INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	**MICROPROCESSORS AND MICROCONTROLLERS**
Course Code	:	**AEC013**
Class	:	B. Tech VI Semester
Branch	:	ECE
Regulation	:	R16
Year	:	2019 – 2020
Course Coordinator	:	Mr. V R Seshagiri Rao, Associate Professor
Course Faculty	:	Mr. D KhalandarBasha, Assistant Professor Mr. B Naresh, Assistant Professor

COURSE OBJECTIVES:

	The course should enable the students to:
I	Imbibe sound knowledge about architecture, instruction set and concepts of 8086 and 8051.
II	Demonstrate the ability to develop programmes for different applications using assembly language of 8086 and 8051.
III	Impart knowledge of different types of external peripherals like 8255, 8259,8279,8251,8257.
IV	Be proficient in Memory and I/O interfacing with 8086 and 8051.

COURSE OUTCOMES (COs):

CO 1	Acquire knowledge about architecture and functional features of microprocessors particularly 8086.
CO 2	Obtain an insight in to the instruction set of 8086 and write programs in assembly level language.
CO 3	Interface different types of external peripherals like 8255, 8259, 8279, 8251 &8257 with 8086.
CO 4	Imbibe knowledge about hardware details of 8051 microcontrollers and develop assembly language programs for data transfer, arithmetic, logical and branch instructions.
CO 5	Design simple systems using timers, interrupts, memories ADC and DACs etc. using 8051.

COURSE LEARNING OUTCOMES (CLOs):

Students, who complete the course, will have demonstrated the ability to do the following:

CLO Code	At the end of the course, the student will have the ability to:
AEC013.01	Understand the internal Architecture and different modes of operation of popular 8086 microprocessors.
AEC013.02	Basic understanding of 8085 and 8086 microprocessors architectures and its functionalities.
AEC013.03	An ability to distinguish between RISC and CISC based microprocessors.
AEC013.04	Understand the importance of addressing modes and the instruction set of the processor which is used for programming.
AEC013.05	Understand and apply the fundamentals of assembly level programming of microprocessors.
AEC013.06	Design and develop 8086 Microprocessor based systems for real time applications using low level language like ALP.
AEC013.07	Understand the memory organization and interrupts of processors helps in various system designing aspects.
AEC013.08	Identify the significance of interrupts and interrupt service routines with appropriate illustrations.
AEC013.09	Ability to interface the external peripherals and I/O devices and program the 8086 microprocessor using 8255.
AEC013.10	Identify the significance of serial communication in8086 with required baud rate.
AEC013.11	An ability to distinguish between the serial and parallel data transfer schemes.
AEC013.12	Develop the interfacing of universal synchronous asynchronous receiver transmitter 8251 with 8086 processor
AEC013.13	Ability to interface the programmable interrupt controller 8259 with 8086.
AEC013.14	Understand the internal Architecture and different modes of operation of popular 8051 microcontrollers.
AEC013.15	Basic understanding of 8051 microcontrollers functionalities.
AEC013.16	Understand the different addressing modes used in assembly language programming of microcontrollers.
AEC013.17	Write programs for arithmetic and logical computations using 8051 instruction sets.
AEC013.18	Construct, and develop of required delay circuits using timers of 8051 in the laboratory.
AEC013.19	Interfacing of physical elements using Digital and analog converters with microcontrollers.
AEC013.20	Assess and interface required memory to microcontrollers with appropriate memory mapping.

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
UNIT-I **8086 MICROPROCESSORS**			
PART-A(Short Answer Questions)			
1	State the details of power supply & clock frequency of 8086.	Remember	CO 1	AEC013.01
2	Elucidate the subroutine program in the programming of Microprocessors	Remember	CO 1	AEC013.01
3	State how pipe lining is it achieved in 8086.	Remember	CO 1	AEC013.01
4	Summarize the format of the flag register of 8086.	Understand	CO 1	AEC013.01
5	Compare between stack pointer and program counter?	Understand	CO 1	AEC013.01
6	List out features of 8086 microprocessor.	Remember	CO 1	AEC013.01
7	State the functional units of 8086 microprocessor architecture	Remember	CO 1	AEC013.02
8	Summarize the advantages of memory segmentation in 8086?	Understand	CO 1	AEC013.02
9	State the maximum memory size that can be addressed by 8086?	Understand	CO 1	AEC013.01
10	Elucidate SEGMENT & ENDS directives with one example.	Understand	CO 1	AEC013.02
11	Summarize the following addressing modes with example: i) Register ii) Register indirect	Understand	CO 1	AEC013.01
12	Elucidate with an example why and how a 20-bit address is generated in 8086.	Understand	CO 1	AEC013.01
13	Compare with examples the following assembler directives i) DB ii) DW iii) DQ iv) DT.	Understand	CO 1	AEC013.02
14	Examine the execution of PUSH instruction with respect to stack addressing mode.	Understand	CO 1	AEC013.02
15	Examine the execution of POP instruction with respect to stack addressing mode.	Understand	CO 1	AEC013.02
16	Enlist the different pointers in 8086 and their significance.	Understand	CO 1	AEC013.01
17	List out general purpose registers in 8086 .	Understand	CO 1	AEC013.01
18	State the details of any two machine control instructions.	Understand	CO 1	AEC013.02

