NEW SCHEME

CS45

USN ☐☐☐☐☐☐☐☐☐☐

Fourth Semester B.E. Degree Examination, July/August 2004

CS/IS

Introduction to Microprocessors

Time: 3 hrs.]

[Max.Marks : 100

Note: 1. Answer any FIVE full Questions.
2. All questions carry equal marks.

1. (a) What is the reason for multiplexing address and data lines in 8085 /8086 processors of intel ?
   With a circuit diagram, explain how the multiplexed address/data signals can be demultiplexed to provide separate address and data signals.   (10 Marks)

   (b) In respect of 8085 or 8086 processors, state any two states signals and any two control signals. Explain how these signals may be used in the processor system.   (10 Marks)

2. (a) What is the use of the following signals of Intel 8086 processor ?
   i) $MN/\overline{MX}$
   ii) RESET
   iii) $\overline{LOCK}$
   iv) QS_0, QS_1
   v) $\overline{TEST}$ (10 Marks)

   (b) What signals are activated when an I/O port at address ABCD Hex is read by an 8086 ?
   Indicate the action using the timing diagram for these signals.   (10 Marks)

3. (a) Consider the following pair of partial programs each with four instructions marked 1,2,3, & 4 :
   i) 1) MOV AX, 4000H
       2) ADD AX, AX
       3) ADC AX, AX
       4) JZ DOWN
   ii) 1) MOV AX, 4000H
       2) ADD AX, AX
       3) RCL AX, 1
       4) JZ DOWN

   Assume the instructions 1, 2, 3, and 4 are executed in sequence by an 8086. For each of the cases i) and ii), what will be the data in AX after executing instruction 3 and from where will the instruction be fetched after executing instruction 4 ?   (10 Marks)

   (b) What are MACRO's ?
   Consider an 8 - digit BCD number stored as ASCII (for example, 4 - digit BCD number 8421 will be stored as 31, 32, 34, 38 in the little endian form used by Intel) in memory locations starting at [DS : SI]. It is required to convert this number into packed 8-digit BCD to be stored at 4 byte locations starting at [ES : DI] in the little - endian Intel format. (for example the decimal number 8421 to be stored as 21, 84). Write a MACRO called ASCII to BCD to do the job.   (10 Marks)

4. (a) Explain clearly with an example of their use the assembler directives : PUBLIC and EXTERNAL. **(10 Marks)**

(b) Write a non-recursive ALP subroutine of 8086, to evaluate the number F_n given by the recursive relation :

$F_n = F_{n-1} + F_{n-2}$. for any given $n > 1$, starting from the definition; $F_0 = 0$ and $F_1 = 1$. Consider the number n to be such that F_n is not more than a 16 bit unsigned integer. **(10 Marks)**

5. (a) State the various flags of 8086. With examples, explain the use of the flags I,D, and AC of 8086. **(10 Marks)**

(b) Consider the two instructions below :
i) CALL FAR [0000 : 000 4H]
ii) INT 01
Even though both of them cause a jump to the same subroutine, namely, interrupt 1 service routine, there are differences while leaving the main program and coming back to the main program. What are the differences ? What should be done to eliminate these differences? **(10 Marks)**

6. (a) Explain clearly, the process of reading a WORD from an odd address in an 8086 system, bringing out the necessity of performing two memory read operations in this case, as compared to reading a WORD from an even address which requires only one memory read operation. **(10 Marks)**

(b) Write an 8086 MACRO to produce 25 ms of delay, without changing any of the processor registers. Consider 8086 operating on a 4MHz clock. **(10 Marks)**

7. (a) Consider an 8086 system with following memory and I/O ports :
ROM : 64 KB starting at address : FOOOOH
RAM : 64 KB starting at address : OOOOOH
IO1 : at address OOOOH
IO2 : at address : 1OOOH
IO3 : at address : 2OOOH
IO4 : at address : 3OOOH
All IO addresses are in the I/O mapped mode. Work out a memory decoder circuit, if possible using a single 74138 decoder, or else with two of 74138 decoders. **(10 Marks)**

(b) With a block diagram explain the operation of 8255 programmable I/O chip. **(10 Marks)**

8. (a) Explain clearly how high power devices can be controlled using 8086 processors. **(10 Marks)**

(b) Write short notes on :
i) Interfacing D - to A converter to 8086 processor
ii) Mod - reg-r/m byte in 8086 instructions **(5+5 Marks)**

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NEW SCHEME

CS45

USN ☐☐☐☐☐☐☐☐☐☐

Fourth Semester B.E. Degree Examination, January/February 2005
Computer Science and Information Science Engineering
Introduction to Microprocessors

Time: 3 hrs.]

