BITS PILANI DUBAI CAMPUS

DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI UAE

II SEM 2021-2022

Evaluation Component: Mid Sem (Closed Book)	Date/Time/Duration: 23-04-22 (9:00-10:30AM) 90 Minutes
Course No : **EEE /ECE/INSTR / CSE F241**	Course Name : **Microprocessor and Interfacing**
Maximum Marks : 60	Weightage :30**%**

Note: Answer all the questions and any missing data can be assumed suitably

Q.1	a) A particular microprocessor has 24 address lines and 24 data lines. What is its word size and the maximum memory it can address? b) How is the memory for 8086 processor segmented and what are the advantages of segmentation? Also, mention the registers related to segmentation and their functionality.	[2+4]
Q.2	a) Assume the AX and BX registers have the following data stored in them. AX = 0E84 ; BX = F087 Perform the operations, AX + BX and BX – AX and show the result. Also, mention how the flag registers are affected in each of the above cases. **b)** What are the various addressing modes supported by the 8086 processor? Identify the addressing modes relevant to each of the below instructions: I. MOV [B400H], AX II. ADD [DI], BH **III.** AND AX, [BX + DI]	[6+8]
Q.3	a) For the following instructions determine the Machine code. Assume both 16 bit mode of operation and 32 bit mode of operation. I. MOV BX,[EDI+2*ECX+10_H] II. MOV EAX,SS:[SI+4000 $_H$] b) Convert the machine instruction to assembly code. Assume instructions are in16 bit mode of operation . I. 678A19 II. 6766 8943 40	[6+6]
Q.4	a) Number of times the instruction sequence below will loop before coming out of loop is MOV AL, 00_H A1: INC AL JNZ A1 b) The following hypothetical program runs in 8086 with the machine code generated as given. For a short jump calculate the displacement generated by the assembler (Show the detail Calculation for full credit) X1: Mov AX,[1234] MC:8B06 3412 add AX, [SI] MC:0304 jnc X1 MC: 73 XX	[4+4]

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Q.5	Generate the Physical address for the following combination of Registers in 8086 Microprocessors I. DS = AB03 and BX=2F11 II. SS = FA12 and SP = 1100 III. CS = F820 and IP = 0020 a)	[3]]

Q.6	a) The following code is used to copy a block of data from a memory location loc1 to loc2 using string instructions, some instructions are missing. Insert the missing instructions and write the complete program
	
	.DATA
	LOC1 DB 12H,34H,15H,20H,22H,04H,87H,67H,88H,34H
	LOC2 DB ?
	.CODE
	MOV AX,@DATA
	MOV DS,AX
	MOV ES,AX
	LEA SI,LOC1
	MOVSB
	INT3
	
	b) Write an ALP program to check whether the given numbers in an array in the memory location 'num' is even or odd. If the number is even store 'E' in location 'status' else store 'O'.
	
	Example :
	Num db 12H,14H,23H,11H,……14H
	Status db 10 dup('O')
		[5+12]

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MOD / R/M	00	01	10	11	
				W = 0	W = 1
000	[BX] + [SI]	[BX]+[SI]+d8	[BX]+[SI]+d16	AL	AX
001	[BX] + [DI]	[BX]+[DI]+d8	[BX]+[DI]+d16	CL	CX
010	[BP] + [SI]	[BP]+[SI]+d8	[BP]+[SI]+d16	DL	DX
011	[BP] + [DI]	[BP]+[DI]+d8	[BP]+[DI]+d16	BL	BX
100	[SI]	[SI]+d8	[SI]+d16	AH	SP
101	[DI]	[DI]+d8	[DI]+d16	CH	BP
110	d16	[BP] + d8	[BP] + d16	DH	SI
111	[BX]	[BX]+d8	[BX]+d16	BH	DI

MOD / R/M	00	01	10	11	
				W = 0	W = 1
000	EAX	EAX+d8	EAX+d32	AL	EAX
001	ECX	ECX+d8	ECX+d32	CL	ECX
010	EDX	EDX+d8	EDX+d32	DL	EDX
011	EBX	EBX+d8	EBX+d32	BL	EBX
100	Scaled Index	Scaled Index +d8	Scaled Index +d32	AH	ESP
101	d32	EBP+d8	EBP+d32	CH	EBP
110	ESI	ESI+d8	ESI+d32	DH	ESI
111	EDI	EDI+d8	EDI+d32	BH	EDI

