AND-OR-NOT gates.

(c) Assume that a computer has 64 byte RAM. The system has a cache of 4 blocks with each block of 32 bit size. Find the location of main memory whose address is 17 , if: 6

(i) Direct mapping is used

(ii) Two way set associative mapping is used.

(d) What is an Interrupt ? How can an interrupt help in enhancing the performance of Input / Output ? 3

(e) What is a micro-operation ? What are the various micro-operations that will be performed in sequence to fetch an instruction from the memory to an Instruction Register (IR) ? Assume suitable set of available registers. 5

(f) What is an instruction in the context of computer organisation ? Explain the purpose of various elements of an instruction with the help of a sample instruction format. 4

(g) What is the purpose of Interrupt Vector Table in 8086 micro processor ? Explain. 4

(h) Write a program in 8086 assembly language to find the largest value in an array of 5 elements stored in the memory . You have to store the result in a memory location. 6

2. (a) What is the difference between S-R and J-K flip-flops ? Draw the logic diagram and characteristic table for J-K flop-flip. Create the excitation table for J-K flip-flop from the characteristics table. Show the steps of this process. 10

(b) What is DMA ? Why is it needed ? How is it different from an I/O processor ? 5

(c) What is the use of large register file of RISC architecture ? Explain with the help of an example/diagram. 5

3. (a) The average seek time of a disk is 20 ms. The disk has 4 platters and each track has 128 sectors. Assuming that the disk rotates at 3000 rpm, find the access time of the disk. Make suitable assumptions, if any. 5

(b) Name any four hard drive interfaces . Why are such interfaces needed ? 4

(c) Consider the register R1 has the value 01011010. Choose register R2 values to perform following operations on register R1. 6

(i) Mark the upper four bits of R1

(ii) Insert the value 1100 as the upper four bits of R1

(iii) Clear R1 register

(iv) Complement the lower four bits of R1.

(d) Explain the following 8086 microprocessor addressing modes with the help of an example each : 5

(i) Direct

(ii) Register indirect

(iii) Indexed

4. (a) Explain the execution of CALL and RETN (function/ subroutine call and return from subroutine /function) instructions with the help of an example and / or diagram. 6

(b) Write a program in 8086 assembly language that compares two strings stored in the memory . Assume that strings end with a character @. 8

(c) What is a multiplexer ? Why is it needed ? Draw a logic diagram and related truth table for a multiplexer. 6

5. Explain the following with the help of an example /diagram , if needed : 20

(a) Floating point number representation

(b) RAID level 1 and level 3

(c) Programmed Input / Output

(d) Segment registers in 8086

(e) Wilkes control unit

No. of Printed Pages : 5

MCS-012

MCA (Revised)

Term-End Examination

December, 2012 15316

MCS-012 : COMPUTER ORGANISATION & ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage 75%)

Note : *Question no. 1 is **compulsory** and carries 40 marks. Attempt **any three** questions from the rest.*

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1. (a) IEEE floating point representation for single precision number use the format as: signbit (1bit) Biased exponent (8 bits) significant. (23 bits) In this representation a floating point number, where 0<E<255 having any significant is equivalent to $\pm(1.N)\,2^{(E-127)}$ Using this format represent the following decimal numbers: (i) 0.125 (ii) 4 Now using the IEEE floating point single representation of the numbers. Perform the operations: $0.125+4$ and 0.125×4 **6**

(b) Simplify the following using Karnaugh's map: $F(A,B,C,D) = \Sigma(0,1,3,5,9,11,14)$. Draw the logic diagram for the resultant boolean expression using AND-OR-NOT gates. 6

(c) Consider a cache uses a direct mapping scheme. The size of main memory is 4 k Bytes and word size of cache is 2 bytes. The size of cache memory is 128 bytes. Find the following : 7

(i) The size of main memory address (assume each byte of main memory has an address)

(ii) Address of cache block

(iii) How a memory location address will be translated to cache address/block/location.

(iv) How can it be determined if the content of specified main memory address exist in cache.

(d) What are the different categories of micro-operations that may be carried out by CPU? 6

Explain each category of micro-operations giving one example for each.

(e) Explain any five characteristics of RISC machine. 5

(f) Write a program in 8086 assembly language to add the values stored in an arrary. You may assume that the array is in the memory having only four elements. You may also assume that the value stored in the array are positive integer values. Result may be stored in register AX. 6

(g) What addressing modes are most suitable for handling arrays? Give justification in support of your answer. 4

2. (a) Explain the process of error detection and correction with the help of suitable diagram. What is an error correction code? Using suitable example, explain how is it different from an error detection code ? 8

(b) Explain why Input/Output interface is needed in a computer. Also explain the functions of an Input/Output interface. 6

(c) How is the number of operand addresses in an instruction effect the size of a program? Explain this with the help of an example. Compare the characteristics of Accumulator based computer architecture to General purpose register architecture based computers. 6

3. (a) Explain the functioning of a master slave flip-flop with the help of suitable diagram. What are the advantages achieved using master-slave flip-flops. 6

(b) Explain the following memory schemes discussing why they are needed: 6

(i) Interleaved memory

(ii) Associative memory.

(c) What is the need of segment registers in 8086 microprocessor? How these registers help in 8

(i) calculating the address of next instruction

(ii) for accessing data

(iii) for dealing with stack in the 8086 microprocessor.

How can you initialise segment registers ?

4. (a) How is a ripple counter different from a synchronous counter? Draw the logic diagram of a 3-bit ripple counter and explain its functioning. 6

(b) Write a program in 8086 assembly language that changes a string having lower case alphabets into an upper case string. Both these strings are to be stored in the main memory. 6

(c) Compare the characteristics of unencoded micro-instructions to that of highly encoded micro-instructions. 6

(d) What is the need of immediate and register addressing ? 2

5. Explain the following giving one example/ diagram if needed. 20

(a) Use of INT21h for Input/Output in 8086 micro-processor.

(b) COM programs and EXE programs

(c) Wilkes control

(d) Input-Output processors

(e) DRAM CELL

No. of Printed Pages : 4

MCS-012

00514

MCA (Revised)

Term-End Examination

June, 2013

MCS-012 : COMPUTER ORGANISATION & ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage : 75%)

Note : *Question no. **1** is **compulsory** and carries **40** marks. Attempt **any three** questions from the rest.*

---

1. (a) Add +45 and −10 in binary using 8 bit registers, in **4**

(i) Signed 1's complement

(ii) Signed 2's complement

(b) Simplify the following function using Karnaugh map and draw the circuit using AND, OR and NOT gates. **6**

$F(A, B, C) = \sum (1, 3, 4, 5, 6, 7)$

(c) Differentiate between **4**

(i) ROM and Flash Memory

(ii) CDROM and CDRW

(d) How many RAM chips of size 512K × 1 bit are required to build 1MByte of memory.Show the address distribution for the scheme. 5

(e) Explain the associative Mapping scheme for Cache Memory. 4

(f) Explain the features of RAID level 1 and RAID level 5. 5

(g) Explain various types of instructions used in a typical computer system. 4

(h) Write a program using 8086 assembly language for multiplication of two 8 bit numbers. Also display the result. 4

(i) Explain the following 8086 microprocessor with the help of an example. 4

(i) DAA

(ii) TEST

2. (a) What are logic Microoperations ? Explain with the help of examples. 6

(b) Write a program using 8086 assembly language to linear search an 8 bit value in consecutive byte memory locations. 7

(c) What is the role of control unit in a computer ? Explain Wilke's control unit using a diagram. 7

3. (a) Explain the memory interleaving with the help of a diagram. 4

(b) Draw and explain a 4 - bit Adder Subtractor circuit. 6

(c) Design and explain an instruction pipeline using an illustration. What are various problems faced by an instruction pipeline ? 10

4. (a) Explain with the help of an example/ diagram if needed 8

(i) Isolated I/O

(ii) Memory Mapped I/O

(b) Explain the following techniques for monitors 8

(i) Shadow Mask

(ii) Cathode Ray tubes

(iii) Dot Pitch

(iv) DPI

(c) Explain the concept of Virtual Memory in the context of memory management. 4

5. (a) Represent a binary number 1001011 in IEEE 754 floating point representation using 32 bit word length (24 bit mantissa and 8 bit biased exponent). 6

(b) What is Interrupt ? Briefly explain the four interrupt conditions. Explain the process of interrupt handling with the help of diagrams. 8

(c) Explain the functioning of a J-K Master Slave flip flop with the help of a diagram. 6

No. of Printed Pages : 3

MCS-012

15375

MCA (Revised)

Term-End Examination

December, 2013

MCS-012 : COMPUTER ORGANISATION & ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage : 75%)

Note : *Question no. **1** is **compulsory** and carries **40** marks. Attempt **any three** questions from the rest.*

1. (a) Add - 35 and - 31 in binary using 8 - bit register, in **4**

(i) Signed 1'S Complement

(ii) Signed 2'S Complement

(b) Simplify the following function using Karnaugh map and draw the circuit using And, OR, Not gates. **6**

F (A, B, C, D) = Σ(0, 2, 8, 9, 10, 11, 13, 15)

(c) Differentiate between. **4**

(i) SRAM Vs DRAM

(ii) CD - R Vs CD - RW

(d) How many RAM chips are required of size 128k × 1 to build 1 M byte of memory. Show the address distribution for the scheme. **5**

(e) What do you mean by Content Addressable Memory (CAM) ? Explain. **4**

(f) Explain the following. 5

(i) Seek time

(ii) Latency time

(iii) Access time

(g) Draw and explain the logic diagram of a 3 bit synchronous counter. 6

(h) Write a program using 8086 assembly language for division of a 16 bit number by a 8 bit number. Also display the result. 6

2. (a) What is instruction pipelining ? What are the various problems that can occur while using an instruction pipeline ? 8

(b) Write a program using 8086 assembly language to find the minimum number in a list of byte size values consecutively stored in the memory. 8

(c) How Call and Return instructions for a subroutine are handled in a computer ? 4

3. (a) What is a multiplexer ? Explain how an 8×1 multiplexer can be designed using two 4×1 multiplexers. 8

(b) What is a master slave flip flop ? Why do we require Master Slave Combination ? 6

(c) Explain the fetch cycle and execute cycle for an addition instruction. 6

4. (a) Explain with the help of an example/ diagram if needed. 6

(i) Programmed I/O (ii) DMA

(b) Explain the functioning of a Micro-programmed control unit with the help of a diagram. 8

(c) What are the uses of large register file in a RISC ? Explain with the help of a diagram. 6

5. (a) Explain any four addressing modes in 8086 microprocessor with the help of an example each. 8

(b) Write code sequence in 8086 assembly language for performing the following operation 6

$$Z = \left(\left(A + B/2 \right) / 10 \right)^{**2}$$

Where ** represents exponentiation.