19	Infer how many times the following loop will be executed
	      MOV CX, 05H
	LABEL1: MOV AX,BX
	      ADD AX,BX
	      INC CX
	      LOOP LABEL1
		Understand	CO 1	AEC013.02

20	Identify the invalid instruction and justify (a) MOV AX, SI (b) MOV [AX], SI (b) MOV [AX], [SI] (d) MOV AX, [SI]	Understand	CO 1	AEC013.02

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
	PART-B(Long Answer Questions)			
1	Describe minimum mode operations of 8086 and draw timing diagram for read operation.	Understand	CO 1	AEC013.01
2	Describe minimum mode operations of 8086 and draw timing diagram for write operation.	Understand	CO 1	AEC013.01
3	Elucidate the architecture of 8086 microprocessor with the help of neat diagram.	Understand	CO 1	AEC013.02

4	Enumerate the functions of the following pins.
	  i) TEST
	  ii) Hold
	  iii) QS0 & QS1
	  iv) S3, S4
		Understand	CO 1	AEC013.02

5	Examine the significance of instruction byte queue in 8086 microprocessor.	Understand	CO 1	AEC013.01

6	Illustrate the following Arithmetic instructions of 8086 microprocessor with details.
	  i) AAA
	  ii) IMUL
	  iii) DIV
	  iv) CWD
		Understand	CO 1	AEC013.01

7	Illustrate the following Arithmetic instructions of 8086 microprocessor with details.
	  i) IN
	  ii) LDS
	  iii) XCHG
	  iv) LEA
		Understand	CO 1	AEC013.03

8	Elucidate the following logical instructions of 8086 microprocessor with examples.
	  i) RCR
	  ii) TEST
	  iii) AND
	  iv) SAR
		Understand	CO 1	AEC013.03

9	Compare the following string instructions used in 8086 microprocessor with examples.
	  i) MOVSB
	  ii) SCASB
	  iii) REP
		Understand	CO 1	AEC013.03

10	Infer the purpose of flag register in 8086 and the different bits of flag register in 8086	Understand	CO 1	AEC013.01
11	Highlight the LEA instruction of 8086 with respect to MOV instruction with suitable example?	Understand	CO 1	AEC013.02

12	Elucidate the following string instructions used in 8086 microprocessor with examples.
	  i) CALL
	  ii) IRET
	  iii) INT
		Understand	CO 1	AEC013.01

13	Enumerate the structure of physical memory organization of 8086 with neat diagram.	Understand	CO 1	AEC013.03
14	Describe the register organization of 8086 processor in detail.	Understand	CO 1	AEC013.01
15	Narrate about maximum mode operations of 8086 and draw timing diagram for memory read operation.	Understand	CO 1	AEC013.01

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
16	Express the details of the following instructions used in 8086 microprocessor with examples. i) JC ii) JNZ iii) JP iv) JNS v) JO	Understand	CO 1	AEC013.02
17	Narrate about maximum mode operations of 8086 and draw timing diagram for memory write operation.	Understand	CO 1	AEC013.02
18	List out Flag manipulation instructions of 8086 microprocessor.	Understand	CO 1	AEC013.02
19	Express the details of the following addressing modes with examples: i) Direct addressing mode ii) Relative base indexed addressing mode	Understand	CO 1	AEC013.02
20	Analyze the following instructions with examples i) XLAT ii) OUT iii) LES iv) XCHG	Understand	CO 1	AEC013.02
	PART-C(Analytical Questions)			
1	Calculate the Physical address of the following instructions. i) SBB AL, ES:[DI + 5A] ii) IMUL AX, [SI + BX − 8C] iii) PUSH AX iv) AND AH, [SI + 42] v)CMP DX, [SI]. Assume CS = 5000H, DS = 8000H, SS = A000H, ES = B000H, SI= 2000H, DI = 6000H, BP = 1002H, SP = 0002H, AX = 0000H, BX = 5200H, CX = 2000H.	Understand	CO 1	AEC013.01
2	Calculate the physical address is represented by i) 4370:561EH ii) 7A32:0028H	Understand	CO 1	AEC013.01
3	Evaluate the physical address of the top of the stack? If the stack segment register contains 3000H and the stack pointer register contains 8434H.	Understand	CO 1	AEC013.01
4	Obtain the memory address of the next instruction executed by the microprocessor, when operated in the real mode, for the following CS:IP combinations: i) CS = 1000H and IP = 2000H ii) CS= 2000H and IP=1000H	Understand	CO 1	AEC013.01
5	Enumerate the function of the following signals. a) NMI b) $\overline{LOCK}$ c) HLDA d) ALE	Understand	CO 1	AEC013.01
6	Examine the function of the following signals. a) $\overline{BHE}$ b) $\overline{READY}$ c) MN/$\overline{MX}$	Understand	CO 1	AEC013.01