[Max.Marks : 100

Note: 1. Answer any FIVE full questions.
2. 8086 code sheet may be used.

1. (a) Explain the architecture of 8085 microprocessor with a neat block diagram.
   (10 Marks)

   (b) Differentiate I/O, mapped I/O and Memory mapped I/O interfacing techniques.
   (6 Marks)

   (c) What is the need of Co-processors? Give an example.   **(4 Marks)**

2. (a) Draw the register organization of 8086 and explain typical applications of each register.   **(6 Marks)**

   (b) Discuss 8086 based system configured in Maximum mode with a neat block diagram.   **(8 Marks)**

   (c) State the function of the following signals of 8086

   i) $\overline{RQ/GT}$ ii) $\overline{LOCK}$ iii) $DT/\overline{R}$.   **(6 Marks)**

3. (a) State and explain the instruction formats of 8086.   **(6 Marks)**

   (b) What do you mean by an addressing mode? What are the different addressing modes supported by 8086? Explain any FOUR of them with an example.
   (10 Marks)

   (c) Which instruction of 8086 can be used for look up table manipulations? Justify your answer with an example.   **(4 Marks)**

4. (a) Define an Assembler Directive ? Explain the following assembler directives with an example for each

   i)   EXTRN ii) EVEN iii) GROUP   **(10 Marks)**

   (b) With suitable example, explain the following instructions by stating the addressing mode they belong to

   i) LDS ii) XLAT iii) CWD iv) SCAS   **(10 Marks)**

5. (a) Find out the machine code for the following instructions.

   i) LEA SI, [BX = 500h] ii) CALL [5000h]
   iii) NEG 50 [BP]
   iv) IN DX, AX

   (10 Marks)

   (b) Write the flow chart and the 8086 ALP to convert the BCD numbers 0 to 9 to their equivalent seven segment codes using the look-up table technique. Assume the CODELIST at the relative addresses from 0 to 9. The BCD number (CHAR) is taken in AL.   **(10 Marks)**

6. (a) What is the difference between the NEAR and FAR procedure? Explain.
                                                            (6 Marks)

(b) Describe the interrupt sequence of 8086.   (6 Marks)

(c) Write ALPs to generate the following delays, using microprocessor system that runs at 5 MHz

   i)   100 ms   ii) 2 sec   (8 Marks)

7. (a) Interface eight 8K chips of RAM and four 8K chips of EPROM with 8086. Interface the RAM bank at a segment address 0B00h and the EPROM bank at a physical address F8000h. Do not allow any fold back space.   (10 Marks)

(b) Discuss modes of operation 8255 programmable peripheral interface. (10 Marks)

8. (a) Draw and explain a typical Stepper Motor Interface. Further, write an ALP to rotate a shaft of a 4-phase stepper motor in clockwise by 5 rotations. (12 Marks)

(b) Write short notes on the following :

   i)   MACROS

   ii) Control of High Power devices using 8255   (8 Marks)

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NEW SCHEME

CS45

USN ☐☐☐☐☐☐☐☐☐☐

Fourth Semester B.E. Degree Examination, July/August 2005
Computer Science and Information Science Engineering
Introduction to Microprocessors

Time: 3 hrs.]

[Max.Marks : 100

Note: *1. Answer any FIVE full questions.*
2. All questions carry equal marks.