(c) Differentiate between. 6

(i) Printers versus Scanners

(ii) CRT versus LCD

No. of Printed Pages : 4

MCS-012

14569

MCA (Revised)/BCA (Revised)

Term-End Examination

June, 2014

MCS-012 : COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : **100***

(Weightage : 75%)

Note : *Question no. **1** is **compulsory** and carries **40** marks. Attempt **any three** questions from the rest.*

1. (a) Add the following using 8 bit signed 2's complement representation : **6**

(i) 25 and -40

(ii) 75 and 80

(b) (i) How many errors correcting bits are required to send an 8 bit data using SEC code ? **2+6=8**

(ii) If a 4 bit data 1010 is received as 1011, how this error, at bit position b1 can be detected ?

(c) Simplify the following functions in Sum Of Product (SOP) form by using K-map. **5**

$F(A,B,C,D) = \Sigma(0,2,4,6,7,8,10)$.

(d) A computer supports a virtual memory of 1 Giga Byte and physical memory of 64 Mega Bytes. How many bits are needed to address the 4

(i) virtual memory

(ii) physical memory

(e) Consider two registers R1 and R2 having the following 4-bit binary values : 6

R1 = 1100

R2 = 1010

Perform the following operations on R1 using R2.

(i) Selective set

(ii) Selective clear

(iii) Selective complement

(iv) Mask operation

(f) Compare the following : 5

(i) RAM Vs ROM

(ii) DRAM Vs SRAM

(g) Write an 8086 Assembly Language Program to add 2 byte sized values stored in memory locations FIRST and SECOND, and store the result in location SUM. 6

2. (a) Differentiate the following : 8

(i) Hardwired control unit Vs Micro-programmed control unit.

(ii) Unencoded micro-instructions Vs encoded micro-instructions.

(b) A computer has a 64 word RAM (1 word = 16 bits) and a cache memory of 8 blocks (block size = 32 bits). Find the main memory word 25 in cache if : **4+4+4=12**

(i) Direct mapping is used

(ii) Associative mapping is used

(iii) 2-way set associative (2 blocks per set) mapping is used.

3. (a) Explain the following techniques for I/O operation : **5+5=10**

(i) Programmed I/O

(ii) Interrupt driven I/O

(b) Explain the following terms with respect to hard disks. **6**

(i) Access time

(ii) Bandwidth

(iii) Rotation speed

(c) Find the average latency of a disk system whose rotation speed is 5000 RPM. **4**

4. (a) Explain the following Addressing modes in Assembly language programming with the help of an example each. **9**

(i) Register Addressing

(ii) Indirect Addressing

(iii) Relative Addressing

(b) List five important characteristics of RISC Architecture. **5**

(c) What is a pipeline in a computer systems ? Illustrate its advantage using an Instruction pipeline. **6**

5. (a) Write an assembly language program using 8086 assembly language to find the length of a string. Make suitable assumptions. 6

(b) Explain the following terms, giving an example/diagram, if needed 14

(i) Flip-flop
(ii) Register
(iii) Single precision floating point representation
(iv) Multiplexer
(v) Assembler
(vi) Int 21 h
(vii) Fetch cycle.

No. of Printed Pages : 3

MCS-012

MCA (Revised) / BCA (Revised)

Term-End Examination

02204

December, 2014

MCS-012 : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage 75%)

Note : *Question number 1 is* ***compulsory*** *and carries 40 marks. Answer any* ***three*** *questions from the rest.*

1. (a) Represent $11{\cdot}0011 \times 2^{10}$ using the IEEE-754 standard for 32-bit floating point representation. *6*

(b) Perform the following operations : *10*

(i) Convert Hex F15C to binary.

(ii) Find the 2's complement representation of – 36 (8 bit).

(iii) Add – 40 and 80 using 8 bit signed 2's complement representation.

(iv) Convert decimal 65·75 to binary representation.

(v) Find the 1's complement of 10110 in 8 bit representation.

(c) Explain the Wilkes control unit with the help of a diagram. 6

(d) Calculate the physical address using the following 8086 registers : 4

(i) SS = 6789 h

SP = 00FF h

(ii) CS = 4412 h

IP = 3900 h

(e) Explain any two uses of INT 21 h in 8086 assembly language. 4

(f) List and explain various micro-operations for fetching an instruction (fetch cycle). 4

(g) A memory has a capacity of 8 K × 8.

(i) How many data input and data output lines does it have ?

(ii) How many address lines does it have ?

(iii) What is the capacity in bytes ? 6

2. (a) Explain the set associative cache mapping scheme with the help of an example. Make and state suitable assumptions. 8

(b) Explain the following 8086 instructions : 6

(i) AND

(ii) SHL

(iii) INC

(c) Explain the concept of Direct Memory Access with the help of a diagram. 6

3. (a) What is an interrupt ? Explain the sequence of steps that occurs during interrupt processing. 8

(b) Explain the classification of printers. 6

(c) How are Call and Return instructions for a subroutine handled in a computer ? 6

4. (a) What is a multiplexer ? Explain how a 4×1 multiplexer can be designed using 2×1 multiplexers. 8

(b) What is an instruction pipelining ? What are the various problems that can occur while using an instruction pipeline ? 6

(c) Explain the following Addressing schemes : 6

(i) Indexed Addressing

(ii) Base Register Addressing

(iii) Relative Addressing

5. (a) Write the 8086 assembly language program to perform the following operation.

$$y = x * y,$$

where x and y may be assumed as memory locations. 6

(b) Explain the construction of an RS-flip-flop. 6

(c) Explain the following with the help of an example/diagram, if needed : 8

(i) Mask operation

(ii) DRAM

(iii) Access time on a hard disk

(iv) Parity bit

No. of Printed Pages : 4

MCS-012

MCA (Revised) / BCA (Revised)

Term-End Examination

June, 2015

14193

MCS-012 : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage 75%)

Note : *Question number **1** is **compulsory** and carries 40 marks. Answer any **three** questions from the rest.*

1. (a) IEEE floating point representation for single precision number uses the format as :

Sign bit (1 bit) Biased exponent (8 bits) Significant (23 bits).

In this representation a floating point number where $0 < E < 255$ having any significant is equivalent to $\pm (1.N)_2 (E - 127)$. Using this format represent the following decimal numbers :

(i) 0·250

(ii) 8

Now using the representation perform the following operations : *10*

(i) $0{\cdot}250 + 8$

(ii) $0{\cdot}250 \times 8$

(b) Simplify the following using Karnaugh's map : *6*

$F(A, B, C, D) = \sum(0, 1, 2, 4, 6, 8, 11, 12)$.

Draw the logic diagram for the resultant boolean expression using AND – OR – NOT gates.

(c) For a computer having 32 word RAM (1 word = 8 bits) and cache memory of 4 blocks (block size = 16 bits), where can we find main memory location 10 in cache if *6*

(i) Associative mapping is used,

(ii) Direct mapping is used.

(d) Explain the following addressing modes with the help of an example each : *6*

(i) Register Indirect Addressing

(ii) Stack Addressing

(iii) Indexed Addressing

(e) Explain any four characteristics of RISC machine. *4*

(f) Write an Assembly language program to search a given number with value 25 in a group of 10 numbers stored in memory. Store 1 in AL register for successful search, else store 0. Make suitable assumptions. *8*

2. (a) Explain the Instruction fetch with the help of micro-operations. 5

(b) What is flash memory ? Explain how it is different from RAM. 5

(c) Why do we need registers in a computer system ? Explain the importance of control and status register with the help of an example. 5

(d) What is the purpose of segment registers in 8086 micro-processors ? Explain how code segment register can be used to calculate the address of the next instruction. 5

3. (a) Explain what is UNICODE. How is it different from ASCII ? 4

(b) What is virtual memory ? Draw a block diagram for mapping a virtual address to a physical address. 5

(c) Explain the programmed I/O with the help of a flow chart. 5

(d) Explain the advantages and disadvantages of using Assembly language programming. 6

4. (a) What are Adders ? Explain half adders and full adders with logic diagram and truth tables. 6

(b) What is DMA ? Draw and explain the block diagram of a DMA controller. 6

(c) Draw the block diagram of the structure of a fixed point Arithmetic Logic Unit. *4*

(d) Write a program in Assembly language for interchanging the value of two memory locations. *4*

5. Explain the following by giving one example or diagram for each : *5×4=20*

(a) D Flip-Flop

(b) The Interrupt Cycle

(c) Video Cards

(d) Far and Near Procedures

(e) CRT

08384

No. of Printed Pages : 4

MCS-012

MCA (Revised) / BCA (Revised)

Term-End Examination

December, 2015

MCS-012 : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage 75%)

Note : *Question number **1** is **compulsory** and carries 40 marks. Attempt any **three** questions from the rest.*

1. (a) IEEE floating point representation for single precision number uses the format as :

Sign bit (1 bit) Biased exponent (8 bits) Significant (23 bits)

In this representation a floating point number where $0 < E < 255$ having any significant bits is equivalent to $\pm (1 . N)\ 2^{(E-127)}$. Using this format represent the following decimal numbers :

(i) 0·375

(ii) 7

Now using the representation perform the following operations : *10*

(i) $0{\cdot}250 \times 7$

(ii) $0{\cdot}375 + 7$

(b) Simplify the following using Karnaugh's map : 4

$$F(A, B, C, D) = \sum(0, 1, 3, 5, 8, 10, 13)$$

(c) Write an assembly language program to find the maximum in a group of 10 numbers stored in memory. Store the result in AL register. 8

(d) What is RAID ? List three features of RAID level 3. 4

(e) How is a main memory address mapped to a cache address ? Assume the main memory size of 1 K words.