EAX/AX/AL	000
EBX/BX/BL	011
ECX/CX/CL	001
EDX/DX/DL	010
ESP/SP/AH	100
EBP/BP/CH	101
ESI/SI/DH	110
EDI/DI/BH	111

REG

Segment	Prefix Value
ES	26_H
CS	$2E_H$
SS	36_H
DS	$3E_H$
FS	64_H
GS	65_H

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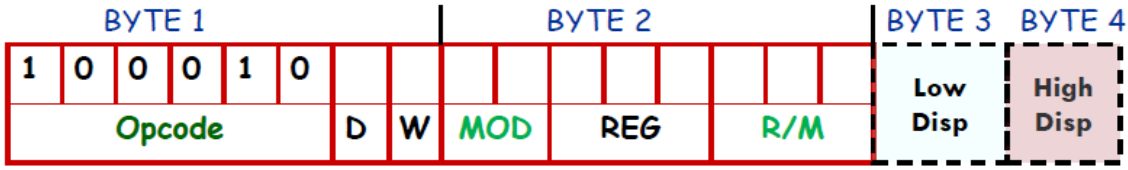

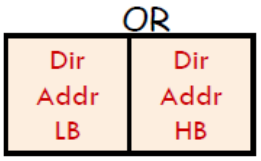

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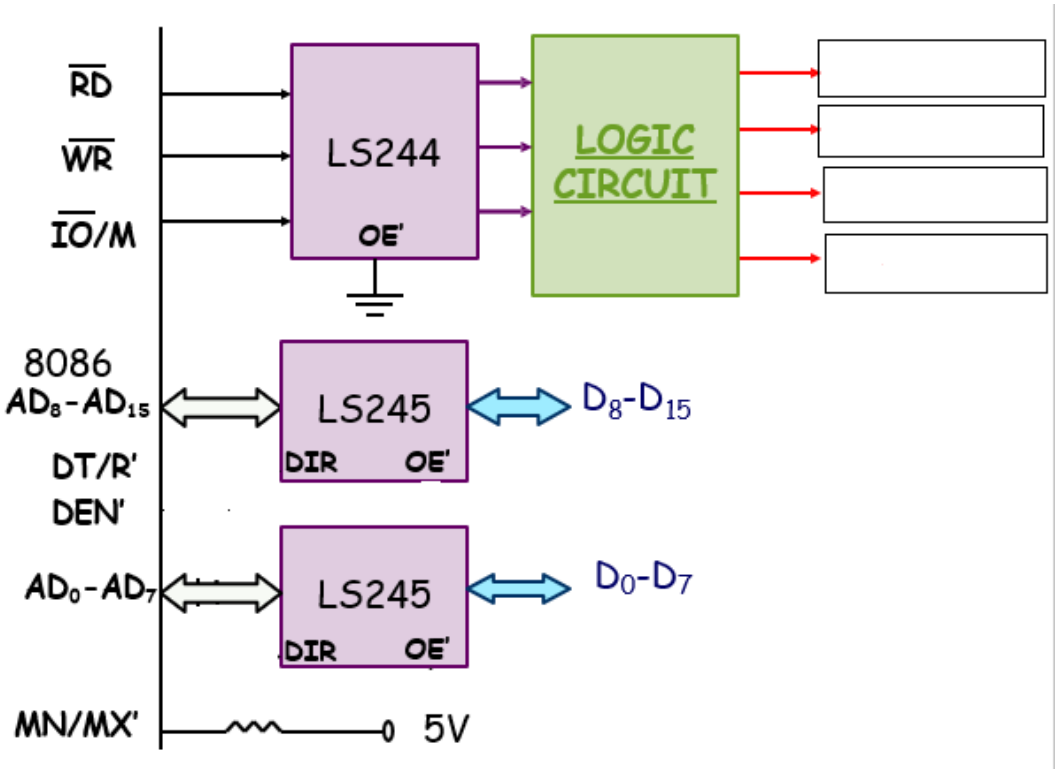
II SEM 2021-2022

