



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

INFORMATION TECHNOLOGY

TUTORIAL QUESTION BANK

Course Title	MICROPROCESSORS AND INTERFACING				
Course Code	AECB55				
Programme	B.Tech				
Semester	FIVE				
Course Type	Open Elective-1				
Regulation	IARE - R18				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	3	-	3	-	-
Course Faculty	Ms. B Lakshmi Prasanna, Assistant Professor				

COURSE OBJECTIVES:

The students will try to learn:	
I	The architecture and operation of microprocessors and microcontrollers.
II	The programming and interfacing of Intel microprocessors, microcontrollers to design processor and controller based circuits.
III	The applications of microprocessors and microcontrollers in the field of Communications, Electronic measurement, control systems, Consumer electronics industry and other real-time systems.

COURSE OUTCOMES:

After successful completion of the course, Students will be able to

Course Outcomes		Knowledge Level (Bloom's Taxonomy)
CO 1	Outline the internal architecture of 8085, 8086 and 8051 microcomputers to study the functionality.	Understand
CO 2	Illustrate the organization of registers and memory in 8086 for programming and memory allocation within processor.	Understand
CO 3	Explain various addressing modes and instruction set of target microprocessor and microcontroller useful for writing assembly language programs.	Understand
CO 4	Distinguish between minimum mode and maximum mode operation of 8086 microprocessor with timing diagrams.	Analyze
CO 5	Interpret the functionality of various types of interrupts and their structure for controlling the processor or controller and program execution flow.	Understand

CO 6	Demonstrate the internal architecture and various modes of operation of the devices used for interfacing memory and I/O devices with microprocessor.	Understand
CO 7	Choose an appropriate data transfer scheme and hardware to perform serial data transfer among the devices.	Apply
CO 8	Outline the salient features of 80286, 80386 and RISC processors in relation to basic 8086 microprocessor.	Understand
CO 9	Illustrate the paging operation and segmentation of advanced microprocessors for memory management.	Understand
CO 10	Interpret the internal building blocks and registers of 8051 microcontroller used to perform serial data transfer, timer operation, interfacing of memory and I/O devices.	Understand
CO 11	Build necessary hardware and software interface using microcomputer based systems to provide solution for real world problems.	Apply

MAPPING OF EACH CO WITH PO(s), PSO(s):

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO 1	2															
CO 2	3															
CO 3	3															
CO 4	2															
CO 5	3															
CO 6	3	5	5										1			
CO 7	3	5	6										1			
CO 8	2															
CO 9	3															
CO 10	3	6	6										1			
CO 11	3	6	6										1			

TUTORIAL QUESTION BANK

MODULE-1				
INTRODUCTION TO 8 BIT AND 16 BIT MICROPROCESSOR				
PART - A (SHORT ANSWER QUESTIONS)				
S.No	Question	Blooms taxonomy level	How does this Subsume the levels?	Course Outcomes
1.	Define Microprocessor and specify the power, clock requirements of 8085 microprocessor.	Remember	---	CO 1
2.	List the applications of microprocessor-based system.	Understand	The learner to have the knowledge of engineering to Understand the areas of microprocessor applications.	CO 1
3.	Compare the features of 8085 & 8086 microprocessor.	Understand	The learner to Remember the features of 8085 and 8086 microprocessors and compare them by Understanding the features.	CO 1
4.	Outline the flag register format of 8086.	Remember	The learner to Recall the ALU operations and Remember the flag register format of 8086 microprocessor.	CO 2
5.	List the branch instructions in 8086.	Remember	---	CO 3
6.	How does stack pointer and program counter function?	Understand	The learner to Recall the execution process of microprocessor and Understand the function of each register.	CO 1
7.	List all the features of 8086 microprocessor.	Remember	---	CO 1
8.	List the functional units of 8086 microprocessor.	Remember	---	CO 1
9.	List two conditional jump instructions with an example.	Remember	---	CO 3
10.	What is the function of an accumulator?	Understand	The learner to Recall the register organization of microprocessor and Understand the function of each block	CO 1
11.	List all the advantages of memory segmentation in 8086?	Understand	The learner to Recall the concept of memory mapping to Understand the advantage of memory segmentation in microprocessor	CO 1
12.	Why 8086 internal architecture is divided into BIU & EU?	Understand	The learner to Recall concept of pipelining process and Understand why to implement it in 8086 Architecture	CO 1
13.	What is the function of BIU?	Understand	The learner to understand the physical address calculations of microprocessor by BIU.	CO 1
14.	Define procedures and macros.	Remember	---	CO 3
15.	List different hardware interrupts of 8086.	Remember	---	CO 3
16.	What are different types of addressing modes of 8086?	Remember	---	CO 3