1 cache block size = 32 bits

No. of cache slots = 16

Cache mapping = 2 way set associative 6

(f) Explain the use of PC, IR, AC, MBR registers of a computer system. 4

(g) Consider Registers R_1 and R_2 containing

$R_1 = 10100000$

$R_2 = 01101100$

Perform the following microoperations using these registers : 4

(i) $R_1 \leftarrow R_1 + R_2$

(ii) Shift Left R_1

(iii) $R_1 \leftarrow R_1$ XOR R_2

(iv) $R_1 \leftarrow R_1 - 1$

2. (a) Explain using a flowchart the steps of an instruction execution. *6*

(b) How many RAM chips of size 256 k × 1 bit are required to build 1 MB of memory ? *4*

(c) Explain the various displacement addressing schemes with the help of an example each. *6*

(d) Calculate the physical address for the following register offset pairs : *4*

(i) SS : SP = 0100h : 0020h

(ii) DS : BX = 0200h : 0100h

(iii) CS : IP = 4200h : 0123h

(iv) ES : SI = 0300h : 0245h

3. (a) Explain the use of parity bit in error detection with the help of an example using odd parity scheme. *5*

(b) Compare the following : *9*

(i) CD-ROM and DVD-ROM

(ii) SRAM and DRAM

(iii) Memory mapped I/O and Isolated mapped I/O

(c) Explain the following 8086 instructions : *6*

(i) XCHG

(ii) XLAT

4. (a) What is a Multiplexer ? Give block diagram, truth table and logic diagram of a 4×1 multiplexer. *8*

(b) Explain any three techniques of identifying the device that has caused the interrupt. *6*

(c) Write a program in 8086 Assembly language for displaying the contents of CL register. *6*

5. Explain the following with the help of an example or diagram for each : *5×4=20*

(a) T flip-flop

(b) DMA

(c) COM programs

(d) The stack

(e) LCD

No. of Printed Pages : 7

MCS-012

MCA (Revised) / BCA (Revised)

14458 **Term-End Examination**

June, 2016

MCS-012 : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage 75%)

Note : *Question number **1** is **compulsory** and carries 40 marks. Attempt any **three** questions from the rest.*

1. (a) State *True* or *False* with brief justification (if false). *5*

(i) A register access is faster than a memory access.

(ii) A bigger size of a program is due to multiple opcodes and operands in an instruction.

(iii) DMA allows the transfer of data directly between external devices.

(iv) The effective address in Based Indexed addressing mode is the sum of the contents of the base register, indexed register and displacement.

(v) An I/O interface is usually a register for either inputting data to or extracting data from the microprocessor.

(b) Represent the number $(55{\cdot}6)_{10}$ as a floating point binary number with 24 bits. The normalized mantissa has 16 bits and the exponent has 8 bits. Assume suitable bias for the exponent. *6*

(c) Perform the following arithmetic operations : *6*

(i) Add (– 85) and (– 85) in 8-bit register using signed 2's complement notation. Also indicate overflow, if any.

(ii) Convert the hexadecimal number ABCD7 into binary and octal.

(iii) Represent decimal 567 into BCD.

(d) Simplify the following Boolean function using Karnaugh map :

$F(A, B, C, D) = \sum(0, 2, 5, 7, 9, 10, 11, 12, 15)$

Also draw the logic circuit for the simplified expression. *5*

(e) Draw the logic diagram of a 2×4 decoder. Also, draw its truth table. *5*

(f) The 8-bit registers R1, R2, R3 and R4 initially have the following values :

R1 = 00001111

R2 = 11110000

R3 = 11001100

R4 = 10101010

Determine the 8-bit values in registers after the execution of the following sequence of micro-operations :

(i) $R1 \leftarrow R1 \oplus R2$ Exclusive OR

(ii) $R4 \leftarrow R1 - R3$ Substract R3 from R1 *4*

(g) A digital computer has a common bus system for 4 registers of 4 bits each. The bus is constructed with multiplexers.

(i) How many selection inputs are there in each multiplexer ?

(ii) What size of a multiplexer is needed ?

(iii) How many multiplexers are there in the bus ? *3*

(h) What is the difference between COM and EXE programs ? *3*

(i) What is an Interrupt Vector Table (IVT) ? Explain in the context of 8086 microprocessor. *3*

2. (a) Using Hamming code, what should be the length of the error detection code that detects the error in one bit for 8 and 16-bit data respectively ? *4*

(b) How is execution of an instruction done ? Illustrate through an example showing memory and register contents for execution of any instruction of your choice. *4*

(c) Using a suitable example, explain the working of a two-way set associative cache mapping scheme. 6

(d) A memory has a capacity of 1024 × 8 bit.

(i) How many data input and data output lines does it have ?

(ii) How many address lines does it have ?

(iii) What is its capacity in bytes ? 6

3. (a) How does DMA overcome shortcomings of interrupt driven and programmed I/O ? Draw the block diagram of a typical DMA controller. Briefly explain its components. 6

(b) Draw various stages of an instruction pipeline. Explain the benefits of the same. 4

(c) Explain the following : 10

(i) Microinstruction

(ii) Stack

(iii) Control memory

(iv) INT 21h in 8086 microprocessor

(v) Buffer register

4. (a) A machine supports 32 operations and 16 addressing modes. The machine has 32 registers and the size of its main memory is 128 MB. Design a simple instruction format for the machine. *6*

(b) Find out the physical addresses for the following segment register offsets for 8086 microprocessor : *6*

(i) SS : SP = 6200h : 0100h

(ii) DS : BX = 4300h : 0200h

(iii) CS : IP = 5000h : 1234h

(c) Discuss the following addressing modes with the help of one example for each : *8*

(i) Indirect addressing

(ii) Register indirect addressing

(iii) Relative addressing

(iv) Immediate addressing

5. (a) Write an assembly language program in 8086 microprocessor to find whether two numbers stored in memory are equal or not. Make suitable assumptions. *5*

(b) Design and explain a logic circuit capable of adding three bits using half adders and appropriate logic gates. 6

(c) Write the code sequence in assembly language for performing the following operation : 4

$$X = B * C / D + (E - F)$$

(d) What is the use of a large register file of RISC architecture ? Explain with the help of an example/diagram. 5

No. of Printed Pages : 5

MCS-012

MCA (Revised) / BCA (Revised)
Term-End Examination
05286
December, 2016

MCS-012 : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*
(Weightage 75%)

Note : *Question number **1** is **compulsory** and carries 40 marks. Attempt any **three** questions from the rest.*

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1. (a) State *True* or *False* with a brief justification (if false). *5*

(i) Boolean relation A + AB = B.

(ii) Hardware interrupts can be invoked with the help of INT function.

(iii) 8086 has a 16-bit data bus and a 20-bit address bus.

(iv) Wilkes Control does not provide a branching microinstruction.

(v) 1 MB equals 2^{30} bits.

(b) Represent the number 1110·0011 in IEEE 754 floating point single precision number representation. 6

(c) Perform the following arithmetic operations : 6

(i) Add (– 125) and (– 105) in 8-bit register using signed 2's complement representation of negative numbers. Also indicate overflow, if any.

(ii) Convert the decimal number 789 to octal, hexadecimal and BCD.

(d) Simplify the following expression using Karnaugh map in sum of the products form :

$F(A, B, C, D) = \Sigma(1, 3, 5, 7, 9, 11, 13, 15)$

Also draw the logic circuit for the simplified expression. 5

(e) Design a 4-bit serial input shift register and explain its working. 5

(f) Draw a suitable diagram and explain the execution of subroutines CALL & RETURN using stack. 5

(g) An 8-bit register contains the binary value 11001101. What is the register value after an arithmetic shift right ? State whether there is an overflow. 3

(h) Write a program in 8086 assembly language that counts the number of characters in a string stored in the data segment. 5

2. (a) What is Von-Neumann architecture ? Explain. 4

(b) Draw an internal organization of 32×4 RAM and explain the purpose of control signals used here. 5

(c) Demonstrate the use of Hamming code for a 4-bit word sequence transmitted as 1000 whereas received as 1100. Make suitable assumptions. 5

(d) With reference to the instruction execution, explain how the following steps are performed and by which component : 6

(i) Calculate the address of the next instruction to be executed.

(ii) Decode the instruction.

(iii) Computation of operand's address.

