Heaven's Light Is Our Guide

RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
3rd Year Odd Semester Examination 2018

COURSE NO: CSE 3109 COURSE TITLE: Microprocessors and Assembly Language TIME: 3 HRS

FULL MARKS: 70

N.B. (i) Answer any SIX questions taking any THREE from each section.
(ii) Figures in the right margin indicate full marks.
(iii) Use separate answer script for each section.

SECTION : A

Q.1. (a) State any three features of Intel 8086 microprocessor. What is the main difference between 8086 and 8088 microprocessor?
(b) Draw the internal architecture of 8086 microprocessor.
(c) What is instruction pre-fetch? How 8086 microprocessor perform instruction pre-fetching?

Q.2. (a) What are the actions take place in the process of a PC start-up after powering it on?
(b) How does a CPU execute a machine instruction?
(c) Can instruction pre-fetching be cumbersome for faster program execution? Explain briefly.

Q.3. (a) What is the significance of using interrupt vector table? Explain with example.
(b) Explain the working principle of INTR, INTA and NMI pin of 8086 microprocessor.
(c) Suppose AX contains 8BCDH and BX contains -71ABH. What will happen when the following instructions are executed:
(i) NEG AX and (ii) SUB AX, BX.
What will be the new settings of CF, SF, ZF, PF and OF.

Q.4. (a) Write an assembly program to determine the smallest number among three decimal numbers.
(b) What is the difference between AND and TEST instruction? If Al contains -15, give the decimal value of AL after SAR Al, 1 is executed.
(c) Write an assembly language program to display a 5X5 grid of "*".

Q.5. (a) What is DMA? Why should we use DMA for faster data transfer instead of using program instructions? 3

(b) How can you reverse a bit pattern using shift and rotate instruction? Explain with example. 3

(c) Suppose that AX=135AH, BX=3739H, CX=6EABH and SP=100H. Give the contents of AX, BX, CX and SP after executing the following instructions: 6

```
PUSH AX
PUSH BX
XCHG AX, CX
POP CX
PUSH AX
POP BX
```

Q.6. (a) Suppose AL=8CH and CF=1. What will be the contents fo AL after executing each of the following instruction: 4

(i) SAR AL, CL; where CL=5

(ii) ROR AL, CL; where CL=20

(b) What happens to the contents of AX after executing the following instruction: 3

```
MOV AX, -1
CWD
```

(c) Write an assembly language program that demonstrates the use of based indexed addressing mode. Use necessary comments to clarify the codes. 5

Q.7. (a) Suppose the following string has been declared: 5

```
STRING1 DB "THIS IS A STRING"
STRING2 DB 11 DUP(?)
```

Write some code that will cause STRING1 to be copied into STRING2 with the blank characters removed.

(b) What is macro? What is the function of instruction pointer IP? 2

(c) Write instructions that will allow user to take a string of letters and digits and separate then in next line. 5

Sample output:

Input: Enter String: 123ABC4

Output: Digits: 1234

Letters: ABC

Q.8. (a) Describe the steps that an 8086 will take when it responds to an interrupt. 3

(b) What is the purpose of a co-processor? What is CPU acceleration? 3

(c) Consider a program having 60% simple instruction and remaining complex. For CISC simple and complex instruction takes 4 and 8 cycles respectively, but RISC takes 7 cycles for simple instructions, complex instructions are executed as 14 simple instructions. If cycle time is 75 ns, what is the ratio of time taken by CISC to RISC for 1000000 instructions? 6

RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
3rd Year Odd Semester Examination 2016

COURSE NO: CSE 3109 COURSE TITLE: Microprocessors and Assembly Language

FULL MARKS: 72 TIME: 3 HRS

N.B. (i) Answer any SIX questions taking any THREE from each section.
(ii) Figures in the right margin indicate full marks.
(iii) Use separate answer script for each section.

SECTION : A

Q.1. (a) What do you mean by 64 bit microprocessor? 2

(b) Explain how an addition of two big numbers, each 2048 bit is down on 64 bit machine? 5

(c) Define logical address and physical address. 2

(d) Suppose a memory location has a physical address 6B32FH. Compute the followings: 1
(i) The offset address if the segment number is 512AH
(ii) The segment number if the offset address is 123AH.