17.	Define Instruction format of microprocessor.	Remember	---	CO 3
18.	What is SEGMENT & ENDS	Remember	---	CO 3
19.	Define assembler?	Remember	---	CO 3
20.	Find the maximum memory size that can be addressed by 8086?	Understand	The learner to Recall the features of microprocessor and Understand how to calculate the memory size	CO 1
PART - B (LONG ANSWER QUESTIONS)				
1.	Explain about the following instructions. a. MOVS/MOVS/MOVSW b. CMPS/CMPSB/CMPSW c. REP/REPE/REPZ/REPNE d. LODS/LODSB/LODSW	Understand	The learner to Rec all Instruction format , Remember the layout of bits of an instruction and Understand the function of each Instruction for assembly language programming	CO 1
2.	Distinguish between procedures and macros.	Understand	The learner to Remember the instructions set of microprocessor and Understand how to execute single and set of instructions at a time.	CO 3
3.	Illustrate about the various addressing modes of 8086 with examples.	Understand	The learner to Remember different addressing modes, Understand the way of accessing operands for assembly language programming	CO 3
4.	Demonstrate about the internal blocks of 8086 by drawing the block diagram.	Understand	The learner to Recall the concept of microprocessor based system, understands the function of each block, and then explains how to execute an instructions.	CO 1
5.	Explain the function of following instructions of 8086. a. ADC b. AAS c. IMUL d. CBW	Understand	The learner to Recall Instruction format , Remember the layout of bits of an instruction and Understand the function of each Instruction for assembly language programming	CO 3
6.	Explain about the following instructions. i. WAIT ii. HLT iii. ESC iv. NOP	Understand	The learner to Recall Instruction format , Remember the layout of bits of an instruction and Understand the function of each Instruction for assembly language programming	CO 3
7.	List all the Arithmetic instructions of 8086 microprocessor and explain with the help of examples.	Understand	The learner to Recall Instruction format , Remember the layout of bits of an instruction and Understand the function of each Instruction for assembly language programming	CO 3
8.	Distinguish between procedures and macros used in 8086 microprocessor with examples.	Understand	The learner to Recall the instructions set of microprocessor and Understand how to execute single instruction and set of instructions at a time during programming	CO 3
9.	Illustrate various data transfer instructions of 8086 microprocessor with examples.	Understand	The learner to Recall Instruction format , Remember the layout of bits of an instruction and Understand the function of each Instruction for assembly language programming	CO 3

10.	List all bit manipulation instructions of 8086 microprocessor and explain with examples.	Understand	The learner to Recall Instruction format , Remember the layout of bits of an instruction and Understand the function of each Instruction for assembly language programming	CO 3
11.	Determine various string instructions used in 8086 microprocessor with examples.	Understand	The learner to Recall Instruction format , Remember the layout of bits of an instruction and Understand the function of each Instruction for assembly language programming	CO 3
12.	List out the assembler directives of 8086 microprocessor and explain them with examples.	Understand	The learner to Recall the function of assembler and Understand how the assembler supports directives to define data, to organize segments, to control procedure, to define macros in assembly language programming	CO 3
13.	Demonstrate about the memory segmentation and instruction Queue of 8086.	Understand	The learner to Recall the concept of memory mapping for explaining the advantage of memory segmentation and Understand the overlapping of instruction execution which increases the processing speed	CO 1
14.	Explain about the control and conditional flags of 8086.	Understand	The learner to Recall the ALU operations and Understand the excitation of bits in flag registers of 8086 microprocessor.	CO 2
15.	Demonstrate about BIU and EU by drawing the block diagram of 8086.	Understand	The learner to Recall pipelining process and understand the physical address calculation, decoding and execution of instructions in microprocessor.	CO 1
16.	What is the importance of assembler directives in 8086 and explain them briefly?	Understand	The learner to Recall the function of assembler and Understand how the assembler supports directives to define data, to organize segments, to control procedure, to define macros in assembly language programming	CO 3
17.	Explain about segments registers in 8086	Understand	The learner to Remember the architecture and register organization, understand about segment registers which stores the starting address of a data	CO 2
19.	Distinguish between jump and loop instructions used in 8086 microprocessor.	Understand	The learner to Understand how to execute a set of instructions repeatedly and how to skip certain number of instructions.	CO 3
20.	Find minimum number of segment registers that are necessary to provide segmentation?	Understand	The learner to Recall the concept of segmentation and Understand about memory management mechanism	CO 3
21.	Explain the register organization of 8086 and write the purpose of each register.	Understand	The learner to Understand the architecture and register organization of microprocessor and Explain about different registers that holds data, starting address, offset address.	CO 2
PART - C (ANALYTICAL QUESTIONS)				
1.	Develop an assembly language program to sort the values in	Apply	The learner to Understand the concepts of Instruction Set, addressing modes, assembler directives and write	CO 3