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
	d) DT/R			
7	Illustrate with details the following addressing modes : i) Indexed addressing mode ii) Based index addressing mode iii) Intra Segment and Intra segment addressing modes	Understand	CO 1	AEC013.01
8	Examine the following instructions used in 8086 microprocessor with examples. i) DAS ii) DAA iii) SHL iv) ROL	Understand	CO 1	AEC013.04
9	Compare the following instructions used in 8086 microprocessor with examples. i) SBB ii) DEC iii) INC iv) CMP	Understand	CO 1	AEC013.04
10	Describe the operation carried out when the fallowing instructions are executed by 8086. i) MOV [SI],AX ii) MOV [BX],CX iii) XLAT iv) MUL BL v) DIV BL	Understand	CO 1	AEC013.01
UNIT-II PROGRAMMING WITH 8086 MICROPROCESSOR				
PART-A(Short Answer Questions)				
1	Elucidate Machine level language.	Remember	CO 2	AEC013.05
2	Compare Machine level language and assembly level language.	Remember	CO 2	AEC013.05
3	Summarize Assembly language program format in 8086 microprocessor.	Remember	CO 2	AEC013.05
4	Calculate is the storage space required to store the interrupt vectors of 8086.	Understand	CO 2	AEC013.08
5	Elucidate interrupt service routine (ISR).	Understand	CO 2	AEC013.08
6	List out the various hardware interrupts in 8086 microprocessor.	Understand	CO 2	AEC013.08
7	Compare the following interrupts. i) NMI ii) INTR	Understand	CO 2	AEC013.08
8	Compare maskable and non maskable interrupts.	Understand	CO 2	AEC013.08
9	Summarize the various internal interrupts in 8086	Understand	CO 2	AEC013.08
10	State address in the interrupt vector table for Type-2 interrupt in 8086	Understand	CO 2	AEC013.08
11	Summarize the significance of an assembler in 8086.	Remember	CO 2	AEC013.05

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
12	Explore how to retrieve data from stack memory of 8086 microprocessor.	Remember	CO 2	AEC013.06
13	List out many interrupts are associated with 8086 microprocessor?	Remember	CO 2	AEC013.07
14	State the instructions to initialize the segment address 2000 to CS register	Understand	CO 2	AEC013.05
15	Examine how to load immediate data into data segment register in 8086 microprocessor.	Understand	CO 2	AEC013.07
16	Express the significance of trap flag in 8086 microprocessor.	Understand	CO 2	AEC013.07
17	State the address for INT 04 in 8086.	Remember	CO 2	AEC013.08
18	List out the types of hardware interrupts in 8086.	Remember	CO 2	AEC013.07
19	Summarize the functioning of INTR pin in 8086.	Remember	CO 2	AEC013.07
20	Narrate the functioning of trap interrupt in 8086.	Remember	CO 2	AEC013.07
PART-B(Long Answer Questions)				
1	Enumerate the interrupt structure of 8086 microprocessor.	Understand	CO 2	AEC013.07
2	Develop ALP's to divide 16 bit data with 8 bit data and32 bit data with 16 bit data.	Understand	CO 2	AEC013.05
3	Describe the stack structure of 8086 microprocessor with PUSH and POP instructions	Understand	CO 2	AEC013.07
4	Examine in detail interrupt handling process in 8086 microprocessor.	Understand	CO 2	AEC013.08
5	Narrate the interrupt cycle of 8086 microprocessor.	Remember	CO 2	AEC013.08
6	Demonstrate with assembly language program in 8086 for searching the largest element in an array.	Understand	CO 2	AEC013.08
7	Highlight the 8086 Interrupt types with interrupt vector table.	Understand	CO 2	AEC013.08
8	Develop an 8086 assembly language program to multiply two 16-bit numbers to give 32-bit result.	Understand	CO 2	AEC013.06
9	Develop an assembly language program to sort the given values in ascending order.	Remember	CO 2	AEC013.06
10	Demonstrate with assembly language program in 8086 for searching the smallest element in an array.	Remember	CO 2	AEC013.05
11	Enumerate the ALP to find average of two numbers.	Remember	CO 2	AEC013.05
12	Develop an ALP to compare two strings using string instructions.	Remember	CO 2	AEC013.06
13	Demonstrate with ALP for searching a string element in a given string using string instructions.	Remember	CO 2	AEC013.06
14	Enumerate the ALP to find average of two numbers.	Understand	CO 2	AEC013.05
15	Develop the ALP to compare two strings using string instructions.	Understand	CO 2	AEC013.05
16	Demonstrate with ALP for performing logical operations in 8086.	Understand	CO 2	AEC013.05