Q.2. (a) Discuss the purpose of the registers: (i) IP and (ii) SP 3

(b) Draw the block diagram of 8086 architecture to depict the units of bus interfacing and execution. 5

(c) Briefly discuss the working procedure of RISC and CISC architecture to make the reductions or making an instruction complex? 4

Q.3. (a) Define PSP. What do you mean by the followings: (The symbols have their usual meanings) 3

(i)
```
MOV AX, @DATA
MOV DS, AX
MOV ES, AX
```

(ii)
```
LEA DX, MSG
MOV AH, 9
INT 21H
```

(b) What do you mean by (i) .CRF file (ii) .EXE file (iii) .LST file and (iv) object file? 2

(c) Write an assembly language code to display the following box of asterisks. Assume every gap is equivalent to one tap. 3

```
*  *  *
*
*  *  *
```

(d) Write an assembly program that will display the following output: Assume every gap is equivalent to one tap. 4

```
   1
2  3  4
5  6  7
   8
```

Q.4. (a) Find the value of flag bits SF, PF, ZF, CF and OF after executing the following statement if AL contains FFH before executing (i) INC AL(ii) MOV AX, -3 4

(b) Suppose AX = 7FFFH and BX = 8000H. Write necessary statements to jump label A if AX>BX otherwise jump to label B. 4

(c) Write an assembly language program to display a 40X10 matrix of '*'; 4

SECTION : B

Q.5. (a) Define (i) signed overflow (ii) unsigned overflow. 2

(b) What happens after the following assembly codes is executed? 2

```
    CMP AX, 0
    JNL ENDIF
    NEG AX
END_IF:
```

(c) Suppose AL and BL contain extended ASCII characters. Write an assembly program to display the one that comes first in the character sequence. 4

(d) Write an assembly code for the followings: 4
(i) Write a count-controlled loop to display a row of 80 stars .
(ii) Count the number of characters in an input line.

Q.6. (a) Define (i) MUL and IMUL instructions (ii) DIV and IDIV instructions. 2

(b) What are the differences between (i) SAL and MUL instructions (ii) SAR and DIV instructions? 2

(c) What will be the output after executing the following code: 2

```
        XOR AX, AX
        MOV CX, 16
TOP:
        ROL BX, 1
        JNC NEXT
        INC AX
NEXT:
        LOOP TOP
```

(d) Write an assembly program that prompts the user to inter a character and subsequent lines print its ASCII code in binary and number of 1 bits in its ASCII code. 6

Sample execution:
TYPE A CHARACTER: A

THE ASCII CODE OF A IN BINARY IS 01000001
THE NUMBER OF 1 BITS IS 2

Q.7. (a) Explain the differences the following instructions: (i) MOV AX, 2456H and (ii) MOV AX, [2456H] 3

(b) Given the following two strings 5

STRING1	R	U	E	T	C	S	E
STRING2							

Draw the strings after the following code is executed:

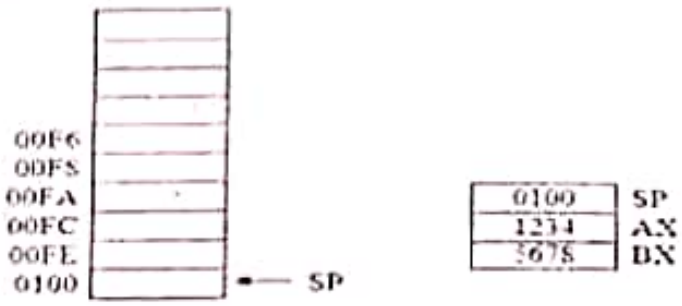
```
MOV AX, @DATA
MOV DS, AX
MOV ES, AX
LEA SI, STRING1
LEA DI, STRING2+5H
CLD
SUB DI, 2
MOVSB
```

(c) Explain the purpose of the following pin of 8086 (i) NMI (ii) M/IO (iii) TEST and (iv) AD_{15} 4