Evaluation Component: QUIZ (Closed Book)	Date/Time/Duration: 25-04-22 (8:20-8:50AM) 30 Minutes
Course No : **EEE /ECE/INSTR / CSE F241**	Course Name : **Microprocessor and Interfacing**
Maximum Marks : 16	Weightage :8**%**

Note: Answer all the questions and any missing data can be assumed suitably

Q.1	Calculate the time required by the 8086 Microprocessor (running on 20MHz frequency) to execute the following instruction by clearly indicating the number of memories read and write machine cycles. MOV [1000H], BX (A30010)	2M
Q.2	Complete the missing connections in the following diagram and fill the outputs from the Logic circuit in the box provided, and answer in two words what does the following circuit do 	3M

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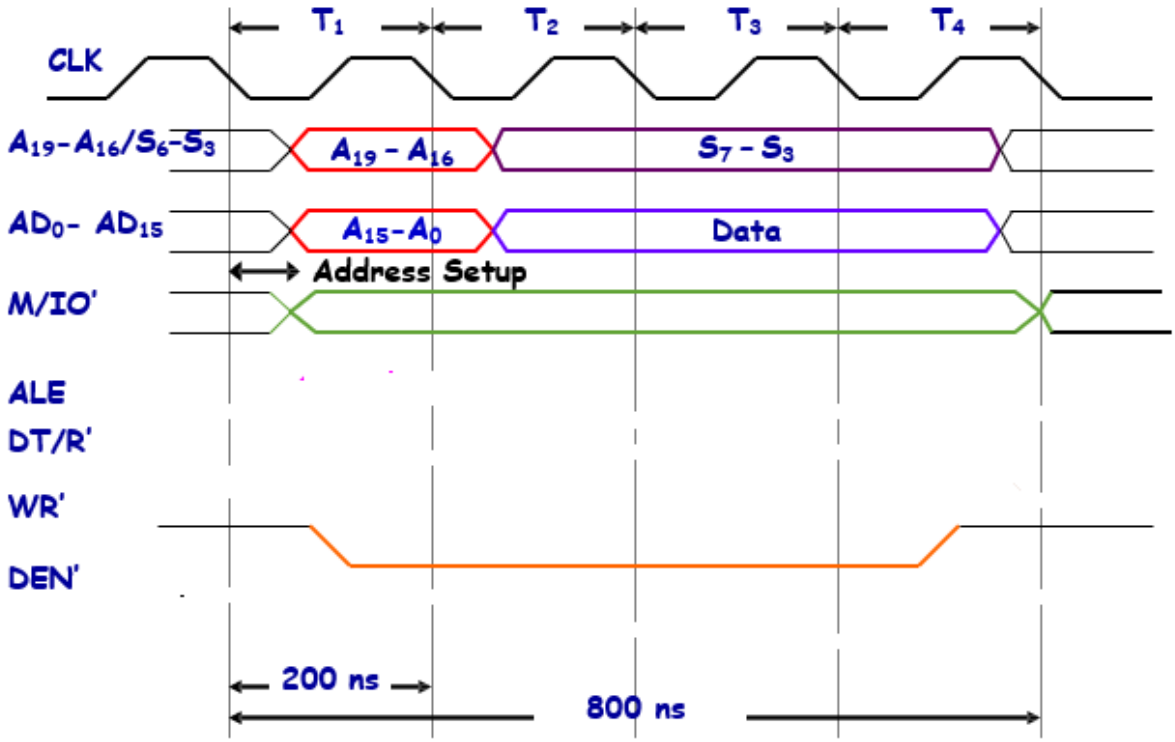
Evaluation Component: QUIZ (Closed Book)	Date/Time/Duration: 25-04-22 (8:20-8:50AM) 30 Minutes
Course No : **EEE /ECE/INSTR / CSE F241**	Course Name : **Microprocessor and Interfacing**
Maximum Marks : 16	Weightage :8**%**

