

Sl. No. of Ques. Paper : 953 G
Unique Paper Code : 251501
Name of Paper : ELHT 501 : Microprocessors and Microcontrollers
Name of Course : B.Sc. (Hons.) Electronics
Semester : V
Duration : 3 hours
Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

*Attempt five questions in all, including
Question No. 1 which is compulsory.
Use of non-programmable scientific calculator is allowed.
Control word formats for various peripherals are given at the end.*

1. (a) Explain the working of the following I/O instructions with examples:
 - (i) Fixed I/O instruction
 - (ii) Variable I/O instruction
 - (b) State whether the following instructions are correct or incorrect with reference to 8086 microprocessor. Give reasons.
 - (i) MOV DS, ES
 - (ii) ADD 1234H, AX
 - (iii) IN CL, 40H
 - (c) What would happen to OF and CF flag bits if 0001H is added to FFFFH?
 - (d) Determine the clock frequency applied to the input of an 8279 if it needs command word 1 equal to 34H to operate at 100 KHz.
 - (e) What is the difference between CALL and JMP instruction of 8086 microprocessor?3×5
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2. (a) Identify the addressing modes for the following instructions:
 - (i) MOV AX, OFFH
 - (ii) MOV DI, [SI]
 - (iii) MOV AH, [BX] [SI]+1234H
 - (iv) MOV AL, [SI]+2000H
 - (v) MOV [BX]+1234H, AL

- (vi) `ADD CX, [1234H]` 6
- (b) How many fields does the segment register contain in the protected mode? Explain these fields. For a Pentium descriptor that contains a base address of `00280000H`, a limit of `00010H`, what starting and ending locations are addressed by the descriptor for $G=0$ and $G=1$? 4
- (c) Explain the different types of unconditional jump instructions (short, near, far). Which type of jump instruction assembles for the following:
- (i) If the distance is `02A0H` bytes
- (ii) If the distance is `10000H` bytes. 5
3. (a) Differentiate between the following instructions:
- (i) `CBW & CWD`
- (ii) `MUL & IMUL`
- (iii) `AND & TEST`
- (iv) `RET & IRET.` 6
- (b) Given that the stack segment register is pointing to location `2408H`, the stack pointer register contains `000AH`, location `2408AH` contains `8934H` and location `2408CH` contains `1243H`, indicate the address of the bottom of the stack, and the address of the top of the stack. If the instruction `POP AX` followed by instruction `POP BX` are performed, calculate the new value of `SP` and the values of `AX` and `BX`. 4
- (c) Write a short sequence procedure in 8086 to exchange 100 bytes of data between memory location having offset `2000H` and `1000H` respectively. 5
4. (a) What is an interrupt? How many different types of interrupts are available in 8086 microprocessor? Illustrate the contents of an interrupt vector and explain the purpose of each part. The interrupt vector for an `INT 40H` instruction is stored at which memory locations? List the events that occur when a hardware interrupt becomes active. 6
- (b) The machine code for the 16 bit instruction `MOV DL, [DI]` is `8A15H`. What will be the machine code for the following 16 bit instructions:
- (i) `MOV [DI], DL`
- (ii) `MOV [DI+1000H], DL` 4
- (c) Describe the operations performed by each of the following instructions:
- (i) `SBB DL, [0200H]`
- (ii) `SHL DX, CL`

- (iii) **CMP AX, [SI]**
- (iv) **POPF**
- (v) **MOVSB** 5
5. (a) Describe the mode 0 and mode 1 I/O operations of 8255. If ports A, B and C of an 8255 are to be configured for mode 0 operation, where A and B ports are input ports and C is an output port, what is the control word? Write an assembly language program that will input the data at ports A and B, add these values together and output the sum at port C. Port A should have the address 60H. You may assume other port addresses. 6
- (b) Explain the block diagram of 8251A. 4
- (c) Interface 8253 with 8086 using counter 1 at a port address of 20H and control word register at 26H. Write an assembly language program to generate a square wave of period 5 ms. The 8086 and 8253 run at 6 MHz and 1.5 MHz respectively. 5
6. (a) Explain different input and output modes of 8279. Find the keyboard/display command word for the following specifications under different situations:
- (i) Encoded Scan, 2 key lockout and 8 character display with left entry
- (ii) Strobed input with decoded scan and 16 character display with right entry. 6
- (b) Briefly explain the function of the following pins of 8086:
- (i) HLDA
- (ii) \overline{DEN}
- (iii) NMI
- (iv) MN/\overline{MX} 4
- (c) Explain the following terms in relation to 8259A:
- (i) Automatic rotation
- (ii) Edge and level triggered mode
- (iii) Specific rotation
- (iv) EOI
- (v) Cascading. 5
7. (a) What is microcontroller? How is it different from a microprocessor? Mention any two applications of the microcontrollers. 6

- (b) Compare the various features of 8086 with 80486. 4
- (c) Draw layout and write a program to interface two LEDs using common cathode technique using 8255 and 8086. The two LEDs should blink alternately. Hardware design requires port address of PORT A as A8H. 5

Control Word format of 8255

IO	MODE	FOR-A	PORT A	PORT C _U	MODE B	PORT B	PORT C _L
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BSR	X	X	X	B ₂	B ₁	BO	S/R
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Control Word format of 8253

SC ₁	SC ₀	RL ₁	RL ₀	M ₂	M ₁	M ₀	BCD
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Control Word format of 8279

Keyboard/Display mode set

0	0	0	D	D	K	K	K
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Programmable Clock

0	0	1	P	P	P	P	P
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