3. (a) How can interleaved memory mechanism be used to improve the overall processing speed of a computer system ? Explain with the help of a diagram. 5

(b) How many RAM chips of size 512 K × 1 bit are required to build 1 M byte main memory ? 3

(c) 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. How many bits are there in tag, index and block fields of the address ? 6

(d) Define the following terms : 6

(i) Seek time

(ii) Latency time

(iii) Hit ratio in cache

4. (a) Draw a logic diagram of one stage of logic circuit for implementation of AND, OR, XOR and complement microoperations. Also draw and explain its functional representation. 6

(b) Differentiate between the following : 6

(i) Hardwired v/s Microprogrammed control

(ii) Horizontal v/s Vertical microinstructions

(c) What is the purpose of multiple segments in 8086 ? 4

(d) Explain the following 8086 microprocessor addressing modes with the help of an example for each : 4

(i) Register Indirect

(ii) Based Indexed

5. (a) Write a step-by-step process to explain how an interrupt is handled by a computer. 6

(b) Draw the logic diagram of JK flip-flop along with its characteristic table and excitation table. Explain various state transitions. 8

(c) Write an assembly program using 8086 assembly language that adds two 2-digit packed BCD numbers stored in the memory. Make suitable assumptions. 6

No. of Printed Pages : 4

MCS-012

MCA (Revised) / BCA (Revised)

Term-End Examination

00602 **June, 2017**

MCS-012 : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage 75%)

Note : *Question number 1 is* ***compulsory*** *and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

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1. (a) Add the following decimal numbers using 8 bit signed 2's complement notation. Indicate overflow, if any. *4*

(i) 50 and – 5

(ii) + 75 and + 85

(b) Represent the following using IEEE 754 single precision (32 bit) floating point number format : *4*

(i) – 20·75

(ii) + 32·50

(c) Prepare the truth table for the following Boolean expressions and simplify using K-map : 6

(i) $A\bar{B}\,\bar{C} + \bar{A}\,B\bar{C}$

(ii) $(A + B)(\bar{A} + \bar{B})$

(d) Explain the following addressing modes with an example each : 4

(i) Register Addressing

(ii) Register Indirect

(e) Illustrate the following operations using four-bit registers R1 and R2 :

(i) Selective Set

(ii) Mask

(iii) Selective Complement

(iv) Insert

Make suitable assumptions. 8

(f) Write an assembly language program for 8086 microprocessor to check if two byte values stored in consecutive memory locations are identical. Store '1' as a result in the next memory location if they are same, else store '0'. 6

(g) A memory has a capacity of 1 M × 16.

(i) How many data input and output lines does it have ?

(ii) How many address lines does it have ? (Assume word addressing) 4

(h) Design a half adder. 4

2. (a) Explain the Hamming Error Correcting Code. A 4-bit data 1100 is received as 1101. How will the Hamming error correcting code detect and correct the error ? *10*

(b) Explain the use of stack for parameter passing in a subroutine/function call. *5*

(c) Explain the design of a 4 × 1 multiplexer. *5*

3. (a) Discuss the use of Interrupt Vector Table (IVT) in handling interrupts for 8086 microprocessor. *5*

(b) Explain the following in the context of cache memory : *10*

(i) Direct mapping

(ii) Set associative mapping

(c) The seek time of a disk is 25 ms. Each track of this disc has 500 sectors. If the disc rotates at 5000 rotations per second, find the access time. *5*

4. (a) Explain the concept of Instruction pipelining, using suitable illustration. *5*

(b) Discuss the register set of 8086 microprocessor. *6*

(c) Explain the structure of a Wilkes control unit with the help of a diagram. *5*

(d) Explain the differences between exe and com programs in the context of 8086 assembly language programming. *4*

5. (a) Explain the following with the help of a diagram/example, if needed : 8

(i) D flip-flop

(ii) Read Only Memory (ROM)

(iii) Opcode in an instruction

(iv) Parity bit

(b) List the differences between the following : 5

(i) LEA and MOV instructions in 8086

(ii) ROL and RCL instructions in 8086

(c) Write an assembly language program in 8086 to move a block of 100 bytes from one memory block to another. Make suitable assumptions. 7

No. of Printed Pages : 4

MCS-012

MCA (Revised) / BCA (Revised)

Term-End Examination

02580

December, 2017

MCS-012 : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage 75%)

Note : *Question number **1** is **compulsory** and carries 40 marks. Attempt any **three** questions from the rest.*

1. (a) Perform the following : *2+4=6*

(i) Convert decimal 49·25 to binary and hexadecimal.

(ii) Convert the following binary to decimal and hexadecimal :

(1) 1100·1101

(2) 1010111·01

(b) A machine uses evaluation stack architecture. Write a program for evaluation of the following expression : *6*

A = B * (C + D) * E

(c) Write an assembly language program to find the smallest number in a byte array of size 10 which is stored at location ARRAY. Make suitable assumptions. 8

(d) Discuss the use of overlapped register window in RISC architecture. 4

(e) Write the characteristic table and excitation tables for the following : 6

(i) JK Flip-flop

(ii) D Flip-flop

(f) How many RAM chips of size 512 × 8 bit are needed to design a memory of 1 M × 32 bit ? 2

(g) Differentiate between the following : 8

(i) SRAM and DRAM

(ii) Hard disk and Magnetic tape storage

(iii) Hardware and Software interrupts

(iv) Program Counter (PC) and Code Segment Register

2. (a) Simplify the boolean function $F = \Sigma (0, 2, 4, 6, 8, 10)$ using a K-map and draw the logic diagram. 5

(b) Draw the truth table and logic diagram of a 3-bit synchronous counter using JK flip-flops. 5

(c) Discuss various elements of an instruction. 4

(d) What is a micro-operation ? List the sequence of micro-operations in an instruction fetch. 6

3. (a) Discuss the flag register for the 8086 microprocessor. 4

(b) Consider a computer having 256 word RAM and cache of 16 blocks (block size = 4 words). Where is a memory word location 120 mapped in cache, if

(i) direct mapping is used ?

(ii) 2-way set associative mapping is used ? 6

(c) Explain various cache write policies. 5

(d) Explain the DMA technique for I/O operation. 5

4. (a) Discuss the use of normalization and biased exponent for floating point representation using a suitable example. 6

(b) Draw the truth table for an 8×3 encoder. 4

(c) Explain the working of a microprogrammed control unit with the help of a diagram. 10

5. (a) Explain the register addressing mode and indirect addressing mode in the 8086 microprocessor. *5*

(b) Differentiate between the following : *5*

(i) PUSH and PUSHF instructions

(ii) AAA and DAA instructions

(c) What is a RAID ? Explain various techniques used in a RAID to enhance reliability. *5*

(d) Explain the use of different segments in 8086 assembly language programming. *5*

No. of Printed Pages : 4

MCS-012

MCA (Revised) / BCA (Revised)
Term-End Examination
June, 2018

01205

MCS-012 : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*
(Weightage 75%)

Note : *Question number **1** is **compulsory** and carries 40 marks. Attempt any **three** questions from the rest.*

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1. (a) Convert the following pairs of decimal numbers to 8 bit signed 2's complement binary numbers and add them. State whether or not overflow occurs in each case. *6*

(i) 34 and 63

(ii) – 63 and – 24

(iii) – 86 and 19

(iv) – 34 and – 96

(b) Simplify the following Boolean expression in SOP form using the K-map : *5*

$F(A, B, C, D) = \Sigma(0, 1, 2, 8, 9, 10, 14, 15)$.

(c) Two 16 bit registers R0 and R1 contain binary values – 97 and + 76 respectively. Carry flag C = 1. What is the result of the following micro-operations : 6

(i) Add R0 and R1 with Carry

(ii) R0 AND with complement R1

(iii) Shift right R1 without carry

(iv) Selective set R1 using R0

(d) Explain the IEEE-32 bit format for single precision floating point representation. Represent

(i) $8{\cdot}75 \times 10^{6}$

(ii) $-0{\cdot}25 \times 10^{-5}$

using this format. 6

(e) How many chips of 512 K × 8 are required for constructing 4 M × 32 memory ? 3

(f) Write a program using 8086 assembly language program to find the larger of two byte values stored in memory location. Store the larger value in BL register. 6

(g) Discuss the data storage scheme used for hard disks. 4

(h) Discuss the indexed addressing scheme with the help of an example. 4

2. (a) Explain the process of error detection using even parity bit scheme. 4

(b) Explain the Hamming error correcting code for 4 bit data using an example. 6

(c) Explain the use of segment registers in 8086 microprocessors. Calculate the physical address given : 6

(i) IP = 2345h

(ii) CS = 1111h

(d) Explain the concept of memory interleaving. 4

3. (a) Explain the construction of J-K flip-flop with characteristic table and excitation table. 6

(b) Explain the construction of a full adder using half adders. 6

(c) Assume a computer has 32 word RAM having word size of 8 bits and cache memory of 4 blocks (block size = 16 bits). Where will be the main memory (RAM) address 12 located in cache if : 8

(i) Associative cache mapping scheme is followed ?

(ii) Direct cache mapping scheme is followed ?

4. (a) Explain how a pipelined processor results in better performance. 5

(b) Explain the interrupt processing in 8086 with the help of a diagram. 5

(c) Discuss any five features of RISC machines. 5

(d) Differentiate between hardwired and microprogrammed control units. 5

5. (a) Write a 8086 assembly language program to interchange two byte sized numbers stored in consecutive memory locations. 5

(b) Explain the following with the help of an example, if needed : 15

(i) Interrupt cycle

(ii) Program controlled I/O

(iii) Flash memory

(iv) 8086 flags

(v) NEAR procedure in 8086 microprocessor

No. of Printed Pages : 5

MCS-012(S)

MCA (Revised) / BCA (Revised)
Term-End Examination
December, 2018

01373

MCS-012(S) : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*
(Weightage 75%)

Note : *Question number **1** is **compulsory** and carries 40 marks. Attempt any **three** questions from the rest.*

1. (a) Using K-map, simplify the following function in Sum of Product form : 5

$F(A, B, C, D) = \Sigma(2, 4, 5, 7, 11, 12, 15)$

Also draw the logic circuit for the simplified expression.