1. (a) Draw and explain the block-diagram of microprocessor - based system and also explain the general sequence it follows to execute the instructions. **(7 Marks)**

(b) Explain the different methods of data transfer possible between MPU and I/O. **(7 Marks)**

(c) Bringout difference between memory mapped I/O and I/O mapped I/O addressing. **(6 Marks)**

2. (a) What are differences between 8086 and 8088 processor. **(5 Marks)**

(b) Explain the function of the following instructions in 8086.

i) XLAT   ii) DAA   iii) XCHG AX, BX   iv) MOVSB. **(8 Marks)**

(c) What is bus cycle ? Draw memory-read bus cycle in minimum mode of operation of 8086. **(7 Marks)**

3. (a) Explain why memory is divided into segments in 8086 ? What are its advantages. **(5 Marks)**

(b) Explain the maximum mode of operation of 8086 with details of each pins. **(8 Marks)**

(c) Explain conditional and control flags of 8086. **(7 Marks)**

4. (a) What is addressing mode ? Explain different addressing schemes used in 8086 with examples of each. **(10 Marks)**

(b) How does main program and subroutine communicates ? Explain with an example. **(10 Marks)**

5. (a) Write an 8086 ALP to find factorial of a number using recursive algorithm. Write comments to make the program clear. **(10 Marks)**

(b) Write an 8086 ALP to convert set of BCD bytes to binary. Use main program and subroutine BCD-BIN for conversion. Write comments. **(10 Marks)**

6. (a) Bringout difference between MACRO and PROCEDURE. **(5 Marks)**

(b) Explain the sequence of operation followed after the execution of INTR interrupt. Write timing diagram. **(10 Marks)**

(c) What do you mean by interrupt priorities ? List out interrupt priorities in 8086. **(5 Marks)**

7. (a) What are the critera to be considered before interfacing memory to the processor. Interface 64KB EPROM and 64 KB RAM to 8086 operating in minimum mode.

(10 Marks)

(b) Explain the different modes of operation of 8255.   (10 Marks)

8.   Write a short notes on :

   i)   Interfacing of stepper motor through 8255   (7 Marks)

   ii)   Control of high power devices using 8255   (7 Marks)

   iii) ADC interface through 8255   (6 Marks)

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NEW SCHEME

Reg. No. ☐☐☐☐☐☐☐☐☐☐

Fourth Semester B.E. Degree Examination, January/February 2006
Computer Science and Information Science and Engineering
Introduction to Microprocessors

Time: 3 hrs.)   (Max.Marks : 100

Note: *1. Answer any FIVE full questions.*
               2. All questions carry equal marks.

1. (a) Explain the architecture of 8085 CPU with the help of a block schematic.**(10 Marks)**

   (b) Describe a scheme to demultiplex the multiplexed AD0-AD7 bus of 8085 CPU.
   (6 Marks)

   (c) Differentiate between memory mapped I/O with I/O mapped I/O. **(4 Marks)**

2. (a) What do you mean by pipelined architecture of CPU? Explain the specific function of the following 8086 registers :

   i) AL   ii) BX   iii) DX   iv) CL   **(2+8 Marks)**

   (b) Describe the minimum mode configuration system of 8086 with a block schematic.
   (10 Marks)

3. (a) Describe the different instruction formats of 8086.   **(6 Marks)**

   (b) Explain the different data related addressing modes of 8086 with an example for each. **(10 Marks)**

   (c) i) How does 8086 identifies between 8 bit and 16 bit operations?

        ii) What is lock prefix? What is its use?   **(4 Marks)**

4. (a) What are the assembler directives? Explain any six such directives used in MASM assembler for 8086 programming. **(8 Marks)**

   (b) Write an assembly language program in 8086 to count the number of positive and negative numbers present in a series of ten signed 8 bit numbers stored from address ARRAY. Store the results at locations PNOS and NNOS respectively.
   (8 Marks)

   (c) Explain briefly the instruction used to handle look up tables in 8086. **(4 Marks)**

5. (a) Write an assembly language program in 8086 to arrange the ten 8 bit numbers stored in a memory starting with address ARRAY in ascending order. **(8 Marks)**

   (b) Describe the interrupt system of 8086 in detail. **(8 Marks)**

   (c) Differentiate between a macro and a subroutine. **(4 Marks)**

6. (a) Explain how to pass parameters in MACROS with the help of an example.**(10 Marks)**

   (b) Explain how a software delay program can be written for 100 msec delay for a 8086 system connected with 10 MHz crystal. **(10 Marks)**

7. (a) Bring out the differences between a static and dynamic RAM. **(4 Marks)**

(b) Interface a set of 8 simple switches and 8 simple LEDS to 8086 using a 8255 PPI chip. The 8255 should be selected for the following addresses. Write a program to indicate the status of the switches on LED's