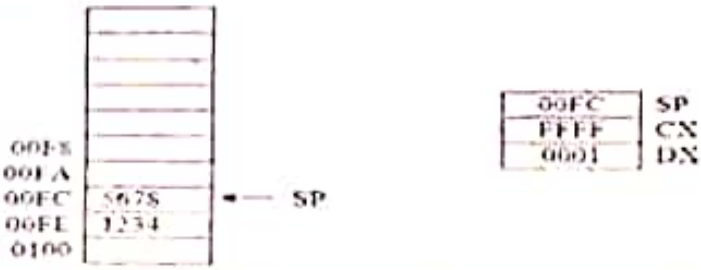
Q.8. (a) Define (i) PUSH and PUSHF instructions (ii) POP and POPF instructions. 2

(b) What is the basic advantage of using STACK? Suppose the empty stack is given below. What happens after the following instructions is executed: (i) PUSH BX and (ii) POP CX. 4

(i)



(ii)



(c) Write an assembly program that lets the user enter time in seconds, up to 65535 and outputs the time as hours, minutes and seconds. 6

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Heaven's Light is our Guide

Rajshahi University of Engineering & Technology

B.Sc. Engineering 3rd Year ODD Semester Examination, 2016

Department of Computer Science & Engineering

Course No. **CSE 3109** Course Title: **Microprocessors and Assembly Language**

Full Marks: 72 Time: **THREE** (03) hours

N.B:

Answer **SIX** questions taking **THREE** from each section.

The questions are of equal value.

Use separate answer script for each section.

SECTION A

Marks

Q.1(a) What are the basic differences between 16-bit and 32-bit microprocessor? **02**

(b) What are the importances of using instruction queue of 8086 microprocessor? **02**

(c) A memory location has a physical address 4A37BH. Compute the followings: **03**

(i) The offset address if the segment number is 40FFH.

(ii) The segment number if the offset address is 123BH.

(d) Use only MOV, ADD, SUB, INC, DEC and NEG translate the following high level language assignment statements into assembly language where A, B, and C are word variables. **02**

(i) A=B-2C-A+1

(ii) B=C-B-2A

(e) Write an assembly program to read one of the hex digits A-F, and display it on the next line in decimal. **03**

Sample execution:

Enter a hex digit: B

In decimal it is: 11

Q.2(a) What are the purposes of using control flags of the flag register of 8088 microprocessor? **03**

(b) For each of the following instructions, give the new destination contents and the new settings of CF, PF, AF, ZF, SF and OF. Suppose that the value of all of the flags are initially 0. **06**

(i) ADD AX, BX; where AX contains 8FFFH and BX contains 0101H.

(ii) NEG AL; where AL contains 7FH.

(c) What are the uses of the following registers of 8088 microprocessor? **03**

(i) CS

(ii) SS

(iii) CX

(iv) DX

(v) IP

(vi) SP

Q.3(a) Suppose AL and BL contain extended ASCII characters. Display the one that comes last in the character sequence. **03**

(b) Write assembly code to do the following decision structure: **03**

(i) IF AL>0
THEN FFh in AH
ELSE
Put 00h in AH
END_IF

(ii) IF (AX<BX) OR (BX<CX)
THEN
Display the message "YES"
ELSE
Display the message "NO"
END_IF

(c) Explain XLAT instruction with an example. **03**

(d) Write an assembly program to perform the following: **03**

Put the sum 1+3+5+7+9+.....+25 in BX.