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
17	Enumerate the ALP to perform 2's complement in 8086.	Understand	CO 2	AEC013.05
18	Develop the ALP to rotate a 16 bit number in 8086.	Understand	CO 2	AEC013.05
19	Demonstrate with ALP for performing multi byte addition in 8086.	Understand	CO 2	AEC013.05
20	Enumerate the ALP to reverse an 8 bit number in 8086.	Understand	CO 2	AEC013.05
	PART-C(Analytical Questions)			
1	Enumerate the assembly language program to sort the given values in ascending order.	Remember	CO 2	AEC013.06
2	Develop assembly language program to display 'IARE MPMC LAB' on the screen.	Understand	CO 2	AEC013.06
3	Demonstrate with an assembly language program to convert a given sixteen bit binary number to its gray equivalent	Remember	CO 2	AEC013.06
4	Enumerate the assembly language program to find factorial of a given number.	Remember	CO 2	AEC013.06
5	Develop assembly language program to find out the largest number from an unordered array of sixteen 8-bit numbers stored sequentially in the memory locations starting at offset 5000H in the segment E000h.	Understand	CO 2	AEC013.06
6	Demonstrate with an assembly language program to insert a byte into the given array.	Remember	CO 2	AEC013.06
7	Enumerate the assembly language program to convert ASCII to BCD.	Understand	CO 2	AEC013.06
8	Develop assembly language program to perform average of n 8 bit numbers in 8086.	Understand	CO 2	AEC013.06
9	Demonstrate with an assembly language program to convert unpacked BCD to ASCII.	Understand	CO 2	AEC013.05
10	Enumerate the assembly language program to find sum of squares.	Understand	CO 2	AEC013.06
UNIT-III **INTERFACING WITH 8086/8088**				
PART-A(Short Answer Questions)				
1	List out the features of the 8255 PPI (Programmable Peripheral Interface).	Remember	CO 3	AEC013.09
2	State how many I/O modes of operations present in 8255 Programmable Peripheral Interface.	Remember	CO 3	AEC013.09
3	List out the applications of stepper motor.	Remember	CO 3	AEC013.09
4	Elucidate the need for Analog to Digital Converter.	Understand	CO 3	AEC013.09
5	Elucidate the need for Digital to Analog Converter.	Remember	CO 3	AEC013.09
6	Summarize bit set or reset (BSR) mode in 8255?	Understand	CO 3	AEC013.09
7	State the use of Port-C signals in 8255?	Understand	CO 3	AEC013.09