(b) (i) Add (– 100) and (– 105) in 8-bit registers using signed 2's complement representation for negative numbers. 2

(ii) Convert decimal number 65·41 to binary. 2

(c) What is a zero address machine ? Write a program to compute the following expression using zero address machine : 4

$$F = (A/B) + (C * D) - E$$

(d) A digital computer has a memory unit of 64 K × 8. 5

(i) How many data input and data output lines does it have ?

(ii) How many address lines does it have ?

(iii) What is the memory capacity in bytes ?

(e) Calculate the physical address given the following 8086 register contents : 4

(i) SS = 7698h
SP = 01FFh

(ii) CS = 5526h
IP = 8874h

(f) Simplify the boolean expression

$$F = \overline{\overline{A + B} + (\overline{A + B})}.$$ 3

(g) What is the minimum set of registers for von-Neumann machine ? What are the functions of these registers ? 4

(h) Write micro-operations for the following : 5

(i) ADD R1, X

(Add the contents of location X to register R1 and place the result in R1).

(ii) Interrupt processing

(i) Write 8086 assembly language program that finds the maximum value among a list of 5 byte numbers. The result should be stored in BX register. 6

2. (a) Explain the working of CD-ROM and DVD-ROM with the help of a block diagram. 5

(b) Using Manning code what should be the length of the error detection code that detects error in one bit ? Justify, using suitable example. 5

(c) Explain the set associative cache memory mapping scheme with the help of an example. 7

(d) Explain the following terms : 3

(i) Seek Time for Hard Disk

(ii) Latency Time for Hard Disk

(iii) Hit Ratio for Cache Memory

3. (a) How many RAM chips of 256 × 1 bits are required to build 32 Mbytes of memory ? 5

(b) Draw an internal organization of 32 × 4 RAM and explain the purpose of its associated control signals. 5

(c) How can an interleaved memory mechanism be used to improve the processing speed of a computer system ? 4

(d) Draw a 4-bit right-shift register and explain its operation. 6

4. (a) Discuss the features and principles of RISC processing. 5

(b) Suppose the value of register R1 is 1101 1110. Perform the following micro-operations : 6

(i) Insert 0010 in place of the leftmost 4-bits

(ii) Clear all the bits of R1

(iii) Arithmetic left shift of R1

(c) Discuss the design and operation of the Wilkes control unit with the help of a diagram. 6

(d) What are the assembler directives ? Explain the purpose of the following 8086 assembler directives : 3

(i) Segment

(ii) Assume

5. (a) Write a program in 8086 assembly language that accepts a character string of maximum size of 10 characters from the keyboard and converts the string to upper case. 8

(b) What will be the output of the following 8086 assembly language statements ? 6

(i) SAL BX, 01 if CF = 0

(ii) ROR BX, 1

(iii) SHR BX, 01 if CF = 0

Given : BX = 1001 1101 1011 1011

(c) Draw the logic diagram, characteristic table and excitation table for a T flip-flop. 6

83142

No. of Printed Pages : 7

MCS-012

MCA (REVISED)/BCA (REVISED)

Term-End Examination

June, 2019

MCS-012 : COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 Hours *Maximum Marks : 100*

(Weightage 75%)

***Note** : Question No. 1 is **compulsory** and carries 40 marks. Attempt any **three** questions from the rest.*

1. (a) Perform the following : 6

(i) Add (–35) and (–75) number in an 8-bit register using signed 2's complement representation. Also indicate an overflow if any.

(ii) Convert binary 01001011 into octal and hexadecimal notation.

(iii) Write BCD equivalent of 256.

(b) Simplify the following Boolean function in SOP form using K-map : 6

$F(A, B, C, D) = \Sigma (0, 3, 7, 9, 13, 15, 18, 21)$

and draw the logic diagram.

(c) Given the 8 bit value 10101101 stored in a register, what are microinstructions required in order to : 6

(i) Clear to 0 the first 4 bits

(ii) Set to 1 the last 4 bits

(iii) Complement the first 4 bits

(d) Assume R2 register having suitable values to perform the micro-operations. Discuss the importance of flags in a computer system. 2

(e) Draw the block diagram of hardwired control unit and explain how does it work ? 5

(f) Explain the use of large register file for RISC machines with the help of an example. 5

(g) Write an 8086 assembly language program to add five byte numbers stored in an array. The result should be stored in AX register. 6

(h) Why does DMA have priority over the CPU when both request a memory transfer of data ? 4

2. (a) How is execution of an instruction done ? Draw the flow chart of the instruction cycle. 5

(b) What are the key features of Von-Neumann Architecture ? 5

(c) Describe through an example how does a two-way set associative cache mapping scheme work. 6

(d) Draw an excitation table for RS flip-flop. 4

3. (a) Draw a 4-bit parallel register using D flip-flops and explain its operation. 6

(b) Categorize the following 8086 assembly language instructions to the instruction types given below : 6

Assembly Instructions	Instruction Type
(1) Move	(i) Data processing instruction
(2) TRAP	(ii) Data transfer instruction

(3) BRN (iii) Privileges instruction

(4) DIV (iv) Program control instruction

(5) STORE

(6) XOR

(c) List the important characteristics of instruction set of a basic computer. 4

(d) What is the difference between the following operations ? 4

(i) Arithmetic shift and logic shift

(ii) Logic shift and circular shift

4. (a) Suppose the value of the registers R_1 and R_2 are : 6

$R_1 = 1101\ 0110$

$R_2 = 1111\ 1001$

Perform the following operations on R_1 using R_2 :

(i) Selective Complement

(ii) Selective Set

(iii) Selective Clear

(b) What is a multiplexer ? Why is it needed ? Draw the logic diagram and truth table for a 4×1 multiplexer. 6

(c) Explain the following 8086 microprocessor addressing modes with the help of an example for each : 6

(i) Indexed

(ii) Register Indirect

(iii) Direct

(d) Discuss the use of a device driver. 2

5. (a) What are the constraints with MOV instruction of 8086 microprocessor ? 3

(b) List all the features of RISC architectures. 6

(c) Draw a general configuration of microprogrammed control unit and discuss its operation. 6

(d) What is performance degradation in a pipeline ? Explain any *two* possible hardware schemes that can be used in an instruction pipeline in order to minimize the performance degradation caused by instruction branching. 5

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MCS-012

MASTER OF COMPUTER APPLICATIONS/BACHELOR OF COMPUTER APPLICATIONS (REVISED) (MCA/BCA)

Term-End Examination

December, 2019

MCS-012 : COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 Hours *Maximum Marks : 100*

Weightage : 75%

Note : *Question No. 1 is compulsory and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

1. (a) Perform the following operations using 8 bit signed 2's complement notation. Also state whether overflow has occurred or not. 6

(i) (– 56) + (–72)

(ii) $(-73) + 84$

(iii) $57 + 71$

(b) Simplify the following Boolean function in SOP form by using k-map. Also draw the logic diagram of the simplified function using AND-OR-NOT gates : 5

$F(A, B, C, D) = \Sigma(0, 2, 8, 10, 12, 13, 14)$.

(c) Consider a main memory of the size 64 kB with each word being of 8 bits (one byte) only and a direct mapping Cache memory of size 4 kB also having data word size of 8 bits. Find the following : 4

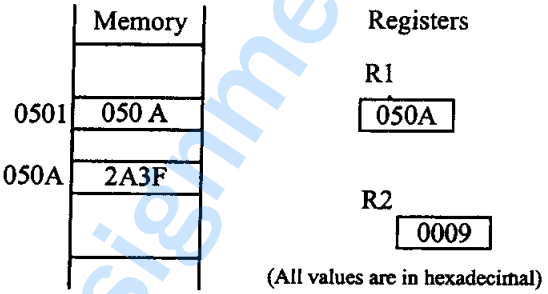
(i) What is the size of tag and index fields of cache ?

(ii) In what location of Cache, hexadecimal address to main memory (AABB) (if exists in cache) will be located ?

(d) What is Programmed Input/Output ? Explain with the help of a diagram. 3

(e) A disk has 300 tracks with each track having 500 sectors. The disk rotates at a speed of 9000 r.p.m. (revolution per minute) and has a seek time of 20 millisecond. Find the access time on the disk. 3

(f) Consider the following memory and register values (all values and addresses are in hexadecimal) :



What will be value of operand, if the following addressing modes are used ? 4

(i) LOAD $(0501)_h$ (Direct Addressing)

(ii) LOAD Indirect $(0501)_h$ (Indirect Addressing)

(iii) Load Indirect R1 (Register Indirect Addressing)

(iv) Load IA R2 0501 (IA → Indexed Addressing)

(g) What is fetch cycle in the context of an Instruction cycle ? Explain the sequence of micro-operations that will be required in fetch cycle. 5

(h) Find the physical address in the context of 8086 microprocessor, given the following values of register pairs (all values are in hexadecimal) : 4

(i) Code Segment (CS) : $(FABF)_h$

Instruction Pointer (IP) : $(1432)_h$

(ii) Stack Segment (SS) : $(OFFF)_h$

Stack Pointer (SP) : $(0110)_h$

(i) Write a program using 8086 assembly language that finds the sum and average of two byte values stored in memory locations X_1 and X_2. The sum should be stored in AX register and average in BX register. 6

2. (a) Assume a 4 bit binary exponent in a floating point number has a bias of 8. How will you represent the following exponent

values (in binary) (Also indicate if a value cannot be represents) : 3

(i) -7

(ii) 3

(iii) 9

(b) What is a parity bit ? Explain with the help of an example. What is an error detection and correction code ? Is parity bit an error detection and correction code ? Give reasons in support of your answer. 5

(c) What is the use of decoder ? Draw the truth table and logic diagram for 2×4 decoder. Also explain the working of the decoder. 6

(d) Draw the logic diagram and make the characteristic table of a J-K flip-flop. Construct the excitation table for J-K flip-flop from the above, explain the process of construction. 6

3. (a) Explain the sector layout on a CD-ROM with the help of a diagram. Assume that a CD-ROM and a hard disk has same number of tracks, sector size and recording surfaces, which of the two will have more storage capacity ? Justify your answer. 6

(b) What is the role of DMA ? Explain the functioning of a DMA with the help of a diagram. 6

(c) Explain any *four* of the following terms in the context of input/output technologies : 8

(i) SCSI

(ii) Scan codes in keyboard

(iii) Resolution of display devices

(iv) Colour depth in display devices

(v) Drive cache

(vi) Print resolution

4. (a) Explain the role of stack in subroutine call and return statements with the help of an example and diagram. 6

(b) A register R1 contains 01110110, what would be the content of register R2 if the following operations are to be performed on R1 using R2 ? 6

Attempt any *three* of the following :

(i) Selective set of upper four bits of R1.