Port A : 0740 H, Port B: 0742H, Port C: 0744H CWR: 0746H. **(10 Marks)**

(c) Explain the Mode-0, Mode-1 and BSR modes of 8255 briefly. **(6 Marks)**

8. (a) Interface a DAC 0800 to 8086 and write a program to generate a triangular waveform. **(10 Marks)**

(b) Interface a stepper motor to 8086 using 8255. **(10 Marks)**

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CS45

USN | | | | | | | | | |

NEW SCHEME

Fourth Semester B.E. Degree Examination, July 2006
CS/IS
Introduction to Microprocessor

Time: 3 hrs.]   [Max. Marks:100

Note: *1. Answer any FIVE full questions.*
2. Comment should be included in the programs.

1 a. Differentiate between standard I/O and memory mapped I/O. **(05 Marks)**
   b. Explain with the help of a block diagram the working of 8085 microprocessor.
                                                                    (10 Marks)
   c. Detail the sequence of operations, when an external interrupts occurs.
                                                                    (05 Marks)

2 a. What are the specific functions of 8086/88 registers?
      i) AL   ii) BX   iii) CX   iv) DX   **(05 Marks)**
   b. Tabulate the differences between minimum and maximum mode of operations.
                                                                    (05 Marks)
   c. Giving the signal functions explain the pin diagram of 8086. Why there are
      two ground pins?   **(10 Marks)**

3 a. List the addressing modes of 8086 with one example each.   **(10 Marks)**
   b. Find the mistakes, if any, in the 8086 instructions and correct them.
      i) XLAI AX, BX
      ii) CMPS DI, SI
      iii) DAS AL
      iv) AAD BL
      v) LDS [DS], [CS]   **(05 Marks)**
   c. What happens when the following assembler directives are executed?
      i) ● MODEL TINY
      ii) APPLE DW 12EFA
      iii) ADD WORD PTR [DX], AX
      iv) ROSE ENDP
      v) ALIGN 2   **(05 Marks)**

4 a. Write an assembly language program to describe a valid VTU number (not
      your own) say 1ZZ05CS023 into the region, college code, year of entry,
      branch and register number. [Assume only 10 colleges in 3 regions].
                                                                    (10 Marks)
   b. Use assembler language to write the PASSWORD program. Your program
      should accept an unechoed keyboard input and output strings such as 'Correct,
      Proceed' and / or 'Wrong, Try again'.   **(10 Marks)**

5   a. Explain the following branch instructions with suitable examples:
        i) LES   ii) CALL MULT NEAR   iii) JMP FACT FAR
        iv) JNAE adder v) JCXZ adder.   **(10 Marks)**
    b. Write an assembly language program to add two 32 bit BCD numbers and
        store the result in memory.   **(10 Marks)**

6   a. Describe the interrupt structure of 8086 in detail. Does NMI have the highest
        priority?   **(10 Marks)**
    b. Differentiate between MACROS and Procedures with an example. **(05 Marks)**
    c. Generate a 2 minutes time delay from 8086 which is connected to a clock
        generator whose input is got from a 15 MHz crystal using software programs.
                                                                              (05 Marks)

7   a. An A/D converter read 20 msec level triggered start of conversion (SOC)
        pulse to function. The processor connected to this should output the digital
        value via 7 segment LED's. Give the experimental setup and necessary
        programs. [Hint: Use 8255 PI/O].   **(10 Marks)**
    b. Interface two 8K EPROMS and four 32K RAMS using suitable decoding logic
        circuits to 8086/88. Assume the required memory space and show the required
        design.   **(10 Marks)**

8   a. Interface a stepper motor to 8086 using suitable connections and programs.
        The motor should be rotated clockwise or anticlockwise using program
        control.   **(10 Marks)**
    b. Using the BSR mode of operation of 8255 PIO, turn on and off 16 LED's with
        1 sec delay, one at a time.   **(10 Marks)**

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CS45

NEW SCHEME

Fourth Semester B.E. Degree Examination, Dec. 06 / Jan. 07
CSE / ISE
Introduction to Microprocessor

Time: 3 hrs.]

