

This question paper contains 4+2 printed pages]

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S. No. of Question Paper : 6458

Unique Paper Code : 251501

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Name of the Paper : ELHT 501 : Microprocessors and Microcontrollers

Name of the Course : B.Sc. (Hons.) Electronics, Part III

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) Identify the addressing modes for the following instructions :

3

(i) ADD[SI], CX

(ii) AAA

(iii) MOV CX, AX.

(b) Explain the function of the following pins :

3

(i) READY

(ii) RESET

(iii) ALE.

P.T.O.

- (c) For an 80286 descriptor that contains a base address of A00000H and a limit of 1000H, what starting and ending locations are addressed by this descriptor ? 3
- (d) What Interrupts type number and Interrupt vector table address is assigned to NMI. 3
- (e) How is 8255 configured if its control register contains 9BH. 3
2. (a) Explain the different data addressing modes of 8086 microprocessor with suitable examples. 5
- (b) Explain in detail the Execution Unit of 8086 microprocessor. What are the applications of registers present in Execution Unit ? 5
- (c) Differentiate between the real and protected mode memory in 80386 microprocessor. 5
3. (a) Trace the execution of the following program segment : Specify the contents of registers and stack after the execution of each instruction : 5

MOV SP, 3000H

MOV AX, 0307H

AAD

MOV BL, 09H

DIV BL

PUSH AX.

- (b) Write an 8086 assembly language program to complement the least significant byte (lower 8-bits) of flag register. 5
- (c) Write an assembly language program to find out whether a given byte is present in a string or not. If it is present store 00H in register AH else store FFH. Starting offset address of string is 0100H. 5
4. (a) Differentiate between the following instructions : 6
- (i) RET and IRET
  - (ii) Intersegment and Intrasegment CALL
  - (iii) DIV and IDIV.
- (b) Describe the events that take place during external hardware interrupt service sequence of 8086 microprocessor. 4
- (c) Implement the following operation without using MUL and DIV instructions : 5
- $$7(AX) - (BX/8) \rightarrow (AX).$$
5. (a) Design a programmable timer using 8253 and 8086. The address for counter 0 of 8253 is 0080H. The clock frequency of 8253 is 2 MHz. 7
- (i) Write instructions to generate a pulse every 50  $\mu$ s from counter 0.
  - (ii) Write instructions to generate a 1 KHz square wave from counter 1. Assume the gate of counter 1 is tied to +5V through a 10 K $\Omega$  resistor. Explain the significance of connecting the gate to +5V.

- (b) Design and explain the block diagram of 8259 PIC. 8
6. (a) Interface an 8255 with 8086 to work as an I/O port. Initialize port A as output port., port B as input port and port C as output port. Port A address should be 0740H. Write a program to sense switch position  $SW_0-SW_7$  connected at port B. The sensed pattern is to be displayed on port A, to which 8 LEDs are connected, while the port C lower ( $PC_L$ ) displays total number of ON switches out of the total eight switches. 7
- (b) Write an ALP to set up 8279 in scanned keyboard mode with encoded scan, N-Key rollover mode. Use a 16-character display in right entry format. Then clear the display RAM with zeros. Read the FIFO for key closure. If any key is closed, store its code to register CL. Then write the byte 55 to all the displays, and return to DOS. The clock input to 8279 is 2 MHz, operate it at 100 KHz. 8
7. (a) Discuss the salient features of 80386 microprocessor. 5
- (b) Explain the advantages of microcontroller. 3
- (c) Discuss the registers of 8237/8257 DMA controller. 7

**Control word format of 8255**

IO	Mode	For-A	Port A	Port $C_U$	Mode-B.	Port-B	Port $C_L$
BSR	X	X	X	$B_2$	$B_1$	$B_0$	S/R

**Control word format for 8253**

SC <sub>1</sub>	SC <sub>0</sub>	RL <sub>1</sub>	RL <sub>0</sub>	M <sub>2</sub>	M <sub>1</sub>	M <sub>0</sub>	BCD
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**Control word format of 8279****Keyboard/Display mode Set**

0	0	0	D	D	K	K	K
---	---	---	---	---	---	---	---

**Programmable Clock**

0	0	1	P	P	P	P	P
---	---	---	---	---	---	---	---

**Control word format of 8251**

S <sub>2</sub>	S <sub>1</sub>	EP	PEN	L <sub>2</sub>	L <sub>1</sub>	B <sub>2</sub>	B <sub>1</sub>
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**Control word format of 8259**ICW<sub>1</sub>

X	X	X	1	LTIM	ADI	SNGL	IC4
---	---	---	---	------	-----	------	-----

ICW<sub>2</sub>

T <sub>7</sub>	T <sub>6</sub>	T <sub>5</sub>	T <sub>4</sub>	T <sub>3</sub>	X	X	X
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ICW<sub>3</sub> (for Master)

S <sub>7</sub>	S <sub>6</sub>	S <sub>5</sub>	S <sub>4</sub>	S <sub>3</sub>	S <sub>2</sub>	S <sub>1</sub>	S <sub>0</sub>
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ICW<sub>3</sub> (Slave)

0	0	0	0	0	ID <sub>2</sub>	ID <sub>1</sub>	ID <sub>0</sub>
---	---	---	---	---	-----------------	-----------------	-----------------

ICW<sub>4</sub>

0	0	0	SFNM	BUF	M/S	AEOI	μP
---	---	---	------	-----	-----	------	----

OCW<sub>1</sub>

M <sub>7</sub>	M <sub>6</sub>	M <sub>5</sub>	M <sub>4</sub>	M <sub>3</sub>	M <sub>2</sub>	M <sub>1</sub>	M <sub>0</sub>
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OCW<sub>2</sub>

R	SL	EOI	0	0	L <sub>2</sub>	L <sub>1</sub>	L <sub>0</sub>
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OCW<sub>3</sub>

0	ESMM	SMM	0	1	P	RR	RIS
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