	ascending and descending order.		the algorithm with an example and then apply it develop the assembly language program	
2.	Find the physical address for the given data i. 4370:561EH ii. 7A32:0028H	Apply	The learner to Recall the concept of memory mapping, Understand segmentation mechanism and Apply it to Calculate the physical address using segment address and offset address.	CO 1
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.	Apply	The learner to Recall the concept of memory mapping, Understand segmentation mechanism and Apply it to Calculate the physical address using segment address and offset address.	CO 1
4.	Estimate the memory address of the next instruction executed by the microprocessor, when operated in the real mode, for the following CS:IP combinations: a. CS=1000H and IP=2000H b. CS=2000H and IP=1000H	Apply	The learner to Recall the concept of memory mapping, Understand segmentation mechanism and Apply it to Calculate the physical address using segment address and offset address.	CO 1
5.	Develop an assembly language program to reverse the given string "1, 2, 3, 4,5, 6".	Apply	The learner to Understand the concepts of Instruction Set, addressing modes, assembler directives and write the algorithm with an example and then apply it develop the assembly language program	CO 3
6.	Write an assembly language program to move a block a data from one memory location to another memory location?	Apply	The learner to Understand the concepts of Instruction Set, addressing modes, assembler directives and write the algorithm with an example and then apply it develop the assembly language program	CO 3
7.	Develop an assembly language program to delete a byte in a string?	Apply	The learner to Understand the concepts of Instruction Set, addressing modes, assembler directives and write the algorithm with an example and then apply it develop the assembly language program	CO 3
8.	Explain in detail about Flag manipulation instructions of 8086 microprocessor with example.	Understand	The learner to Recall Instruction format , Remember the layout of bits of an instruction and Understand the function of each Instruction for assembly language programming	CO 3
9.	Develop an assembly language program to find sum of squares.	Apply	The learner to Understand the concepts of Instruction Set, addressing modes, assembler directives and write the algorithm with an example and then apply it develops the assembly language program.	CO 3
10.	Explain about the operation carried out when the fallowing instructions are executed by 8086. i. MOV [SI],AX ii. MOV [BX],CX iii. XLAT	Understand	The learner to Recall Instruction format , Remember the layout of bits of an instruction and Understand the function of each Instruction for assembly language programming	CO 3

	iv. MUL,BL v. DIV,BL			
MODULE-II				
OPERATION OF 8086 AND INTERRUPTS				
Part – A (Short Answer Questions)				
1.	List the operating modes of 8086 microprocessor.	Remember	---	CO 4
2.	What are the minimum mode signals of 8086 microprocessor.	Remember	---	CO 4
3.	List the maximum mode signals of 8086 microprocessor.	Remember	---	CO 4
4.	What are different hardware interrupts in 8086?	Remember	---	CO 5
5.	What is the function of ALE, BHE/S7,DEN , DT/R Pins in 8086 microprocessor.	Understand	The learner to Remember the pin configuration of 8086 microprocessor and Understand the function of signals	CO 4
6.	How following pins in 8086 microprocessor function. i. READY, ii. MN/MX, iii. HOLD and iv. HLDA	Understand	The learner to Remember the pin configuration of 8086 microprocessor ,and Understand the function of signals	CO 4
7.	Define interrupt vector table.	Remember	---	CO 5
8.	Define interrupt service routine.	Remember	---	CO 5
9.	Distinguish between maskable and non-mask able interrupts?	Understand	The learner to Remember the concept of Interrupt and Understand the classification of interrupts and Compare them with respect to interrupt request	CO 5
10.	What is meant by polling?	Understand	The learner to Remember the concept of Interrupts and Understand different methods for data transferring between processor and I/O devices	CO 5
11.	List the priorities of 8086 interrupts.	Remember	---	CO 5
12.	What is the function of INT-03H interrupt.	Understand	The learner to Recall Interrupt Vector Table and Remember about dedicated interrupts and Understand each interrupt, and write the interrupt used for break point in the program	CO 5
13.	How the interrupt response of a 8086 microprocessor is performed.	Understand	The learner to Remember the concept of interrupt and Understand how to accept and execute an interrupt request	CO 5
14.	List different Types of interrupts in 8086 microprocessor	Remember	---	CO 5
15.	Distinguish between minimum mode and maximum mode.	Understand	The learner to Recall the pin configuration of 8086 microprocessor, Remember the signals under different operating modes and Compare them with respect to their architectures.	CO 4
16.	What are DOS and BIOS interrupts.	Remember	---	CO 5
17.	How the following DOS interrupts	Remember	---	CO 5