Q.4(a) Explain the working principle of interrupt vector table. **03**

(b) What happens to the contents of the AX after executing the following 8086 instruction sequence: **03**

MOV AX, F180H

CBW

CWD

(c) Why is DMA data transfer faster than doing the same data transfer with program instruction? **02**

(d) How many interrupt pins are exists in 8086 microprocessor? What are the purposes of using those pins? **02**

(e) Explain the differences between the following instructions: **02**

MOV AX, 2437H and MOV AX, [2437H]

SECTION B

Q.5(a) What happens when the PC is powered up? **02**

(b) Suppose AL contains ABH and CF=1. Give the new contents of AL after each of the following instructions is executed. Assume that the preceding initial condition for each part of this question. **04**

(i) SHL AL, 1
(ii) SAR AL, 1
(iii) ROL AL, CL if CL contains 3
(iv) ROR AL, CL if CL contains 2

(c) Define macro. Write a macro to place the largest of two words in AX. **03**

(d) Write an assembly language program that will take the input N from user and display the following output: **03**

N	N	N	N	N
N	N	N	N	N
N	N	N*N	N	N
N	N	N	N	N
N	N	N	N	N

N.B. you have to use loop to solve this problem.
Sample input:
Enter the number: 5
Sample output:

5	5	5	5	5
5	5	5	5	5
5	5	25	5	5
5	5	5	5	5
5	5	5	5	5

Q.6(a) What is the function of instruction pointer (IP)? **02**

(b) Describe the general purpose registers of 8086 microprocessor. **04**

(c) Write down the differences between DOS routine and BIOS routine. **03**

(d) What are the purposes of instruction queue in 8086 microprocessor? **03**

Q.7(a) Write down the syntax for procedure declaration. What are the differences between NEAR and FAR procedure? **04**

(b) How does the CPU implement a conditional jump? **03**

(c) Explain the significance of direction flag (DF) in string operation. **03**

(d) What happens when stack size is omitted during stack segment declaration? **02**

Q.8(a) Compare RISC processor with CISC processor. **03**

(b) Briefly describe the Intel 8086 family of microprocessors. **04**

(c) Write down the restriction on MOV and XCHG instructions **03**

(d) For which condition DIV and IDIV will give the same result, Explain. **02**

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Rajshahi University of Engineering and Technology
B.Sc. Engineering 3rd Year 5th Semester Examination, 2015
Department of Computer Science and Engineering
Course No. CSE 507 Course Title: Microprocessor and Assembly Language
Full Marks: 70 Time: THREE (03) hours

N.B.

Answer SIX questions taking THREE from each section.
The questions are of equal value.
Use separate answer script for each section.

SECTION A

Q1(a) What do you mean by 32-bit microprocessor? How adding operation of two numbers of 128-bit each is done by using 32-bit microprocessor. Explain with example. 07⅔

(b) Draw the Von Neumann Architecture. Why is it called general purpose Computer Architecture? 04

Q2(a) Briefly describe (i) RISC and (ii) CISC. 04

(b) Describe the different processor family. 05⅔

(c) What do you mean by physical and logical address of memory? 02

Q3(a) Explain how a 20-bit physical address for 8086 is handled by 16-bit register? 02⅔

(b) Find the physical address of the following: 03
(i) 5706H:6121H (ii) 3AFEH:00F2H

(c) What do you mean by core 2 duo microprocessor? Explain it with necessary figure. 03

(d) Define (i) Many core processor and (ii) Multicore processor 03

Q4(a) Explain (i) INT 16H and (ii) INT 21H. 02

(b) What is STACK? How stack operation is done? Explain with example. 04

(c) What happens after executing a CALL and RET instruction. 03

(d) Suppose two strings are defined as follows: 02⅔

```
.DATA
STR1 DB 'RUET CSE'
STR2 DB 7 DUP(?)
```

Write instructions to copy STR1 into STR2 in reverse order.

SECTION B

Q5(a) Briefly describe the flag register in 8086 microprocessor. 04

(b) Explain XLAT instruction with an example. 02⅔

(c) Write an assembly program that can find a substring from a string. 03

(d) What is the basic difference AND and TEST instruction? 02

Q6(a) What are the advantages of DUP and PTR instruction? 03⅔

(b) Describe the function of each status flag in 8086 microprocessor. 03

(c) Write an assembly program that converts an uppercase sentence into lowercase and vice versa. 05

Q7(a) Write assembly code for the following decision structures- 05

i)
```
IF AL<=BL
  THEN
  Display the character in AL
  ELSE
  Display the character in BL
  END_IF
```

ii)
```
If (AX<BX) OR (BX<CX)
  THEN
  Display the message "YES"
  ELSE
  Display the message "NO"
  END_IF
```

(b) Using the logic instruction clear the most and least significant bits of AL leaving the other bits unchanged. 02

(c) Suppose AL contains 11001011b. Give the new contents of AL and CF after each of the following instruction is executed 04⅔
i) ROL AL, CL where CL contains 2
ii) ROR AL, CL where CL contains 2.