(ii) Selective complement of lower four bits of R1.

(iii) Masking the lower four bits of R1 to zeros, upper four bits remain unchanged.

(iv) Clear all the bits of R1.

(c) Explain the working of Wilkes control unit with the help of a diagram. 5

(d) List any *three* characteristics of RISC architecture. 3

5. (a) Explain with the help of an example, how loops can be implemented in 8086 assembly language programming. 5

(b) List any *three* features of EXE programs. 3

(c) Explain the following 8086 assembly language instructions with the help of an example each : 9

(i) XCHG

(ii) CMP

(iii) ROL and RCL

(d) What is a NEAR procedure call in 8086 assembly language ? 3

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MCS-012

MASTER OF COMPUTER APPLICATION/BACHELOR OF COMPUTER APPLICATION (REVISED) (MCA/BCA)

Term-End Examination

June, 2020

MCS-012 : COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 Hours *Maximum Marks : 100*

Weigthage : 75%

***Note** : (i) Question No. 1 is compulsory and carries **40** marks.*

*(ii) Attempt any **three** questions from the rest.*

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1. (a) Convert the following numbers as stated : 6

(i) $(23.125)_{10}$ to binary

(ii) $(36.5)_{10}$ to octal

(iii) $(135)_{10}$ to hexadecimal

(b) Draw the truth table for the following Boolean function :

$$F = (A \cdot B + C) + (\overline{A} \cdot C) + (\overline{B} \cdot A \cdot \overline{C})$$

Use k-map to simplify the above Boolean function. 5

(c) What is the need of Cache memory ? Explain the direct Cache mapping scheme with the help of an example/diagram. 6

(d) Explain the interrupt-driven I/O technique with the help of a diagram. 4

(e) How is the next instruction that is to be executed brought into Instruction Register for execution ? Explain the sequence of micro-operation that are needed to perform this operation. Which of these micro-operations will take longest time to execute ? Give justification in support of your answer. 6

(f) How is the large register file of RISC useful ? 3

(g) Write a program using 8086 assembly language that finds the larger of two byte values stored in two memory locations named A and B respectively. The larger of two values should be stored in AL register. 6

(h) Calculate the physical address for the following segment register : 4

Offset (or Register) pair

(i) Offset of date byte in segment $(0200)_h$

Data Segment (DS) : $(IFFF)_h$

(ii) Code Segment Register (CS) : OF10

Instruction Pointer Register (IP) :

2562

2. (a) Explain the 'Stored Program Concept' for a Von Neumann machine. 4

(b) What is an I/O processor ? Explain its characteristics. Explain the selector and multiplexer channels with the help of diagram(s). 6

(c) Consider the Registers R1 having value $(1011\ 0101)_2$ and R2 having value

$(0110\ 0111)_2$. Perform the following operations using R1 and/or R2. The result should be stored in a register R :

(i) Addition of R1 and R2 with carry

(ii) Decrement R1

(iii) Increment R1

(iv) Subtract R2 from R1

It may be noted that only addition micro-operation is allowed. 6

(d) Explain the FAR procedure call in the context of 8086 assembly language. 4

3. (a) What is an Interrupt Vector Table in 8086 microprocessor ? How is it used to process an Interrupt ? Explain with the help of a diagram. 6

(b) Explain the following in the context of micro-programmed control unit : 6

(i) Control memory

(ii) Sequencing logic

(iii) Vertical micro-instruction

(c) Explain the following in the context of printing technology : 6

(i) Print quality

(ii) Impact and non-impact printers

(iii) Print resolution

(d) List any ***four*** advantages of densely packed integrated circuits. 2

4. (a) What is the use of Multiplexers ? Draw and explain the logic diagram of a 4 × 1 multiplexer. Also draw the truth table for this multiplexer. 6

(b) A memory chip has a capacity of 1 M × 16 bits : 4

(i) How many address lines does it have ?

(ii) What is the capacity of the chip in bytes ?

(c) What is an Accumulator base Instruction Set Architecture ? Write the assembly code for the expression A = B * C + D for Accumulator based machine. 6

(d) What is the role of Flag register in 8086 microprocessor ? Explain the role of any *three* flags in this register. 4

5. Explain briefly any ***eight*** of the following :

$8 \times 2\frac{1}{2} = 20$

(a) Assembler

(b) Stack segment

(c) EXE programs

(d) Shift instruction

(e) D flip-flop

(f) Memory interleaving

(g) Latency time in disk access

(h) Normalization of floating point numbers

(i) Unicode

(j) Counters

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MCS-012

MASTER OF COMPUTER APPLICATION/BACHELOR OF COMPUTER APPLICATION (REVISED) (MCA/BCA)

Term-End Examination

December, 2020

MCS-012 : COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 Hours *Maximum Marks : 100*

Weightage : 75%

Note : *Question No. **1** is compulsory and carries **40** marks. Attempt any **three** questions from the rest.*

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1. (a) Perform the following computation using binary 2's complement notation, assuming the register size to be of 8 bits. Also check for occurrence of overflow : 6

   (i) – 63 + 74

(ii) – 128 + 39

(iii) + 86 + 42

(b) Explain the meaning of 'minterm' in the context of digital logic circuits. Make the truth table and simplify the following Boolean function in SOP form using K-maps. Also draw the logic diagram : 5

$F(A, B, C) = \Sigma (0, 1, 4, 6, 7)$

(c) The main memory of a computer is of 64 K words size having a word size of 16 bits. The cache of this computer also has a block size of 16 bits having 256 blocks. Answer the following questions if direct mapping scheme has been followed : 5

(i) Size of tag and index fields of cache address.

(ii) In which address of cache a main memory address (AFBA) can be found ?

(iii) What will be the action of memory management system if the stated memory address is not found in cache location ?

(d) What is an Interrupt ? Explain any ***one*** technique that can be used to determine which device has issued the interrupt. 4

(e) Assume that an instruction has been fetched in Instruction Register (IR) of a computer, and has been decoded. R register DR is to be used for fetching the operand and AC register is to be used for calculation. Write and explain the various micro-operations for the purpose of execution of the instruction :

Add AC, A

where A is memory location which has the operand and the address of A is presently stored in MAR. 4

(f) Explain the horizontal and vertical micro-instruction format with the help of a diagram each. Which of the two micro-instructions is faster ? Give reason in support of your answer. 6

(g) Write a program in 8086 assembly language that stores $(FEDC)_h$ in AX register and $(BA98)_h$ in BX register. It then stores the values of AL, AH, BL and BH in four consecutive byte locations in the memory. Make suitable assumptions. 6

(h) What is Memory Interleaving ? Discuss its advantages. 4

2. (a) Explain the concept of S-R flip-flop with the help of logic diagram and characteristic table. Make and explain the excitation table of S-R flip-flop. 6

(b) How normalization and biasing are used for representation of floating point numbers ? Explain using a suitable example. 5

(c) Briefly explain the following : 6

(i) RAID

(ii) Charge Coupled Devices

(iii) Seek Time of a Disk

(d) Describe the concept of address space and memory space in virtual memory with the help of an example. 3

3. (a) Explain the following addressing schemes with the help of an example of each : 6

(i) Indexed Addressing

(ii) Base Register Addressing

(iii) Relative Addressing Scheme

(b) Explain the concept of instruction pipelining with the help of a diagram. 5

(c) Explain the following instructions of 8086 microprocessor : 6

(i) CMP

(ii) JMP

(iii) RCL

(iv) SHR

(d) Explain the advantages of using segments in 8086 microprocessor. 3

4. (a) Draw the truth table of a 8 × 3 encoder. Also, write the expressions for the outputs in terms of inputs. 5

(b) Explain the advantages of having densely packed integrated circuits. 4

(c) What is an I/O interface in a computer ? List the functions of I/O interfaces. 5

(d) Explain the features and uses of the following I/O devices : 6

(i) DVD-ROM

(ii) Printer

(iii) Scanner

5. (a) What is an Interrupt Vector Table (IVT) for a 8086 microprocessor ? Explain with the help of a diagram, how interrupts are processed using IVT. 6

(b) What is the role of flag register in 8086 microprocessor ? Explain the use of (i) overflow flag (ii) string direction flag, (iii) parity flag in 8086 microprocessor. 4