[Max. Marks:100

Note: *1. Answer any FIVE full questions.*
2. Draw diagrams whenever necessary.

1 a. Draw and explain internal block diagram of 8085 microprocessor. **(08 Marks)**
   b. Differentiate between memory mapped I/O and I/O mapped I/O configuration of I/O devices.
   (06 Marks)
   c. Explain with timing diagram the opcode fetch memory read cycle for 8085 µP.
   (06 Marks)

2 a. Explain functions of general purpose register and memory pointers in 8086 µP.
   (08 Marks)
   b. Explain with block diagram the minimum mode configuration of 8086 µP. How demultiplexing of address bus is obtained?
   (08 Marks)
   c. Differentiate between 8086 and 8088 µP.
   (04 Marks)

3 a. Explain functions of following 8086 µP pins:
   i) Ready ii) Reset iii) $\overline{BHE}$ iv) DT/$\overline{R}$.
   (08 Marks)
   b. Explain instruction format for MOV instruction find out binary code for MOV AX, BX instruction.
   (08 Marks)
   c. What are assembler directives? Explain following assembler directives:
   i) dw ii) dup iii) EQV iv) ENDP.
   (04 Marks)

4 a. Explain following instructions and mention the effect on flag and pointers after execution of instructions:
   i) jc down ii) call square iii) X lat iv) DAA.
   (08 Marks)
   b. Write an ALP which uses a macro to display the message "8086 Microprocessor" on monitor when a character 'γ' is pressed.
   (06 Marks)
   c. Write one instruction for a given set of instructions
   i) PUSH AX   ii) UP:SUB CX, 01   iii) add al, bl
      PUSH BX   jnz up   jnc down
      ──   add al, 01
      POP AX   down: ──
      POP BX
   (06 Marks)

5 a. Write an ALP to sort 16 bit binary number array in ascending order by using bubble sort method.
   (08 Marks)
   b. Write a procedure to generate 5 second delay by using 8086 µP working at 10 MHz clock.
   (06 Marks)
   c. Discuss any three memory reference addressing mode of 8086 µP with an example.
   (06 Marks)

6   a.   Write an ALP which check whether the given string is palindrome or not. Display the suitable message and also store the reverse of string in memory location. Use string instructions only.   **(08 Marks)**

     b.   Explain Interrupt Vector Table of 8086 μP.   **(06 Marks)**

     c.   Discuss with example conditional and unconditional branch instructions.   **(06 Marks)**

7   a.   Interface the RAM and ROM ICS of size 64 k X 8 bits each to 8086 μP as per given memory map.

       ROM IC 1 & 2 → E0000H to FFFFFH

       RAM IC 1 & 2 → A0000H to BFFFFH

       RAM IC 3 & 4 → C0000H to DFFFFH.

       Show implementation of this memory system with decoding logic by using IC 74LS138.   **(10 Marks)**

     b.   Explain with neat diagram the internal block diagram of 8255 PPI. Find out control word for mode 0 with A as I/P and B, C as output port.   **(10 Marks)**

8   a.   Interface 4 digit seven segment display to 8086 μP by using output port of 8255 PPI. Write initialization sequence to output seven segment code to display.   **(10 Marks)**

     b.   Interface DAC to 8086 μP. Write an ALP to generate rectangular waveform by using DAC.   **(10 Marks)**

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USN ☐☐☐☐☐☐☐☐☐☐

NEW SCHEME

Fourth Semester B.E. Degree Examination, July 2007
CSE / ISE
Introduction to Microprocessor

'Time: 3 hrs.]   [Max. Marks:100

Note : *1. Answer any FIVE full questions.*
2. Draw neat diagrams whenever necessary.