Note: Answer all the questions and any missing data can be assumed suitably

Q.3	Complete the following timing diagram by drawing the missing signal levels for ALE, DT/R' and DEN'	2M
Q.4	Calculate the total number of machine cycles required by the 8086 microprocessor to execute the following Assembly codes UP: MOV AX,0023H (B82300) MOV BX,0023H (BB 2300) CMP AX, BX (3BC3) JNZ UP (75F6)	3M



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Course No : **EEE /ECE/INSTR / CSE F241**	Course Name : **Microprocessor and Interfacing**
Maximum Marks : 16	Weightage :8**%**

Note: Answer all the questions and any missing data can be assumed suitably

Q.5	. An 8088 based system have • A ROM requirement of 8KB with Chip available, one number of 2732and two number of 2716 with an end address of 23FFFH • A RAM section for address space of 51000H-523FFH with Chip available are 6116 and 6104. Write the address space of each of the chip.	3M
Q.6	Following is a memory interfaced to 8088 microprocessor, identify the size of memory both ROM and RAM and write its address space. The address lines not shown are used by the memory chip.	3M

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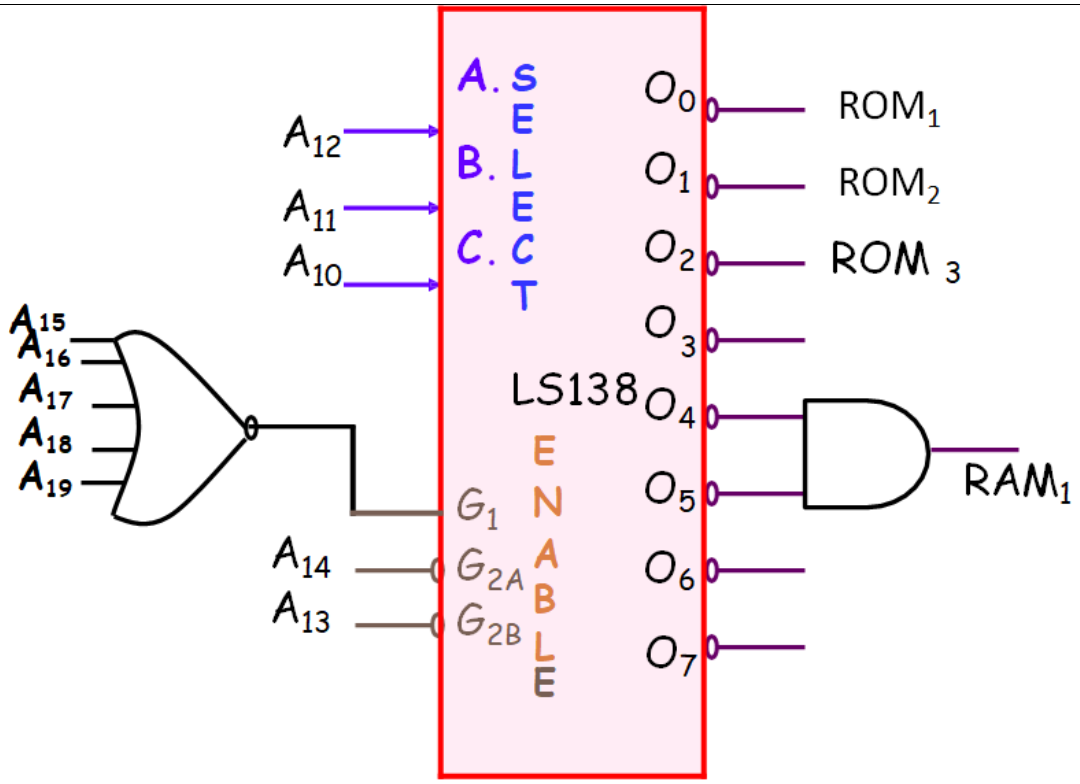
Course No : **EEE /ECE/INSTR / CSE F241**	Course Name : **Microprocessor and Interfacing**
Maximum Marks : 16	Weightage :8%