Q8(a) Describe the function of general purpose registers of 8086 microprocessor. 04

(b) Explain the function of the following: 03
i) Debugger ii) Linker and iii) Assembler.

(c) Give two example of 8-bit, 16-bit and 32-bit microprocessors 03

(d) The register pair SS:BP is used to access data from which segment? 01⅔

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Heaven's Light is our Guide

Rajshahi University of Engineering & Technology

B.Sc. Engineering 3rd Year 5th Semester Examination, 2013

Department of Computer Science & Engineering

Course No. CSE 307 Course Title: Microprocessors and Assembly Language

Full Marks: 70 Time: THREE (03) hours

N.B.

Answer **SIX** questions taking **THREE** from each section

The questions are of equal value.

Use separate answer script for each section.

SECTION A

		Marks
Q1(a)	What do you mean by 8-bit microprocessor and 16-bit microprocessor?	04
(b)	Define RISC and CISC. Mathematically describe the performance for both of them.	05
(c)	Draw Von Neumann architecture and write the main components of it.	02½
Q2(a)	Explain why the system with multi-core processor is better than the system with single core processor?	02
(b)	How many cores are available in the following processor family? (i) Core i3 (ii) Core i5 (iii) Core i7.	01½
(c)	Briefly discuss the followings for 8086 microprocessor: (i) physical memory address and (ii) logical memory address.	03
(d)	Find the physical address for the followings: (i) 4370H:561EH (ii) 7A32H:0028H	03
(e)	How a 20-bit physical address for 8086 is handled by 16-bit register?	02
Q3(a)	Write two main features of the following microprocessors: (i) 4004 (ii) 8008 (iii) 8080 (iv) 8086/8088 (v) 80286 (vi) 80386 (vii) 80486 (viii) Pentium (ix) Pentium Pro/II/III (x) Pentium	05
(b)	What do you mean by Core 2 Duo microprocessor? Explain with necessary figure.	03½
(c)	Define (i) A many-core processor (ii) A multi-core processor.	03
Q4(a)	Discuss what happens when the PC is power up.	03½
(b)	Briefly describe how an assembly instruction is executed?	04
(c)	Write an assembly code to display 'CSERUET' and convert it into lower case.	04

SECTION B

Q5(a)	Explain (i) INT 16H and (ii) INT 21H	02½
(b)	Define STACK. Explain a real application of STACK with necessary figure.	03
(c)	What happen after executing a CALL and RET instructions?	03
(d)	Write an assembly code that a user enters 0000 as time in second and outputs the time in hours, minutes and seconds.	03
Q6(a)	What are the purposes of using TEST instruction? Explain with example.	02½
(b)	Write the assembly code for the following decision structure:	05

(i) IF AX<0
THEN
PUT -1 IN BX and print JOB IS TERMINATED
END_IF

(ii) If (DL>="A") and (DL<="Z")
THEN
Display "we are CSERUET"
END_IF

(c)	Write assembly code for the followings:	04
	(i) Copy the contents of a byte array size 50 into another array in reverse order.	
	(ii) Replace the *(star) by E of the string: 'W* AR* CS* RU*T'	
Q7(a)	What are the purposes of TF in the flag register?	03
(b)	For the following instruction, give the new destination contents and the new setting of CF, SF, ZF, PF and OF. Suppose that, the flags are initially 0. ADD AL, BL; where AL contains 80H and BL contains 80H.	03
(c)	Find the unknown value for each of the following physical addresses. Assume all numbers are hexadecimal numbers. (i) 6765 : ? = DABC0 (ii) ? : CD21 = 32D21	03
(d)	A data segment is to be located from address $A0000_{16}$ to $AFFFF_{16}$. What value must be loaded into DS?	02½
Q8(a)	Write down the operations that can be performed with the string instructions.	04½
(b)	Define macro. Write a macro to place the largest of three words in AX.	03
(c)	Do you think that physical memory is one dimensional? If yes, explain with example how two dimensional array elements are arranged with it.	04