1 a. Explain with help of block diagram, the working of 8085 microprocessor. **(08 Marks)**
   b. What are the functions of following 8086/88 µP registers? i) AX ii) CX iii) DX
      iv) SP.   **(08 Marks)**
   c. Differentiate between I/O mapped and I/O and memory mapped I/O.   **(10 Marks)**

2 a. Write functions of following 8086 µP signals.
      i) RESET ii) READY iii) ALE iv) DT / $\overline{R}$ **(08 Marks)**
   b. With block diagram, explain minimum mode configuration of 8086 µP.   **(06 Marks)**
   c. Draw and explain timing diagram of 8086 µP for minimum mode configuration for
      opcode fetch memory read cycle.   **(06 Marks)**

3 a. Explain the following addressing modes of 8086/88 µP with an example. **(10 Marks)**
      i) Immediate ii) Direct iii) Register Direct iv) Register relative v) Base – index.
   b. Explain execution of following 8086 instruction. What will be content of destination
      register? Also mention effect on flags and pointers after execution of instruction.
      i)   DAA if AL = 8 AH, CF = 0, AF = 0.
      ii) AND AX, OFFOH if AX = 5678, CF = 0.
      iii) DIV BH if AX = 0050H, BX = 1000H.
      iv) ROR AX, CX if AX = 0420H, CX = 0002H.
      v)   PUSH CX if CX = 4020H, SP = 00FFFH.   **(10 Marks)**

4 a. What happens when following assembler directives are executed?
      i) x dw ?   ii) ARRAY DB 10DUP(0)   iii) BCD – BIN ENDP
      iv) disp macro x. v) add AX, word ptr [BX]   **(10 Marks)**
   b. Explain the fields used in the template for the instruction 'MOVE data between
      register and register/memory'. Find the machine code for instruction MOV AX, [SI].
                                                                          (10 Marks)

5 a. Write an ALP to sort the given 16 bit unsigned binary numbers in ascending order by
      using Bubble – sort method.   **(10 Marks)**
   b. Write an ALP to read two strings of equal length through keyboard. Check whether
      the strings are equal or not. Display necessary message on monitor. Use string
      functions only. Write macro for read a character through keyboard and display
      message by using DOS functions.   **(10 Marks)**

6 a. Write an ALP to generate time delay of 1 sec. Using 8086 MP working with 10 MHz
      clock.   **(08 Marks)**

    b. Explain structure of interrupt vector table of 8086/88 µP. Explain dedicated interrupts.   **(06 Marks)**

    c. Explain the instructions to process the following flags : i) DF ii) CF iii) IF.

                                                              (06 Marks)

7   a. Interface 256 KB RAM by using 64 KB RAM chip to 8086 µP with starting address of 80000 H. Give detail memory map. Use IC 74 LS138 for decoding logic.

                                                          (10 Marks)

    b. Interface 8255 PPI to 8086 µP at address FFOO H. Write CW format for 8255 PPI. Find out CW for 8255 PPI for mode 'O' with a port as input and B, C as output ports.

                                                          (10 Marks)

8   a. Interface 8 bit DAC IC 0808 to 8086 µP by using 8255 PPI B port. Give neat interfacing diagram with decoding logic. Write an ALP to generate triangular waveform.   **(10 Marks)**

    b. Write notes on :

        i)   Control of High power devices using 8255 PPI.

        ii) Interfacing 4 digit seven segment display to 8086 µP using 8255 PPI. **(10 Marks)**

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Fourth Semester B.E. Degree Examination, Dec. 07 / Jan. 08
Introduction to Microprocessors

Time: 3 hrs.   Max. Marks:100

Note : *1. Answer any FIVE full questions.*
2. Proper comments to be included in the programs.

1 a. With proper reasons justify the need for multiplexing address and data lines in 8085/8086. With a neat figure, explain multiplexing and how demultiplexing of address and data lines are achieved. Explain with a figure generation of control signals $\overline{IORD}$, $\overline{IOWR}$, $\overline{MEMR}$, $\overline{MEMW}$. **(10 Marks)**
   b. Explain in detail with a neat figure the complete architecture of 8085. **(10 Marks)**

2 a. What are the uses of the following signals in 8086:
      i) $\overline{LOCK}$ ii) ALE iii) QS_0 and QS_1. **(06 Marks)**
   b. Differentiate between memory mapped I/O and I/O mapped I/O interfacing techniques. **(04 Marks)**
   c. Explain with a neat diagram the different blocks in the minimum mode configuration of 8086. **(10 Marks)**

3 a. Explain in detail the condition and control flags of 8086. **(04 Marks)**
   b. State and explain the instruction formats of 8086 for MOV instruction to move data between register slash memory to register / memory. **(06 Marks)**
   c. Define the concept of addressing mode. Explain with examples any four types of addressing modes. **(10 Marks)**

