Code No: RR320202 **Set No. 1**

III B.Tech II Semester Regular Examinations, Apr/May 2007
MICROPROCESSORS AND INTERFACING
(Common to Electrical & Electronic Engineering, Electronics & Communication Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Electronics & Control Engineering and Electronics & Telematics)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. The register contents of 8086 is given below.

   CS=5000H, DS=6000H, SS=A000H, ES=B000H, SI=2000H, DI=3000H, BP=1002H, SP=0002H, AX=0000H, BX=5200H, CX=2000H, DX=2000H

   Calculate the effective address and physical address of the following instructions.

   (a) IMUL AX, [BP+BX-8D]
   (b) SBB AL, ES:[SI+5D]
   (c) PUSH AX
   (d) AND AH, [SI+42D]
   (e) CMPSB
   (f) CMP DX, [SI]
   (g) XOR DH, [DI+8D]
   (h) DIV AX, [SI+2] [16]

2. (a) Using REPEAT - UNTIL construct, develop a sequence of 8086 instructions that reads a character string from the keyboard and after pressing the enter key the character string is to be displayed again.
   (b) What is a procedure? Give an example to declare a procedure as near? Make this procedure as PUBLIC procedure? [7+9]

3. Why do we prefer interrupt driven data transfer than programmed I/O transfer? Show the complete hardware design to resolve the multiple interrupts based on priority? [4+12]

4. Interface an 8-bit DAC to 8255 with an address map of 0100H to 0103H. The DAC provides output in the range of +5V to -5V. Write the instruction sequence for the following?

   (a) For generating a square wave with a peak to peak voltage of 2V and the frequency will be selected from memory location 'FREQ'. [6+10]
   (b) For generating a triangular wave with a maximum voltage of +4V and a minimum of -2V.

5. (a) Distinguish between synchronous and asynchronous serial data transmission techniques? Discuss the advantages and disadvantages? [8]
   (b) Draw the block diagram of combination of FAX and Data Modem? Explain each block? [4+4]

6. (a) Which interrupt type is associated with NMI? Mention its vector address?
   (b) What is the purpose of IF flag in handling the interrupts?
   (c) Which interrupt type is associated with TF flag? What is the vector address? Explain the use of this interrupt? [5+5+6]

7. It is necessary to interface 512KB SRAM and 128KB EPROM to an 8086 based system. The size of SRAM and EPROM chips is 64KB. Address of SRAM starts from 00000H and that of EPROM is from E0000H. Design the entire memory interface? Give the address map of individual chip? [16]

8. Interface two 8255's to 8051 with starting address of 0F000H? Show the hardware design? Write the instruction sequence to initialize all ports of first 8255 as output ports in mode 0 and in the second 8255 port A as input in mode 1 and other ports as input in mode 0. [16]

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Code No: RR320202 **Set No. 2**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. It is necessary to check weather the word stored in location 4000H:A000H is positive number or not? Show all possible ways of testing the above condition and store 00H if the condition is satisfied in location 3000:2002. Otherwise store 0FFH. [16]

2. (a) Develop an assembly language program to multiply two BCD numbers of 2-digits each?
   (b) Develop a PUBLIC procedure to convert 4-digit Hex to BCD number and return the value? [7+9]

3. (a) Show the circuit required to generate the upper and lower I/O strobes in minimum and maximum modes of 8086?
   (b) What is the minimum no. of bus cycles that can occur between the time an interrupt request is recognized and the first instruction in the interrupt service routine is fetched. Draw the interrupt acknowledge cycle? [7+9]

4. (a) What is BSR mode operation? How it is useful in controlling the interrupt initiated data transfer for mode 1 and 2?
   (b) Explain the transistor buffer circuit used to drive 7-segment LEDs? [8+8]

5. (a) Explain demand transfer mode and block transfer mode of 8237?
   (b) Show how 8237's are cascaded to provide more number of DRQ's and explain the operation?
   (c) Explain how memory to memory transfer is performed with 8237? [5+6+5]

6. (a) What is the address map of interrupt address vector table? Explain how a vector address is stored in this table? How many interrupts are serviced with this table?
   (b) What is the purpose of operational command words of 8259? Explain their format and the use? [6+10]

7. (a) With a neat sketch explain the function of memory array of PROM?
   (b) Draw the basic cell structure of EPROM and explain the principle of operation?
   (c) Distinguish between EPROM and E^2PROM? Mention their application areas?