Heaven's Light is our Guide

Rajshahi University of Engineering and Technology

B.Sc. Engineering 3rd Year 5th Semester Examination, 2013 (A)

Department of Computer Science and Engineering

Course No. CSE 507 Course Title: **Microprocessors & Assembly Language**

Full Marks: 70 Time: **THREE** (03) hours

N.B.

Answer **SIX** questions taking **THREE** from each section.

The questions are of equal value.

Use separate answer script for each section.

SECTION A

		Marks
Q1(a)	What are the purposes of using instruction queue of 8086 microprocessor?	02⅔
(b)	Write the necessity of using segment and offset address to calculate the actual physical address of the memory of 8086 microprocessor.	03
(c)	What are the working principles of execution unit and Bus interface unit of 8086 microprocessor?	03
(d)	Write are the advantages of 80286 microprocessor over 8086 microprocessor.	03
Q2(a)	Write the necessity of using CS: IP to fetch the instruction from main memory.	02⅔
(b)	Describe briefly the uses of AX, BX, CX and DX.	04
(c)	What will happen of flag register after executing the instruction SUB AX, BX where AX=FFFEH and BX=FFFEH?	05
Q3(a)	How can you copy the memory contents from one string to another with MOVSW instruction? Write with suitable example.	03⅔
(b)	Write short note on i) Implied addressing mode and ii) Based-indexed addressing mode.	03
(c)	Write the minimum mode pin functions of 8088 microprocessor.	05
Q4(a)	What are the differences between a register and a memory location? Determine the physical address of a memory location given by 0A51:CD90h.	03⅔
(b)	Which are the registers available to the programmer for general data manipulation? Write down the purpose of these registers.	04
(c)	Suppose that the following data are loaded starting at offset 0000h:	04

```
A   DB   7
B   DW   1ABCh
C   DB   'HELLO'
```

i) Give the offset address assigned to variable A, B and C.

ii) Give the contents of the byte at offset 0004h.

iii) Give the offset address of the character "O" in 'HELLO'.

iv) Give the contents of the byte at offset 0002h in Hex.

SECTION B

			Marks
Q5(a)	Why are the following instructions illegal? How do we solve these problems?		04
	i)	MOV WORD1, WORD2	
	ii)	XCHG WORD1, WORD2	
	iii)	ADD BYTE1, BYTE2	
	iv)	SUB BYTE1, BYTE2	
(b)	Translate the following high-level language assignment statement into assembly language. A, B and C are word variables.		03⅔

B=3×B+7-A

(c)	Describe the registers value when we want to use INT 21H instruction for the following purpose:		04
	i)	Single key input.	
	ii)	Display a character.	
Q6(a)	Write down an assembly code, where if AX contains a negative number, display 'NEG', if AX contains 0, display 'ZERO'; if AX contains a positive number, display 'POST'		05
(b)	Have any problem I the following code If so, explain it and solve this problem.		03⅓

```
MOV   CX, 0
MOV   AH, 2
MOV   DL, '*'
TOP:
      INT   21h
      LOOP  TOP
```

(b) Clear, set and complement the sign bit of AX while leaving the other bits unchanged. 03

Q7(a) What are the purposes of CLD and STD instructions? 02

(b) What will happen when the following instructions will be executed? 03¾

i) STOSB
ii) LODSB
iii) MOVSB

(c) Write a program that prompts the user to type a hex number of four hex digits or less, and outputs it in binary on the next line. If the user enters an illegal character, he or she should be prompted to begin again. Accept only uppercase letters 06

Q8(a) Write the difference between i) MUL and IMUL instructions and ii) DIV and IDIV instructions. 02

(b) Suppose the stack segment is declared as: .STACK 3001H 03

i) What is the hex content of SP when the program begins?
ii) What is the maximum hex numbers of words that the stack may contain?