4 a. Explain with examples how the following instructions are executed. (Make suitable assumptions for the examples).
      i) LEA CX, [5468 H] ii) DAA iii) MUL CX iv) SHR BX, CL (CL = 2). **(08 Marks)**
   b. Bring out the differences between 8086 and 8088 microprocessor. **(04 Marks)**
   c. Define an assembler directive. Explain the following directives with examples:
      i) DUP ii) EQU iii) ASSUME iv) EXTRN. **(08 Marks)**

5 a. Write an ALP to sort five 16-bit numbers stored in an array in ascending order using bubble sort method. **(10 Marks)**
   b. Differentiate between macros and procedures with an example. **(05 Marks)**
   c. Write a program to generate a delay of 2 seconds using a microprocessor that runs on 5 MHz. **(05 Marks)**

6 a. Explain in detail the interrupt sequence of 8086. **(06 Marks)**
   b. Discuss with examples conditional and unconditional bunch instructions. **(06 Marks)**
   c. Write an ALP which checks whether a given string is a palindrome or not and display suitable messages. Use string instructions only. **(08 Marks)**

7 a. Explain with a neat diagram the internal block diagram of 8255 PPI and compute the control word for – mode Φ with port A and C as output and port B as input. **(10 Marks)**
   b. Interface four numbers of 8 k × 8 chips of RAM and four number of 8 k × 8 chips of EPROM. Starting address of RAM bank is 08000 H and EPROM bank is F4000 H. The microprocessor is 8088. Use suitable decoding logic. **(10 Marks)**

8 a. Interface a DAC to 8086 microprocessor. Write an ALP to generate a rectangular waveform using DAC. **(10 Marks)**
   b. Interface a stepper motor to 8086 using suitable connections. Write an ALP such that the motor must rotate in anticlockwise direction. **(10 Marks)**

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Fourth Semester B.E. Degree Examination, June-July 2009
Introduction to Microprocessors

Time: 3 hrs.

Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Draw and discuss the internal block diagram of 8086. **(10 Marks)**
b. How is the memory organized in 8086? What are the advantages of such a scheme?
(06 Marks)
c. Explain the flag register of 8086. **(04 Marks)**

2 a. Explain the following signals of 8086:
i) $\overline{BHE}$ ii) $AD_{15} - AD_0$ iii) $A_{19} - A_{16} (S_6 - S_3)$ iv) $\overline{S}_2 - \overline{S}_0$ **(08 Marks)**
b. Draw a timing diagram to explain the general bus operation cycle in Max mode of 8086.
(06 Marks)
c. What was the reason for developing a 8088 processor? How does it compare with 8086?
(06 Marks)

3 a. State and explain the different instruction formats available in 8086 instruction set. **(10 Marks)**
b. What is an addressing mode? Illustrate with examples, the different addressing modes supported by 8086. **(10 Marks)**

4 a. Illustrate the following instructions with examples and explain:
i) MOV & XCHG
ii) CMP & DAA
iii) SAL & SAR
iv) JNZ & JC
v) LOOP
(10 Marks)
b. Explain the following assembler directives and operators with examples:
i) DB   ii) ASSUME   iii) END   iv) EXTRN   v) PROC. **(10 Marks)**

5 a. Write an ALP to implement bubble sort in ascending order. **(10 Marks)**
b. Write an ALP to display the message "8086 programming is interesting". **(10 Marks)**

6 a. Explain the stack structure of 8086. **(08 Marks)**
b. Differentiate between:
i) External and Internal interrupts.
ii) Maskable and Non-Maskable interrupts. **(04 Marks)**
c. Describe Interrupt Response Sequence in 8086. **(08 Marks)**

7 a. What is a Macro? How is it different from a subroutine? **(08 Marks)**
b. Write a macro "SQUARE" that calculates the square of a number. **(02 Marks)**
c. Write an ALP to generate a delay of 100ms on a 8086 system that runs at 5 MHz frequency.
(10 Marks)

8 Write short notes on:
a. Differences between Memory mapped I/O and I/O mapped I/O. **(06 Marks)**
b. Different modes of operation of 8255. **(07 Marks)**
c. Interfacing stepper motor through 8255. **(07 Marks)**

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