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
8	Specify the purpose of 8255 in the interfacing with external devices?	Understand	CO 3	AEC013.09
9	State the bit of a control word for the 8255, which compares between the I/O mode and the BSR mode?	Understand	CO 3	AEC013.09
10	List the different types of modes in I/O mode of 8255.	Understand	CO 3	AEC013.09
<td colspan="5" align="center">**CIE- II**</td>
1	Elucidate the need of 8259 PIC (Programmable Interrupt Controller)?	Remember	CO 3	AEC013.13
2	Specify the format of ICW1 in 8259 PIC.	Understand	CO 3	AEC013.13
3	Categorize the types of communications.	Remember	CO 3	AEC013.10
4	Compare the terms USART and UART.	Remember	CO 3	AEC013.10
5	Elucidate the use of 8251 (Universal Synchronous Asynchronous Receiver Transmitter) chip.	Understand	CO 3	AEC013.11
6	List out the important features of 8251(Universal Synchronous Asynchronous Receiver Transmitter).	Remember	CO 3	AEC013.10
7	Compare between serial communication and parallel communication.	Remember	CO 3	AEC013.11
8	Elucidate the need of DMA Controller.	Remember	CO 3	AEC013.09
9	Specify the frame format of mode word of 8251.	Understand	CO 3	AEC013.10
10	State the significance of 8279.	Remember	CO 3	AEC013.09
<td colspan="5" align="center">**PART-B(Long Answer Questions)**</td>
1	Enumerate the pin diagram of 8255 Programmable Peripheral Interface.	Remember	CO 3	AEC013.09
2	Describe the control word format of 8255 Programmable Peripheral Interface in I/O & BSR mode.	Understand	CO 3	AEC013.09
3	Specify control word of 8255 for BSR mode and explain in detail.	Understand	CO 3	AEC013.09
4	Appraise mode 2 operation of Programmable Peripheral Interface.	Understand	CO 3	AEC013.09
5	Contrast the different modes of operation of Programmable Peripheral Interface.	Understand	CO 3	AEC013.09
6	Describe the interfacing diagram of 8255 with 8086 microprocessor.	Understand	CO 3	AEC013.09
7	Describe the architecture of 8255 Programmable Peripheral Interface and explain.	Understand	CO 3	AEC013.09
8	Enumerate the control word format of 8255 in I/O and BSR mode.	Understand	CO 3	AEC013.09
9	Examine the mode 0 operation of 8255 Programmable Peripheral Interface	Understand	CO 3	AEC013.09
10	Examine the mode 1 operation of 8255 Programmable Peripheral Interface	Understand	CO 3	AEC013.09

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
	CIE- II			
1	Enumerate the internal architecture of 8259 Programmable Interrupt Controller with a neat block diagram.	Understand	CO 3	AEC013.13
2	Describe various features of 8279 controller with neat block diagram	Understand	CO 3	AEC013.09
3	List out the operating modes of 8259A and narrate each operation.	Understand	CO 3	AEC013.13
4	Analyze the different types of command words used in 8259?	Remember	CO 3	AEC013.13
5	Construct the internal block diagram of 8251 USART and explain about each block in detail.	Remember	CO 3	AEC013.10
6	Enumerate the pin diagram of 8251-Universal Synchronous Asynchronous Receiver Transmitter.	Understand	CO 3	AEC013.10
7	Describe how to interface a DMA controller with a microprocessor? Narrate how DMA controller transfers large amount of data from one memory locations to another memory locations	Remember	CO 3	AEC013.09
8	State about DMA? Descibe the DMA based data transfer using 8257 DMA controller.	Understand	CO 3	AEC013.09
9	Enumerate the internal architecture of 8257 Direct Memory Access Controller	Remember	CO 3	AEC013.09
10	Describe how 8251 is used for serial data communication	Remember	CO 3	AEC013.10
	PART-C(Analytical Questions)			
1	Enumerate the assembly language Program to generate the ramp wave using DAC.	Remember	CO 3	AEC013.09
2	Develop an assembly language program to convert analog to digital using 8086.	Understand	CO 3	AEC013.09
3	Demonstrate with an assembly language program to interface stepper motor with 8086 and rotate in anti-clock wise direction.	Remember	CO 3	AEC013.09
4	Enumerate the assembly language Program to generate the saw tooth wave form.	Remember	CO 3	AEC013.09
5	Explain how stepper motor is interfaced with 8086 and write an ALP to rotate the motor in clock wise direction.	Understand	CO 3	AEC013.09
6	Demonstrate with an assembly language Program to generate the triangular wave form.	Remember	CO 3	AEC013.09
7	Enumerate the operation of stepper motor with neat circuit diagram, also discuss interfacing of stepper motor with 8086.	Remember	CO 3	AEC013.09
8	Design an interface between 8086 microprocessor and two chips of 8K X 8 EPROM and two chips of 8K X 8 RAM. Select the starting address of EPROM is F0000H and RAM address starts at 30000H.	Understand	CO 3	AEC013.09
9	Interface two 4K X 8 EPROMS and two 4K X 8 RAM chips with 8086 microprocessor.	Understand	CO 3	AEC013.09
10	Design an interface between 8086 microprocessor and two chips of 16K X 8 EPROM and two chips of 32K X 8 RAM. Select the starting address of EPROM suitably. The RAM address must start at 00000H.	Understand	CO 3	AEC013.09