(c) Suppose AL=8CH and CF=1. What will happen of AL contents after executing each of the following instruction: 03

i) ROR AL, CL; where CL= 20
ii) SAR AL, CL; where CL=5

(d) Write an assembly language program that lets the user enter two character sting on separate lines and decides which string comes first alphabetically or if the string are identical. 03¾

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Heaven's light is our guide

Rajshahi University of Engineering & Technology

B.Sc. Engineering 3rd Year 5th Semester Examination, 2012

Department of Computer Science & Engineering

Course no: CSE 507 Course Title: Microprocessor & Assembly Language

Full marks: 70 Time: Three (03) hours

N.B. Answer six questions, taking three from each section.
The questions are of equal value.
Use separate answer script for each section.

SECTION-A

Q1. (a) How can you locate instruction by using code segment (CS) and instruction pointers (IP)? Explain briefly. 3 2/3

(b) Explain based indexed addressing mode with suitable example. 3

(c) Draw the internal architecture of 8086 microprocessor. 5

Q2 (a) What are the purposes of using PI, TF and DF flag in flag register? Why DF flag can be used for string istruction? Explain with suitable examp e. 4

(b) What will be the output of the status flags after executing the instruction:
SUB AX, BX; Where AX=FEEFH and BX=1F8EH 5

(c) What and why we use File Allocation Table (FAT)? 2 2/3

Q3 (a) What will happen when a PC is powered on? 2 2/3

(b) What is interrupt? How can a microprocessor handle internal interrupt? Write with example. 3

(c) What is interrupt vector table? Write the working principle of interrupt vector table by a microprocessor. 3

(d) Draw the block diagram of 8255A PPI. 4

Q4 (a) Describe the maximum mode pin functions of 8086 microprocessor. 4

(b) What are the differences among INTR, INTA and NMI pin function of 8088 microprocessor? 3

(c) What happens to the contents of AX after executing the following instruction: 2
MOV AX, -20
CWD

(d) Define macro? What are its uses? 2 2/3

SECTION-B

Q5. (a) Write the difference between TEST and AND instruction with suitable example. 2 2/3

(b) Why DMA operation is faster than normal microprocessor operation? Which 8086 microprocessor pins can be used for DMA operation in maximum and minimum mode? Explain briefly. 4

(c) In which case we can use XLAT instruction? 2

(d) When the stack has completely filed the stack area, SP=0. If another two words are pushed onto the stack, what would happen to SP? What might happen to the program? 3

Q6 (a) Write down two differences between DOS and BIOS routines. 2

(b) Write down the differences between RISC and CISC architecture. 2

(c) Using MOV, ADD, INC instructions translate the following high level language statement into assembly language. Here P is a word size variable. 4 2/3
P=10+5*P

(d) Explain each channel of 8257 DMA controller? 3

Q7 (a) What is advantage of using unconditioned jump instruction (JMP) over using conditional jump instructions? 2 2/3

(b) If AL contains FEh then what will be the content of AL after executing the following statement when CL contains 8 5
i) SHL AL,CL ii) SAR AL,CL

(c) Write a macro to initialize an n-word array to 1!, 2!, 3! .... n! and show how to invoke it. 4

Q8. (a) Why 8086 uses lower and upper memory bank? Describe the following cases with suitable examples: 5
i) Byte movement with odd address
ii) Byte movement with even address
iii) Word movement with odd address
iv) Word movement with even address

(b) Define machine cycle and instruction cycle. 2

(c) Draw the internal block diagram of 8087 co-processor.

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"Heaven's light is our guide"

Rajshahi University of Engineering & Technology

B.Sc. Engineering 3rd Year 5th Semester Examination, 2011

Department of Computer Science & Engineering

Course no: **CSE 507** Course Title: **Microprocessors & Assembly Language**

Full marks: 70 Time: Three (03) hours

N.B. Answer six questions, taking three from each section.
The questions are of equal value.
Use separate answer script for each section.