Note: Answer all the questions and any missing data can be assumed suitably



Absolute Addressing

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II SEM 2021-2022

Evaluation Component: Compre Part-C (Open Book)	Date/Time/Duration: 80 Minutes
Course No : **EEE /ECE/INSTR / CSE F241**	Course Name : **Microprocessor and Interfacing**
Maximum Marks : 40	Weightage :20%

1. Answer all questions.
2. For getting full credit, show all steps in arriving at your final answer.

Q.1	Interface eight switches to port A and a Seven Segment LED (Common Cathode) display to Port B of an 8255 Programmable Peripheral Interface Controller. The 8086-based system should take input from one of the switches and produces a binary combination for numbers between 00 to 07 to the input of port A (use a logic device between switches and Port A). For example, if SW1 out of SW0 to SW7 is closed, then port A (PA7-PA0) input will be 00000001 or if SW7 out of SW0 to SW7 is closed, then port A (PA7-PA0) input will be 00000111. The number corresponding to the switch pressed has to be displayed on the 7-Segment LED. For example, when SW2 is pressed, then the 7-segment display has to show 2 on it. Draw a complete system diagram using 8086,8255 and other required Logic elements. Write the complete program for the above-said specification. (Assume base address of 8255 as 80H)	[15]
Q.2	A temperature sensor data (8bit) is available from the Analog to Digital Converter (ADC) which is connected to the 8086 microprocessors through Port B of the 8255. The temperature data is assumed to be hexadecimal (00 to FF). The 8086-based system should sense the temperature every 1 second and check the temperature, if the temperature goes above 50H, then the seven-segment LED (Common Cathode) which is connected to Port A, should display 'H' otherwise it should display 'L'. Design a system using 8086, 8255, ADC, and required logic devices. Give the required program to implement the above system. (Assume base address of 8255 as 80H)	15M
Q.3	Design an 8086-based circuit using 8255 IC for the following requirement. You need to design an 8x3 encoder with an active low input. There are eight switches to set the input Port B) of the encoder and three LEDs as output (Port A). ***Example:*** *If SW-0 is closed and all other switches SW1 to SW7 are open, then LED-0=OFF, LED-1= OFF, and LED-2=OFF. If SW-3 is closed, and all other switches are open, then LED-0=ON, LED-1= ON and LED-2=OFF, and so on Draw* the block level circuit diagram and write the 8086-snippet code for the same. (Assume base address of 8255 as 50H)	10M

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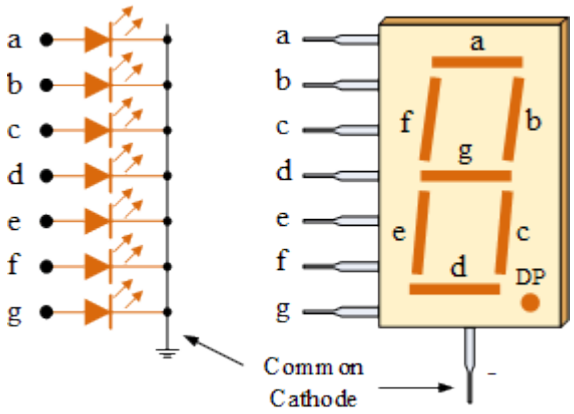
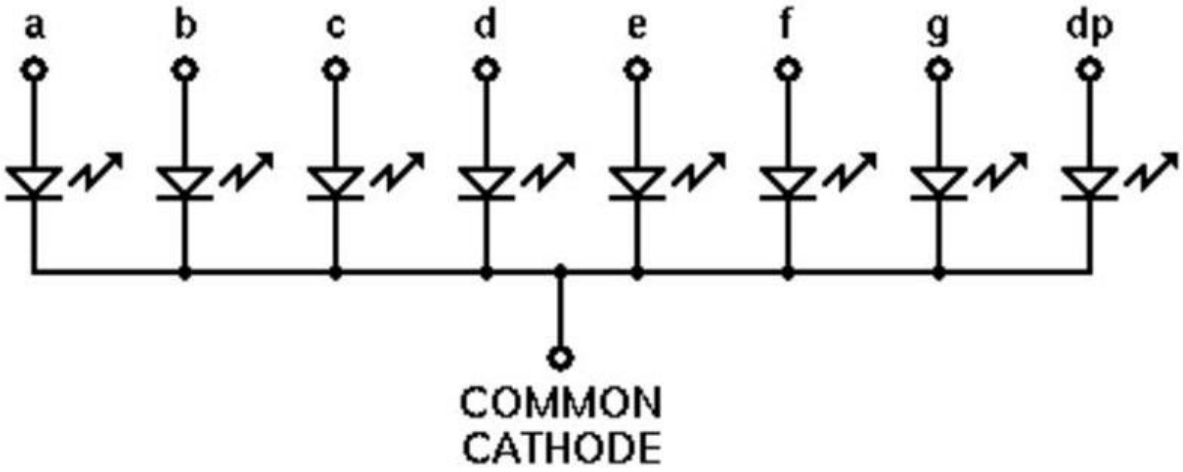
Evaluation Component: Compre Part-C (Open Book)	Date/Time/Duration: 80 Minutes
Course No : **EEE /ECE/INSTR / CSE F241**	Course Name : **Microprocessor and Interfacing**
Maximum Marks : 40	Weightage :20%