(c) Explain the working of Wilkes control unit with the help of a diagram. 5

(d) List any ***five*** characteristics of RISC machines. 5

MCS-012

MCA (Revised) / BCA (Revised)
Term-End Examination
June, 2021

MCS-012 : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*
(Weightage : 75%)

Note : *Question number **1** is **compulsory** and carries 40 marks. Attempt any **three** questions from the rest.*

1. (a) Perform the following computations using *signed 1's complement* notation of length 8 bits. Also indicate overflow, if any : *6*

(i) – 76 – 52

(ii) + 79 + 49

(iii) + 79 – 86

(b) Design a full-adder circuit using K-map. *4*

(c) Explain the two-way set associative cache mapping scheme with the help of an example. *5*

(d) What is DMA ? Why is it useful ? Draw the block diagram of a DMA interface. *5*

(e) Instructions of machine are such that they have two register operands. However, to load a register a special instruction has been designed which either contains the operand value or address of the operand. List and explain four addressing modes for this machine. *4*

(f) What is the role of control memory in a micro-programmed control unit ? Explain the organisation of control memory with the help of a diagram. What is a horizontal micro-instruction ? Explain. *6*

(g) Write a program using 8086 assembly language that moves content of byte memory location X1 and X2 to AL and BL registers. The program then finds the larger value of AL or BL register and stores it in DL register. *6*

(h) Assume the following values in the registers :
Instruction Pointer (IP) contains $(A521)_h$
Stack Pointer (SP) contains $(OOFF)_h$
Code Segment (CS) contains $(OFFF)_h$
Stack Segment (SS) contains $(OOOF)_h$
Find the following using the above information : *4*

(i) Physical address of top of stack

(ii) Physical address of instruction

2. (a) Draw logic diagram to implement AND, OR and NOT operations using NAND gate(s). *5*

(b) Explain the following in the context of floating point number representation with the help of an example : *5*

(i) Normalised mantissa

(ii) Biased exponent

(c) How many RAM chips of size 512 K × 1 bit are required to build 1 MB memory ? *2*

(d) What is Programmed Input/Output ? Explain with the help of a diagram. Explain the difference between Programmed I/O and Interrupt driven I/O. *6*

(e) What is Latency time in the hard disk ? *2*

3. (a) Explain the steps required to fetch an instruction from a memory location to instruction register with the help of micro-operations. *5*

(b) What will be the length of various fields of an instruction considering the following ? *5*

(i) 64 possible operations

(ii) 8 addressing modes

(iii) Memory size of 4 KB (byte addressing is used)

(iv) It has 32 registers

(v) Each instruction has one register and one memory operand

Make suitable assumptions.

(c) Explain the concept of NEAR and FAR procedural calls in 8086 microprocessor with the help of one example each. *6*

(d) Explain the use of INT 21h in 8086 microprocessor for reading a single character from the keyboard with the help of an example. *4*

4. (a) Draw and explain the truth table and logic diagram of a 3-bit synchronous counter. *5*

(b) Explain the von Neumann architecture with the help of a diagram. *5*

(c) What is an Input/Output processor ? How is it different from DMA ? *4*

(d) Differentiate between the following : *6*

(i) SRAM and DRAM

(ii) ROM and Flash Memory

5. (a) What is the use of stack in subroutine CALL instruction ? Explain using an example. *5*

(b) Why is RAID used in computers ? What is RAID Level 0 ? *3*

(c) Explain the following assembly language instructions with the help of an example each : *8*

(i) MUL

(ii) ADD

(iii) TEST

(iv) SHR

(d) Explain the use of CX register in implementing looping in 8086 assembly language. *4*

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MCS-012

MASTER OF COMPUTER APPLICATIONS/BACHELOR OF COMPUTER APPLICATIONS/POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS (MCA/BCA/PGDCA)

Term-End Examination

December, 2021

MCS-012 : COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 Hours *Maximum Marks : 100*

Weightage : 75%

Note : *Question No.* ***1*** *is compulsory and carries* ***40*** *marks. Attempt any* ***three*** *questions from the rest.*

1. (a) Perform the following operations using 8-bit signed 2's complement notation. Also indicate overflow, if it occurs : 5

   (i) Subtract (– 56) and (+ 72)

   (ii) Add (– 58) and (– 70)

   (iii) Add (– 75) and (+ 38)

   (iv) Add (– 25) and (+ 76)

   (v) Add (+ 57) and (– 57)

(b) Simplify the following function in SOP form by using K-map. Also draw the logic diagram of the simplified function using AND-OR-NOT gates : 5

$F(A, B, C, D) = \Sigma (0, 2, 5, 7, 13, 15)$

(c) Consider a DRAM chip is a square memory array of size (1024 × 1024 × 8) bits. 4

   (i) What would be the number of address lines for this memory array ?

   (ii) How many input or output data bit lines will be required for this chip ?

   (iii) What is the need of refresh counter which is part of a DRAM chip ?

   (iv) How many such chips will be needed to make a memory of 4 MByte ?

(d) What is the need of an I/O interface in a computer ? 3

(e) What is FAT in the context of a disk ? How is it different to Inode ? 3

(f) Explain the following addressing schemes with the help of an example each : 6

(i) Indexed addressing scheme

(ii) Register indirect addressing scheme

(iii) Relative addressing scheme

(g) Explain the sequence of micro-operations of an interrupt cycle for a simple machine having registers Accumulator (AC), Instruction Register (IR), Memory Address Register (MAR), Memory Buffer Register (MBR) and Program Counter (PC). 4

(h) Write a program in 8086 assembly language that compares the two byte values stored in two consecutive memory locations. The bigger of the two values is put in AL register. 5

(i) Explain with the help of an example, how a 16-bit address of an operand in an instruction of 8086 microprocessor, is converted to 20 bit address with the help of segment register(s). 3

(j) What is an assembler ? 2

2. (a) Explain any ***three*** advantages of densely packed integrated circuits. 3

(b) Explain the differences between fixed point representation and floating point representation. 4

(c) Explain the process of error detection and correction with the help of a diagram. 4

(d) Draw logic diagram to show how NOR gate can be used to implement NOT, OR and AND logic. 4

(e) Draw the logic diagram of T flip-flop. Explain its working and make

characteristics table for T flip-flop. Also make the excitation table for T flip-flop. 5

3. (a) Explain with the help of a diagram the Direct Cache mapping scheme for a machine having 64 byte memory with cache memory of size 8 byte. Assume the block size of main memory as 1 byte and size of each cache line as 1 byte. Make and state suitable assumption, if any. 5

(b) Differentiate between programmed I/O and DMA techniques of I/O. 5

(c) Explain any ***five*** of the following in the context of I/O organisation and technologies : 5×2=10

(i) Access time of magnetic disk

(ii) Disk layout of CD-ROM and its advantages

(iii) Scan codes in the context of Keyboard

(iv) Classification of printers

(v) Memory mapped I/O

(vi) Daisy chaining scheme of interrupt handling

(vii) Graphic accelerators

4. (a) Given the content of register R1 as 10101100, and register R2 as 00110110. Perform the following operations on register R1 using register R2 : 4

(i) Selective set R1

(ii) Selective clear R1

(iii) Selective complement R1

(iv) Mask operation on R1

(b) What is an Instruction Pipeline ? Assuming that an instruction pipeline has only three stages as :

Instruction Fetch (IF), Decode (DE) and Execute (EX), draw a diagram that shows execution of 4 consecutive instructions using this pipeline. 4

(c) Compare the features of horizontal micro-instruction to vertical micro-instructions. Draw the diagram for a vertical micro-instruction. 5

(d) List any ***four*** characteristics of RISC machine. 4

(e) What are the different components of an instruction ? Explain with the help of an example. 3

5. (a) How can DOS function call be used to read a single character ? Explain with the help of an example. 4

(b) Given the values of AL = $(05)_h$, BL = $(0A)_h$ and CL = $(01)_h$. What will be the value of carry flag and zero flag when the following instructions are executed :

(i) CMP AL, $(0A)_h$ 1

(ii) CMP BL, $(0A)_h$ 1

(iii) CMP CL, $(0A)_h$ 2

(c) Explain the following instructions of 8086 microprocessor with the help of *one* example each : 8

(i) ROL

(ii) DEC

(iii) XCHG

(iv) XOR

(d) Differentiate between .COM and .EXE program in the context of 8086 microprocessor. 4

MCA (Revised) / BCA (Revised)

Term-End Examination

June, 2022

MCS-012 : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours *Maximum Marks : 100*

(Weightage : 75%)

Note : *Question number **1** is **compulsory** and carries 40 marks. Attempt any **three** questions from the rest.*

1. (a) Simplify the following Boolean function in SOP form by using K-map. Also draw the logic diagram of the simplified function using AND-OR-NOT gates : *5*

$$F(A, B, C, D) = \Sigma (0, 2, 4, 6, 9, 11, 14)$$

(b) Draw the logic diagram of D flip-flop. Explain its working. Make the characteristics table and excitation table for D flip-flop. *5*

(c) Why is DMA needed ? What are the different functions that a DMA interface should perform ? *3*

(d) A disk rotates at a speed of 6000 rpm (revolutions per minute). It has a seek time of 10 milliseconds. The disk has 100 tracks with each track having 200 sectors. Find the average access time of this disk. *3*

(e) A RAM chip has a capacity of 16 K × 4 bits. Answer the following questions for this RAM : *1+1+2=4*

(i) How many numbers of input and output lines does this memory have ?

(ii) How many address lines does it have ?

(iii) How many such chips will be needed to construct a RAM of size 64 K Byte ?