SECTION-A

Q1. (a) What is fetch cycle and execution cycle? A machine language instruction adds the contents of Ax to the contents of the word at address 0, what happens during those cycle? 4 2/3

(b) What is PSP? Why we need to initialize DS explicitly in our program? 3

(c) What will be the destination contents and new settings of status register after executing the following instruction: 2
ADD AL,BL; where AL = F8H, BL=E5H

(d) How many times the following loop will be executed? 2

```
MOV CX,0
TOP:
MOV AX,5
LOOP TOP
```

Q2. (a) Suppose the stack segment is declared as follows: 3

```
.STACK 300H
```

(i) What is the hex content of SP when the program begins?
(ii) What is the maximum hex number of words that the stack may contain?

(b) Suppose A is 5×7 word array stored in row major order. Write some code to (i) clear row 4 and (ii) clear column 3. Use based indexed addressing mode. 4 2/3

(c) Write assembly code instruction to: 4
(i) calculate the fractional of a given number.
(ii) reverse the bit pattern of AL and put the reserved pattern in AL.

Q3. (a) What is meant by 16-bit microprocessor? 2

(b) Explain the difference between the following instructions: 2 2/3
MOV AX, 2437H and MOV AX, [2437H]

(c) Draw and mention the function of each block of a 8255 programmed I/O chip. 4

(d) If the control word format is $(10000010)_2$ of a 8255 programmed I/O chip, mention the function of all ports and mode of selection. 3

Q4. (a) What is Direct Memory Access (DMA)? Why is DMA data transfer faster than doing the same data transfer with program instruction? 3

(b) Explain each channel of 8237 DMA controller 4

(c) Describe briefly XLAT instruction with an example. 3

(d) How does 8086 and 8087 recognize 8087 instruction? 1 2/3

SECTION-B

Q5. (a) What is File Allocation table (FAT)? 1 2/3

(b) Suppose two strings are defined as follows: 3

```
.DATA
Str1 DB 'Hello'
Str2 DB 5 DUP(?)
```

Write instructions to copy Str1 into Str2 in reverse order.

(c) Consider the array declaration: 4

```
W DB 10, 20, 30, 50, 60, ?
```

Write instructions to insert 40 between 30 and 50 (Assume DS and ES are initialized to the data segment)

(d) Write macros to initialize 3
(i) a n-word array to 1!, 2!.....n! and show how to invoke it.
(ii) a block of memory to the first N integer. Then invoke it to initialize an array to the first 100 integers.

Q6. (a) What happens when PC is powered up? 1 2/3

(b) What are the restrictions of using MOV and XCHG instructions? Explain with example. How to overcome the restriction. 3

(c) A memory location has physically address 80FD2H. In what segment does it have offset BFD2H? 3

(d) Write the instructions for the followings: 4
(i) Suppose AL and BL contain extended ASCII characters. Display the one that comes first in the character sequence.
(ii) If AL contains 1 or 3, display "0"; if AL contains 2 or 4, display "e".

Q7. (a) Which bit of 8086 flag register is used by the string instructions? How? Illustrate this by using the 8086 MOVSB instruction. 4

(b) Classify the I/O structure of a typical micro-computer. What are the differences between standard and memory mapped programmed I/O? 3 2/3

(c) What is meant by foldback in linear decoding? Interface an 8086 microprocessor to a 256KB RAM system with 64KB RAM chip using the linear decoding technique and mention the address map of each ship. 4

Q8. (a) Write an assembly language program that lets the user enter two character string on separate lines and decides which string comes first alphabetically or if the strings are identical. 4

(b) Suppose AL=8CH and CF=1. What will be the contents of AL after executing each of the following instruction: 3

(i) ROR AL,CL; where CL=20

(ii) SAR AL, CL; where CL=5

(c) Suppose AX=AF05H, BX=15FBH and SP=00FCH. What will be the contents of AX, BX, SP and status flags after executing the following instruction 2 2/3

```
PUSH BX
XCHG AX, BX
PUSH AX
POPF
POP BX
PUSH AX
```

(d) What happens to the contents of AX after executing the following instruction:

```
MOV AX, -1
CWD
```

******