1. Answer all questions.
2. For getting full credit, show all steps in arriving at your final answer.

7-Segment LED Details (Common Cathode)





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Evaluation Component: Compre Part-B (Closed Book)	Date/Time/Duration: 45 Minutes
Course No : **EEE /ECE/INSTR / CSE F241**	Course Name : **Microprocessor and Interfacing**
Maximum Marks : 20	Weightage :10%

1. Answer all questions.
2. For getting full credit, show all steps in arriving at your final answer.

Q.1	Design a memory interface system for 8088 based microprocessor consisting of • A ROM requirement of 16KB with Chip available, two number of 2732and required number of 2716 with an end address of A3FFFH • A RAM section for address space of 30000H-33FFFH with Chip to be used are 6132 and 6164. • And LS 183. Design the memory interfacing circuit using absolute addressing.	[8]
Q.2	8086-based system is having a memory requirement of 320K. Out of this 128K of ROM and rest is RAM. The mapping is as follows RAM with starting address 00000H ROM with starting address A0000H Chips available: 61256, 27128, LS138. Design the memory interfacing circuit. Use absolute addressing.	[10]
Q.3	Write the address space of each of the Chips in an 80286 processor, which has 512K of memory requirements. Out of this 320K is ROM with a starting address of 040000H and rest are RAM with a final address of 0DFFFFH. Chips available: 27256. 61256.	[2]

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Evaluation Component: Compre Part-A (Closed Book)	Date/Time/Duration: 45 Minutes
Course No : **EEE /ECE/INSTR / CSE F241**	Course Name : **Microprocessor and Interfacing**
Maximum Marks : 20	Weightage :10%

1. Answer all questions.
2. For getting full credit, show all steps in arriving at your final answer.

Q.1	a) Explain the process involved when a Microprocessor executes an instruction. b) Explain how the instructions might look like when a multiplication operation (of two numbers) is carried out in CISC and RISC processors.	[2+3]
Q.2	a) A microprocessor has 24 address lines. What is the maximum size of the memory it can address? Write down it's memory address space. b) In order to generate a physical memory address of 2F0FF, which registers are used and what should be their content?	[2+2]
Q.3	Identify the addressing mode in the following instruction: MOV AX, [BX] Assuming BX has a value 2342H and DS has a value 2000H and assuming the data stored in the memory locations pointed to by these registers to be 74H and 82H, find the value in the register AX after the execution of the above instruction.	[1+2]

Q4	Consider the following code snippet where signed arithmetic operation is being performed.
	MOV CL, 73H
	MOV BL, 4FH
	ADD CL, BL
	Do the following:
	a) What is the result of the above operation and where is it stored?
	b) What is the decimal equivalent of the above binary value?
	c) How are the flag bits affected as a result of the above operation?
		[5]

Q5	What is the difference between a latch and a buffer. How are they used in a 8086-based microprocessor system.	[3]