(f) Perform the following micro-operations in a sequence to registers R1 and R2. The initial value of R1 is 00111111 and R2 is 11000001. *5*

(i) $R \leftarrow R1 + R2 + 1$ (Add with carry)

(ii) $R1 \leftarrow R2 +$ (All 1s) in a Register (Decrement)

(iii) $R2 \leftarrow R1$ (Transfer R1)

(iv) $R \leftarrow R1 \wedge R2$ (AND)

(v) $R \leftarrow \overline{R1}$ (Complement R1)

(g) Explain the concept of Micro-program Control Unit. What is the need of control memory ? How is control memory organised ? Explain with the help of a diagram. *5*

(h) Consider the following pair of registers or offsets of size 16 bits of 8086 microprocessor. Explain how these registers or offset pairs are used to compute physical memory address of 20 bits. Show actual address computation : *4*

(i) DS has $(25CD)_h$ and offset $(004A)_h$

(ii) SS has $(2F1A)_h$ and SP has $(1124)_h$

(i) Write a program using 8086 assembly language that finds the smallest of three byte values stored in the memory. *6*

2. (a) What is a multiplexer ? Draw the truth table and logic diagram of 2×1 multiplexer and explain its working. *4*

(b) What is half adder ? Draw the truth table for a half adder and construct the logic diagram of a half adder using AND, OR and NOT gates only. *4*

(c) Explain how an even parity bit can identify error using an example of 4 bit data. Can it identify the bit which is in error ? Give reason in support of your answer. *4*

(d) Perform the following operations using signed 2's complement notation of 8 bits. Also indicate overflow, if any. *4*

(i) + 59 + 83

(ii) + 59 – 83

(iii) – 59 + 69

(iv) – 59 – 69

(e) Explain the concept of Von Neumann machine, with the help of a diagram. *4*

3. (a) Draw the logic diagram of a RAM cell using a J-K flip-flop. Explain various input and selection lines for this cell. Explain how reading or writing can be performed on this cell. *7*

(b) Explain the direct cache mapping scheme for a memory of size 4 K Byte and cache of size 128 byte. The main memory is byte addressible and size of one slot/line of cache is also 1 byte. *5*

(c) Explain the characteristics of the following I/O devices/interfaces : *6*

(i) DVD-ROM

(ii) LCD monitors

(iii) Scanner

(d) Define the term "Interrupt" in the context of a computer, with the help of an example. *2*

4. (a) Assuming that a machine has instructions of size 16 bits only. How many bits of this instruction will be required for the following ? *1+1+2=4*

(i) Length of operation code (op-code) if the machine has 50 instructions.

(ii) Length of addressing mode bits if machine has four different addressing modes.

(iii) If one of the four addressing modes is direct addressing, then what would be the size of main memory address that can be supported by this machine ?

(b) What is the role of memory stack for implementation of subroutine call and return instructions ? Explain with the help of suitable diagrams. *6*

(c) Explain the functioning of Wilkes control unit, with the help of a diagram. *5*

(d) How is a large register file used in RISC machine ? Explain with the help of a diagram. *5*

5. (a) Explain the following instructions of 8086 microprocessor, with the help of an example each : *8*

(i) XCHG

(ii) LEA

(iii) ADC

(iv) XOR

(b) Explain the differences between ROL and RCL instructions of 8086 microprocessor, with the help of an example each. *4*

(c) Explain the role of Interrupt Vector Table (IVT), for processing of an Interrupt in 8086 microprocessor, with the help of a diagram. *5*

(d) What is an Assembler ? Explain its purpose. *3*

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MCS-012

MASTER OF COMPUTER APPLICATIONS (REVISED)/ BACHELOR OF COMPUTER APPLICATIONS (REVISED)

(MCA/BCA)

Term-End Examination

December, 2022

MCS-012 : COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 Hours *Maximum Marks : 100*

Note : *Question No.* ***1*** *is compulsory and carries 40 marks. Attempt any* ***three*** *questions from the rest.*

1. (a) Convert the following pairs of decimal numbers to 8-bit, signed, 2's complement numbers and add them. State, whether or not overflow occurs in each case : 6

   (i) 58 and 100

(ii) –71 and 13

(iii) –100 and –28

(b) What is the difference between combinational logic and sequential logic ? 2

(c) Design a combinational circuit using K-map, whose output is zero if the 4-bit input binary number is a multiple of 3, otherwise the output is one. 6

(d) What is the use of addressing modes ? Explain the base register addressing and relative addressing schemes with the help of ***one*** example of each. 6

(e) Explain the layout of a magnetic disk with the help of a diagram. Also, explain access time on a magnetic disk. 6

(f) Explain the concept of programmed input/output with help of a flowchart. 4

(g) Explain the Wilkes control unit with the help of a diagram. 5

(h) Write a program using 8086 assembly language that converts an ASCII digit stored in a memory location to equivalent binary value. This binary value should be stored in AL register. 5

2. (a) Explain the role of any ***five*** registers used in a basic computer. 5

   (b) Draw and explain the half adder circuit. 5

   (c) Explain the role of parity bit in error detection with the help of an example. 4

   (d) Explain the functioning of master-slave flip-flop with the help of a diagram. 6

3. (a) What is instruction cycle ? How are different kinds of instructions interpreted ? 6

   (b) Explain the role of flag registers in assembly language programming with the help of an example. 4

   (c) What is Cache Memory ? Why is it needed ? Explain the direct mapping cache organisation with the help of a diagram. 6

   (d) What are the differences between .COM and .EXE programs ? 4

4. (a) Explain the term micro-operation. How is a micro-operation different from an instruction ? Write the sequence of micro-operations required to fetch an instruction from the memory to CPU register. You may assume suitable set of registers. 8

(b) Explain the features of RISC architectures. 6

(c) Calculate the physical address for the following register values/offset in a 8086 microprocessor : 6

(i) CS = 2351 h and IP = 1256 h

(ii) DS = 4FFFh and offset in data segment = 0100h

(iii) SS = 3FFFh and SP = 0111h

5. (a) Represent the following numbers using IEEE-754 floating point single precision number format : 4

(i) 1010.0001

(ii) –0.0000111

(b) Write the assembly language code using 8086 assembly language for performing the following operation : 6

Z = ((A + B) / 5 * C) ** 2

(c) How many RAM chips of size 256 × 1 bit are required to build 1 M byte memory ? 5

(d) Explain the use of large register file in RISC with the help of a diagram. 5

No. of Printed Pages : 5

MCS-012

MASTER OF COMPUTER APPLICATIONS/BACHELOR OF COMPUTER APPLICATIONS (REVISED) (MCA/BCA)

Term-End Examination

June, 2023

MCS-012 : COMPUTER ORGANIZATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 Hours *Maximum Marks : 100*

(Weightage : 75%)

Note : *Question No. **1** is compulsory and carries **40** marks. Attempt any **three** questions from the rest.*

1. (a) Describe the structure of 8086 micro-processor with the help of a diagram. 6

   (b) What is an instruction cycle ? Explain with the help of a flowchart. 6

   (c) Represent the following numbers using IEEE-754 floating point single precision number format : 4

   (i) 1010.0001

   (ii) – 0.0000111

   (d) Explain instruction pipeline with the help of a diagram. 4

   (e) What are the different kinds of Interrupts ? How does CPU know that an interrupt has occurred ? 5

   (f) What is DMA ? Explain the functions of DMA. 5

   (g) Consider a four variable Boolean function :

   $$F = \Sigma(0, 4, 6, 7, 8, 10, 11, 15)$$

   Minimize this function using K-map and draw the resultant function using logic gates. 6

   (h) Convert decimal number $(49.25)_{10}$ into : 4

   (i) binary

   (ii) hexadecimal

   (iii) octal

2. (a) Explain the differences between micro-programmed control and hardwired control. 5

(b) Draw and explain the logic diagram of a 3×8 decoder. 5

(c) Design a combinational circuit with three inputs x, y, z and three outputs A, B, C. When the binary equivalent of input to this circuit is 0, 1, 2 or 3 the binary output is one greater than the input. When the binary equivalent of input is 4, 5, 6 or 7 the binary output is one less than the input. Also draw the truth table. 6

(d) Find the 9's and 10's complement of 128. Then convert 128 to binary and find 1's and 2's complement. 4

3. (a) Add 25 and (– 25) in binary using 8-bit register for the following representations : 6

(i) Signed magnitude representation

(ii) Signed 1's complement

(iii) Singed 2's complement

(b) Explain the following instructions of 8086 assembly language with the help of an example : 8

(i) ADC

(ii) MUL

(iii) XOR

(iv) ROL

(c) Explain the role of Interrupt Vector Table (IVT) in the context of 8086 micro-processor with the help of a diagram. 6

4. (a) The following memory units are specified by the number of words times the number of bits per word. How many address lines and input-output data lines are needed in each case ? 4

(i) $2K \times 16$

(ii) $64K \times 8$

(b) What is a micro-operation ? Explain the sequence of micro-operations required to fetch an instruction stored in the memory in the context of a Von Neumann machine. 6

(c) Explain the following addressing modes with the help of an example of each : 6

(i) Register addressing

(ii) Index addressing

(iii) Direct addressing

(d) Find the even and odd parity bits for the following 7-bit data : 4

(i) 1010101

(ii) 0000111

5. (a) Explain the terms ASCII and UNICODE. 3

(b) Register 'A' holds 8-bit binary 11011001. Determine B operand and the logic micro-operation to be performed in order to change the value in A to : 6

(i) 0000 1001

(ii) 1111 1001

(iii) 0010 0110

(c) Write the assembly language code using 8086 assembly language for performing the following operation : 6

$$Z = \left((A - B) / 10 * C\right) * *2$$

(d) Explain the use of circular overlapped register window in a RISC processors with the help of a diagram. 5