	function. (i) Function Call 01 (ii) Function Call 02			
18.	What is the function of following BIOS interrupts. (i) INT 10 (ii) INT 21	Remember	---	CO 5
19.	How pipe lining is achieved in 8086.	Understand	The learner to Recall the architecture of 8086 and Understand the operation to execute an instructions	CO 4
20.	Compare the following interrupts. i) NMI ii) INTR	Understand	The learner to Recall the pin configuration of 8086 , Remember the classification of interrupts and Understand how to mask and unmask interrupts during interrupt request at these signals	CO 5
PART - B (LONG ANSWER QUESTIONS)				
1.	Explain minimum mode operations of 8086 and draw timing diagram for read operation.	Analyze	The learner to Recall the operating modes of 8086, Remember the architecture and Understand the operation and Analyze with timing diagrams	CO 4
2.	Demonstrate on minimum mode operations of 8086 and draw Timing diagram for write operation.	Analyze	The learner to Recall the operating modes of 8086, Remember the architecture and Understand the operation and Analyze with timing diagrams	CO 4
3.	Illustrate the functions of the following pins. i) TEST ii) Hold iii) QS0 & QS1 iv) S3, S4	Understand	The learner to Remember the Pin configuration of 8086 and Understand specific function of each signal when they are enabled or disabled	CO 4
4.	Explain about maximum mode operations of 8086 and draw timing diagram for memory read operation.	Analyze	The learner to Recall the operating modes of 8086, Remember the architecture and Understand the operation and Analyze with timing diagrams	CO 4
5.	Explain about maximum mode operations of 8086 and draw timing diagram for memory write operation.	Analyze	The learner to Recall the operating modes of 8086, Remember the architecture and Understand the operation and Analyze with timing diagrams	CO 4
6.	Illustrate about the following pins in 8086 microprocessor. I. READY, II. MN/MX, III. HOLD and IV. HLDA	Understand	The learner to Remember the Pin configuration of 8086 and Understand specific function of each signal when they are enabled or disabled	CO 4
7.	Explain about the functions of the following pins. a. TEST b. RQ/GT0 & RQ/GT1 c. QS0 & QS1 d. S0,S1,S2	Understand	The learner to Remember the Pin configuration of 8086 and Understand specific function of each signal when they are enabled or disabled	CO 4
8.	Write the functions of the following 8086 microprocessor pins. a. ALE	Understand	The learner to Remember the Pin configuration of 8086 and Understand specific function of each	CO 4