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
	CIE- II			
1	Enumerate about signal descriptions of 8259.	Remember	CO 3	AEC013.13
2	Describe the functional types used in control words of 8251	Remember	CO 3	AEC013.10
3	Explore the transmission and reception of serial data using 8251 indicating the functions of various registers in it.	Remember	CO 3	AEC013.10
4	Narrate about signal descriptions of 8257.	Remember	CO 3	AEC013.09
5	Show 8259A interfacing connections with 8086 at the address 074x. Develop an ALP to initialize the 8259A in single level triggered mode, with call address interval of 4, non-buffered, no special fully nested mode. Then set the 8259A to operate with IR6 masked, IR4 as bottom priority level, with special EOI mode, set special mask mode of 8259A. Read IRR and ISR into registers BH and BL respectively. IR0 of 8259 will have type 80H.	Understand	CO 3	AEC013.13
6	Analyse initialization sequence of 8259 with flow chart.	Remember	CO 3	AEC013.13
7	Appraise about ICW's and OCW's of 8259 for different modes.	Remember	CO 3	AEC013.13
8	Demonstrate the interfacing 8279 keyboard controller with neat block diagram.	Remember	CO 3	AEC013.09
9	Narrate the interrupt sequence in 8086 microprocessors.	Remember	CO 3	AEC013.13
10	Design the hardware interface circuit for interfacing 8251 with 8086. Set the 8251A in asynchronous mode as a transmitter and receiver with even parity enabled, 2 stop bits, 8-bit character length, frequency 160kHz and baud rate 10k. Write an ALP to transmit 100 bytes of data string starting at location 2000:5000H.	Understand	CO 3	AEC013.12
	UNIT-IV **8051 MICROCONTROLLER**			
	PART-A(Short Answer Questions)			
1	Compare between microprocessor and microcontroller.	Understand	CO 4	AEC013.14
2	State the significance of EA line of 8051 microcontroller?	Remember	CO 4	AEC013.14
3	Compare between MOVX and MOV.	Remember	CO 4	AEC013.14
4	State the size of the on-chip program memory and on-chip data memory of 8051 microcontroller	Remember	CO 4	AEC013.14
5	Highlight the advantages of using a microcontroller in place of a microprocessor.	Remember	CO 4	AEC013.14
6	Express the function of DPTR in 8051 microcontroller.	Remember	CO 4	AEC013.14
7	List the applications of 8051 microcontroller.	Remember	CO 4	AEC013.14

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
8	List out the addressing modes supported by 8051?	Remember	CO 4	AEC013.14
9	Describe the functions of ALE and PSEN signals of 8051 microcontroller.	Understand	CO 4	AEC013.14
10	Elucidate XTAL1 and XTAL2 in 8051 microcontroller.	Understand	CO 4	AEC013.14
11	Enlist register banks in 8051 microcontroller.	Remember	CO 4	AEC013.14
12	Illustrate example instructions for direct addressing mode of 8051 microcontroller.	Understand	CO 4	AEC013.16
13	Elucidate indexed addressing mode for 8051.	Remember	CO 4	AEC013.16
14	List out any four alternate functions of port 3 of 8051 microcontroller.	Remember	CO 4	AEC013.16
15	List out addressing modes are supported by 8051 to copy the Data transfer with example.	Remember	CO 4	AEC013.16
16	State the contents of registers with MOVX, @R1.	Understand	CO 4	AEC013.14
17	Express the ports used to address external memory in 8051?	Remember	CO 4	AEC013.14
18	List out different addressing modes in 8051 micro controller.	Remember	CO 4	AEC013.16
19	Elucidate the direct addressing mode with example.	Understand	CO 4	AEC013.16
20	State about execution of instruction DIV in 8051 micro controller.	Understand	CO 4	AEC013.17
PART-B(Long Answer Questions)				
1	Describe the register set of 8051 Microcontroller with examples	Understand	CO 4	AEC013.14
2	Narrate internal architecture of 8051 microcontroller in detail with neat diagram.	Understand	CO 4	AEC013.14
3	Enumerate the addressing modes of 8051 micro-controller with examples	Understand	CO 4	AEC013.16
4	Explore the methods how to access external memory devices in an 8051 based system.	Understand	CO 4	AEC013.14
5	Analyze the operation of I/O ports in 8051 with neat sketch.	Understand	CO 4	AEC013.14
6	Construct the functional diagram of 8051 Microcontroller and explain the Input /Output lines in detail	Understand	CO 4	AEC013.14
7	Enlist the features of 8051 microcontroller and compare it with 8086 microprocessor.	Understand	CO 4	AEC013.14
8	Analyze the features of Special Function Registers of 8051 microcontroller	Understand	CO 4	AEC013.14
9	Develope an ALP for positive and negative numbers in given array in 8051 microcontroller.	Understand	CO 4	AEC013.18
10	Express the PSW register format in 8051 and give example instructions which effect the respective flags.	Remember	CO 4	AEC013.18