[5+5+6]

8. Discuss the following signal descriptions?
   (a) ALE/PROG
   (b) $\overline{EA}/V_{PP}$
   (c) $\overline{PSEN}$
   (d) RXD
   (e) $\overline{INT_o}$ / $\overline{INT_1}$
   (f) TXD
   (g) T_0 AND T_1
   (h) $\overline{RD}$ [8x2=16]

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Code No: RR320202 **Set No. 3**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. The register contents of 8086 is given below.

   CS=4000H, DS=B000H, SS=C000H, ES=7000H, SI=2000H, DI=3000H, BP=1000H, SP=0002H, AX=0000H, BX=5200H, CX=8000H, DX=2800H

   Calculate the effective address and physical address of the following instructions.

   (a) MOV CL, [BP+BX-30D]
   (b) AND DX, ES:[SI]
   (c) PUSH BX
   (d) SUB DL, [DI]
   (e) MOVSB
   (f) CMP AX, [DI]
   (g) ADC DX, [DI+8D]
   (h) IMUL AX, [SI+2D] [16]

2. (a) Discuss various branch instruction of 8086 microprocessor, that are useful for relocation?
   (b) Using a do-while construct, develop a sequence of 8086 instructions that reads a character string from the keyboard and after pressing the enter key the character string is to be displayed again. [6+10]

3. The I/O circuitry in an 8086 based system consists of five I/O devices with one status signal for each device. Design the required hardware providing two address locations to each device, one for status and other for data. In the range 0F00H to 0FOFH. Write an instruction sequence to test the status of each device and store it. [16]

4. (a) What is BSR mode operation? How it is useful in controlling the interrupt initiated data transfer for mode 1 and 2?
   (b) Explain the transistor buffer circuit used to drive 7-segment LEDs? [8+8]

5. (a) With a neat sketch explain 8237 DMA controller and its operation? [8]
   (b) How do we connect RS-232C equipment

i. To data terminal type devices?
ii. To serial port of SDK ?86, RS-232C connection? [4+4]

6. (a) Draw the block diagram of 8259 and explain each block? Discuss the salient features of 8259?
   (b) What is the address map of interrupt address vector table? How many interrupts that this table can serve? [11+5]

7. (a) Design a memory interface in an 8088 based system with 64KB SRAM and 16KB EPROM. The SRAM starts at 00000H address and EPROM ends at FFFFFH. All the memory chips are of size 16KB. Use 74LS138 decoder.
   (b) With the help of basic cell explain SRAM and DRAM? Discuss the advantages and disadvantages of the above memories? [8+8]

8. (a) Discuss the following signal descriptions?
   i. $\overline{INT_0}/\overline{INT_1}$
   ii. TXD
   iii. T_0 AND T_1
   iv. $\overline{RD}$ [4x2=8]
   (b) Draw and discuss the formats and bit definitions of the following SFR?s in 8051 microcontroller?
   i. TMOD
   ii. PSW [2x4=8]

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Code No: RR320202 **Set No. 4**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. It is necessary to check weather the word stored in location 3000H:2000H is zero or not. Show all possible ways of testing the above condition using different addressing modes and store 0FFH if the condition is satisfied in location 3000H:2002H. Otherwise store 00H. [16]

2. (a) Explain with example how a far procedure is declared as PUBLIC? Show how an external near procedure is called in main program?
   (b) Discuss the assembler directives with examples? [6+10]

3. (a) What is the purpose of ALE, BHE, DT/$\overline{R}$ and $\overline{DEN}$ pins of 8086? Show their timing in the system bus cycle of 8086?
   (b) Discuss the system bus cycle of 8086 with a neat diagram? What is the use of wait cycles? Compare wait and idle cycles? [8+8]

4. (a) Draw the block diagram of 8255 and explain each block?
   (b) What is BSR mode operation? How it is useful in controlling the interrupt initiated data transfer for mode 1 and 2? [8+8]

5. (a) What is the difference between 20mA current loop and RS232-C standard?
   (b) Explain the necessity of RS232 to TTL interface and draw the circuit?
   (c) Draw the circuit of TTL to RS232 and explain the necessity of this interface. [6+5+5]

6. With detailed hardware and the associated algorithm, explain how a real time clock will be implemented in an 8086 based system. [16]

7. In an SDK-86 kit 64KB SRAM and 32KB EPROM is provided on system and provision for expansion of another 64KB SRAM is given. The on system SRAM address map is from 00000H to 0FFFFH and that of EPROM is from F8000H to FFFFFH. The expansion slot address map is from 80000H to 8FFFFH. The size of SRAM chip is 32KB. EPROM chip size is 16KB. Give the complete memory interface and also the address map for individual chips? [16]

8. (a) Enlist salient features of 8051 family of microcontrollers?
   (b) Explain with waveforms different modes of counter/timer in 8051? [8+8]

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