	b. INTR c. NMI d. CLK		signal when they are enabled or disabled	
9.	Illustrate about the following 8086 microprocessor pins functionality. a. READY b. TEST c. HOLD d. RESET	Understand	This would require the learner to Remember the Pin configuration of 8086 and Understand specific function of each signal when they are enabled or disabled	CO 4
10.	Outline the interrupt structure of 8086 microprocessor and explain.	Understand	The learner to Remember the concept of Interrupts and its structure Understand the allocation of all the interrupts in interrupt table	CO 5
11.	Explain about interrupt handling mechanism in 8086 microprocessor.	Understand	The learner to Understand the process of halting main program temporarily and executing ISR by Recalling IVT Concept during interrupt request	CO 5
12.	Illustrate about the interrupt cycle of 8086 microprocessor.	Understand	The learner to Understand the process of executing interrupt by Recalling IVT Concept during interrupt request	CO 5
13.	Outline 8086 Interrupt groups in interrupt vector table.	Understand	The learner to Remember the structure of Interrupt vector Table and Understand the allocation of all the interrupts under different groups	CO 5
14.	Distinguish between polling method and interrupt method in 8086 interrupts	Understand	The learner to Recall what is interrupt and Understand the difference between different interrupt methods	CO 5
15.	What operation is performed during handling an interrupt service.	Understand	The learner to Understand the process of halting main program temporarily and executing ISR by Recalling IVT Concept during interrupt request	CO 5
16.	List out different types of DOS interrupts and write their functions.	Understand	The learner to Understand different types of interrupts and Explain about interrupts that perform special functions	CO 5
17.	Illustrate about different types of BIOS interrupt and write their functions.	Understand	The learner to Understand different types of interrupts and Explain about interrupts that perform special functions	CO 5
18.	Explain the functions of the following DOS interrupts. I. Function Call 01 II. Function Call 02 III. Function Call 03 IV. Function Call 04	Understand	The learner to Understand different types of interrupts and Explain about interrupts that perform special functions	CO 5
19.	Illustrate about the functions of the following BIOS interrupts. I. INT10 II. INT11 III. INT12 IV. INT13	Understand	The learner to Understand different types of interrupts and Explain about interrupts that perform special functions	CO 5
20.	Summarize about the concept of Interrupts in 8086 microprocessor.	Understand	The learner to Understand different types of interrupts and their functions ,need of Interrupt Vector table and explain the process of interrupt handling mechanism during interrupt request	CO 5

PART - C (ANALYTICAL QUESTIONS)

1.	Explain how the interrupt is serviced by PIC If more interrupts occurs at the same time.	Understand	The learner to Understand different types of interrupts and their priorities and Explain about interrupt servicing process based on priorities in PIC	CO 5
2.	Why the lower order address bus is multiplexed with data bus? How they will be de-multiplexed? With the help of figure explain demultiplexing of address/data bus.	Understand	The learner to Recall the concept of system bus , Understand the importance of enabling and disabling ALE signal by explaining the operation of 8086 microprocessor	CO 4
3.	Outline the bus request and bus grant timing diagrams in minimum mode systems and explain the operation.	Understand	The learner to Recall the function of HOLD and HLDA signals , Understand the operation of 8086 microprocessor and Explain how to give the system bus access to requesting master	CO 4
4.	Outline the Bus request and bus grant timings in maximum mode systems.	Understand	The learner to Recall the function of Request and Grant signals , Understand the operation of 8086 microprocessor and Explain how to give the system bus access to requesting master	CO 4
5.	Distinguish between minimum mode and maximum mode in 8086 microprocessor.	Understand	The learner to Understand what are different operating modes and Identify the difference between two modes considering their Architectures	CO 4
6.	Compare polling method and Interrupt method and explain which method is generally preferred and why.	Understand	The learner to Understand different methods to transfer data between processor and I/O device and then able to Identify the better method	CO 5
7.	Illustrate about the following I. Software and Hardware interrupts II. Vectored and Non-Vectored interrupts III. Maskable and Non-Maskable interrupts	Understand	The learner to Remember the classification of Interrupts and then Explain what happens when these interrupts are initiated	CO 5
8.	List out the priorities of interrupts in 8086 microprocessor and explain their significance.	Understand	The learner to Remember priorities of interrupts, their function and then Explain what happens when more interrupts requests at the same time	CO 5
9.	Identify the function calls in DOS Interrupts that perform the following functions. I. Read Character From Com1 II. Write Character To Com1 III. Display A Character String IV. Buffered Key Board	Remember	---	CO 5
10.	Illustrate about the following BIOS interrupts I. INT14H II. INT15H III. INT16H IV. INT17H	Remember	---	CO 5

UNIT-III

INTERFACING WITH 8086

PART - A (SHORT ANSWER QUESTIONS)