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
11	Enumerate the internal and external data memory organization of 8051	Remember	CO 4	AEC013.15
12	Compare between AJMP, LJMP and SJMP instructions of 8051 microcontroller.	Understand	CO 4	AEC013.16
13	List out the various 16 bit registers of 8051 and their operation with examples	Understand	CO 4	AEC013.14
14	Develop an ALP for even and odd numbers in given array in 8051 microcontroller.	Understand	CO 4	AEC013.14
15	Illustrate various conditional instructions of 8051 micro controller and their effect on flags.	Understand	CO 4	AEC013.16
16	Examine the various instructions to transfer data from external and internal memory in 8051 microcontroller.	Remember	CO 4	AEC013.16
17	Illustrate various unconditional jump instructions of 8051 micro controller.	Understand	CO 4	AEC013.16
18	Enumerate how logical operations can be carried out in 8051 microcontroller and their effect on flags.	Understand	CO 4	AEC013.16
19	Narrate how stack operations can be done in 8051 microcontroller.	Remember	CO 4	AEC013.17
20	Develop ALP for 16 bit addition in 8051 microcontroller and show the PSW.	Understand	CO 4	AEC013.17
PART-C(Analytical Questions)				
1	Enumerate 8051 program to convert packed BCD number available in accumulator, into two ASCII numbers and save them in internal RAM locations 48H and 4 9 H .	Understand	CO 4	AEC013.16
2	Develop 8051 program to move a array of data between two external memory blocks.	Understand	CO 4	AEC013.16
3	Demonstrate the use of PUSH instruction to put the number 82H in RAM locations 34H to 37H. Also list out the same program without PUSH instruction in 8051.	Understand	CO 4	AEC013.16
4	Design a program in 8051 to count number of zero bits available in a byte available in external RAM at 1000h. Store zero bit count in internal RAM location 60H.	Understand	CO 4	AEC013.16
5	Enumerate an ALP for largest number in given array using 8051 microcontroller.	Understand	CO 4	AEC013.20
6	Develop a program to find the average of five 8 bit numbers. Store the result in 55H in 8051 microcontroller.	Understand	CO 4	AEC013.17
7	Write an ALP for smallest number in given array using 8051 microcontroller.	Understand	CO 4	AEC013.17
8	Enumerate a program to generate a delay of 1 millisecond without using timers in 8051 microcontroller.	Understand	CO 4	AEC013.17
9	Ten bytes are stored in external data memory starting at 5000h. Develop a program to transfer this block data to memory locations with starting address 6000h	Understand	CO 4	AEC013.17
10	Develop assembly language program to toggle 8 bits of port1 with delay of 100ms in 8051 microcontroller.	Understand	CO 4	AEC013.17

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome

UNIT-V **SYSTEM DESIGN USING MICROCONTROLLER**				
PART-A(Short Answer Questions)				
1	Elucidate the PCON register in 8051 microcontroller.	Understand	CO 5	AEC013.15
2	State the control word format for Programmable timer in 8051.	Understand	CO 5	AEC013.15
3	Classify the types of communication with examples in 8051.	Understand	CO 5	AEC013.15
4	Compare between timers and counters in 8051.	Understand	CO 5	AEC013.18
5	State which register is used for serial programming in 8051.	Understand	CO 5	AEC013.16
6	State the format of Timer control register (TCON) 8051 microcontroller.	Understand	CO 5	AEC013.18
7	List out the external interrupts of 8051 microcontroller.	Remember	CO 5	AEC013.18
8	Elucidate the Interrupt Priority register format of 8051.	Remember	CO 5	AEC013.18
9	Summarize the function of the Timer mode (TMOD) register in 8051.	Remember	CO 5	AEC013.15
10	Compare between interrupt vectors and interrupt service routine.	Understand	CO 5	AEC013.18
11	List out relevant port bits assigned for external interrupts in 8051.	Understand	CO 5	AEC013.18
12	Elucidate the Timer mode register (TMOD) format in 8051.	Remember	CO 5	AEC013.18
13	Elucidate the Interrupt Enable register format of 8051	Remember	CO 5	AEC013.19
14	List out the interrupt vector addresses for external interrupts in 8051.	Remember	CO 5	AEC013.19
15	State the three internal interrupts of 8051 microcontroller.	Remember	CO 5	AEC013.19
16	List out the interrupt vector address for timer interrupts in 8051.	Remember	CO 5	AEC013.19
17	State how many clock pulses exist in one machine cycle of 8051.	Understand	CO 5	AEC013.19
18	List out the Vector address for serial communication Interrupts in 8051.	Remember	CO 5	AEC013.19
19	Calculate the minimum and maximum counts in Timer mode 1 of 8051 microcontroller.	Understand	CO 5	AEC013.18
20	Elucidate is the gap between the interrupts vectors in 8051 microcontrollers.	Remember	CO 5	AEC013.19
PART-B(Long Answer Questions)				
1	Demonstrate with a neat diagram to interface a stepper motor with 8051 microcontroller and explain.	Understand	CO 5	AEC013.20

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
2	Enumerate how to interface an LCD display with microcontroller.	Understand	CO 5	AEC013.20
3	Explore the interrupt management of 8051 microcontroller.	Understand	CO 5	AEC013.18
4	Describe about serial communication details of 8051 microcontroller.	Understand	CO 5	AEC013.20
5	Narrate mode 2 of serial communication in 8051 microcontroller.	Understand	CO 5	AEC013.20
6	Compare timer & counter? Analyze the 16-bit timer mode and 8-bit auto-reload mode of 8051 microcontroller.	Understand	CO 5	AEC013.18
7	Explore TCON & PCON operation with an example in 8051.	Understand	CO 5	AEC013.18
8	Demonstrate interfacing of 8051 microcontroller with an ADC with schematic.	Understand	CO 5	AEC013.20
9	Narrate mode 1 of timer operation with it's applications.	Understand	CO 5	AEC013.18
10	Describe mode 1 of serial communication in 8051 microcontroller	Understand	CO 5	AEC013.18
11	Enumerate about mode 3 of timer operation with their applications.	Understand	CO 5	AEC013.18
12	Narrate the details of various Special function register used for interrupt operation in 8051.	Understand	CO 5	AEC013.19
13	Describe mode 0 of serial communication in 8051 microcontroller.	Understand	CO 5	AEC013.19
14	Explore how communication at variable baud rates can be done in 8051 microcontroller.	Understand	CO 5	AEC013.18
15	Analyze key bouncing and how keyboard is interfaced with 8051 microcontroller.	Understand	CO 5	AEC013.20
16	Demonstrate how a digital to analog converter is interfaced with 8051 microcontroller with schematic.	Understand	CO 5	AEC013.20
17	Narrate the details of various Special function register used for timer operation in 8051.	Remember	CO 5	AEC013.18
18	Describe how interrupts are handled in 8051 micro controller with details corresponding SFR's.	Remember	CO 5	AEC013.19
19	Enumerate the details of various Special function register used for serial communication in 8051.	Remember	CO 5	AEC013.19
20	Examine how different baud rates can be provided for serial communication in 8051.	Understand	CO 5	AEC013.19
PART-C(Analytical Questions)				
1	Enumerate a program to make the stepper motor to rotate both clockwise directions in 8051 microcontroller.	Remember	CO 5	AEC013.20
2	Design the circuit diagram to interface a keyboard with microcontroller and explain how microcontroller recognizes the key-press.	Remember	CO 5	AEC013.20
3	Develop a program to make the stepper motor to rotate both anti clockwise directions in 8051 microcontroller.	Remember	CO 5	AEC013.20
4	Enumerate an ALP to generate triangular waveform forms using 8051 microcontroller.	Understand	CO 5	AEC013.20
5	Program the on-chip timer in 8051 to be an event counter. Use model and display the binary count on P1. Set the initial count to be Zero.	Understand	CO 5	AEC013.20

S. No	QUESTION	Blooms Taxonomy Level	Course Outcome	Course Learning Outcome
6	Interface DAC 08 and write ALP to generate square wave using 8051.	Understand	CO 5	AEC013.18
7	Develop an ALP to generate saw tooth wave forms using 8051 microcontroller.	Understand	CO 5	AEC013.19
8	Enumerate a program to generate 2 kHz square wave form at port 1.0 of 8051.	Understand	CO 5	AEC013.20
9	Demonstrate how to transfer the message " LBRCE" serially at 4800 baud rate in mode 1(8 bit UART) in 8051.	Understand	CO 5	AEC013.18
10	Develop a program to generate 4kHz square wave form at port 1.0 of 8051.	Understand	CO 5	AEC013.18

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