1.	What are the operating modes of 8257 DMA controller.	Remember	---	CO 6
2.	What is the need of 8257 DMA controller.	Understand	The learner to Understand the way of Data transfer between device and memory	CO 6
3.	List out the features of 8257 DMA Controller.	Remember	---	CO 6
4.	List out the operating modes of 8257 DMA controller.	Remember	---	CO 6
5.	What is the function of terminal count register.	Understand	The learner to Remember the Architecture of DMA controller and then explain what happens after each DMA cycle	CO 6
6.	What is the need of 8259A PIC.	Understand	The learner to Remember the concept of interrupts, and then Explain how to handle interrupts when they occur at a time	CO 6
7.	List out the features of 8259A Programmable Interrupt Controller.	Remember	---	CO 6
8.	Outline the format of ICW1 in 8259 PIC.	Remember	---	CO 6
9.	How the interrupt sequence will happen between 8086-8259A.	Understand	The learner to Recall the concept of Interrupts and Understand about microprocessor and programmable interrupt Controller and then Explain how to halt main program temporarily and execute interrupt service routine	CO 6
10.	What is the need of Command Words of 8259A	Understand	The learner to Understand the way of programming 8259A	CO 6
CIE-II				
11.	How communication in microprocessor happens.	Understand	The learner to Understand different ways of transmitting data between computer and peripherals and then Explain which type is preferred in microprocessor	CO 7
12.	Compare different types of communications in microprocessor.	Understand	The learner to Understand different ways of transmitting data between computer and peripherals and then Compare considering area of applications	CO 7
13.	What is the need of 8251 (Universal Synchronous Asynchronous Receiver Transmitter) chip.	Understand	The learner to Remember different types of communication and Understand what type of communication is performed in computers and peripherals and then Explain how to convert the data and transmit	CO 7
14.	List the features of 8251(Universal Synchronous, Asynchronous Receiver Transmitter).	Remember	---	CO 7

15.	List out various serial communication standards available.	Remember	---	CO 7
16.	What are the most commonly used signals in RS232.	Remember	---	CO 7
17.	What are the specifications of serial communication mode RS-232C.	Remember	---	CO 7
18.	List out various types of serial communication techniques used in 8086 microprocessor.	Understand	The learner to Understand different types of communication and Explain how to Synchronize between two ends of communication	CO 7
19.	What is the necessity of interfacing of 8251 USART with 8086 microprocessor.	Understand	The learner to Remember different types of communication and Understand what type of communication is performed in computers and peripherals and then Explain how to convert the data and transmit	CO 7
20.	Why serial data transfer is preferred over parallel data transfer for microprocessor communication.	Understand	The learner to Recall different types of communication and Understand what type of communication is performed in computers and peripherals and then explaining which method is preferable to transmit data over longer distances	CO 7

PART - B (LONG ANSWER QUESTIONS)

1.	Explain the pin configuration of 8257 DMA controller with the neat sketch.	Understand	The learner to Remember the pin diagram of DMA controller and Understand the functionality of each pin	CO 6
2.	Illustrate the need of DMA controller and its interfacing to 8086.	Understand	The learner to Recall different types of communication and Understand what type of communication is performed in computers and peripherals and then Explain how to convert the data and transmit	CO 6
3.	Demonstrate on the operating modes of 8257A DMA controller.	Understand	The learner to Understand the need of DMA controller and then Explain how CPU and DMA controller interact ,and DMA controller connects memory and I/O device Recalling the modes of operation	CO 6
4.	Outline the architecture of 8257 DMA controller and explain about each block?	Understand	The learner to Understand the need of DMA controller and then Explain the functionality of each block for data transfer between memory and I/O	CO 6
5.	Explain the internal architecture of 8259 Programmable Interrupt Controller with a neat block diagram.	Understand	The learner to Recall the concept of interrupts and their priorities , Understand the functionality of each block in the architecture and then Explain the operation how to handle more number of Interrupts	CO 6
6.	Illustrate different types of command words used in 8259 PIC?	Understand	The learner to Understand the ways of programming 8259A and Explain how to service the interrupts	CO 6
7.	Outline the formats of Initialization Command Words and explain in detail.	Understand	The learner to Understand the ways of programming 8259A and then Explain about the importance of	CO 6

			each bit in the register for initializing PIC	
8.	Outline the formats of Operational Command Words and explain in detail.	Understand	The learner to Understand the ways of programming 8259A and then Explain about the importance of each bit in the register for operating PIC in different in different modes	CO 6
9.	What is the importance of Cascading interrupt controllers.	Understand	The learner to Recall the architectures of PIC, Understand their operation then explain how to service more than 8 interrupts	CO 6
10.	Illustrate about the following Operating modes of 8259A PIC. (i)Fully Nested Mode (ii) Automatic Rotation Mode (iii)Specific Rotation Mode (iv)Automatic EOI	Understand	The learner to Recall the architectures of PIC, Understand ISR block and explain how interrupt priorities will be changed based on operating modes	CO 6
CIE-II				
11.	Outline the internal block diagram of 8251 USART and explain about each block in detail.	Understand	The learner to Recall the need of DMA controller and Explain about the architecture by Understanding the function of each block for data transfer between microprocessor and peripherals	CO 7
12.	Explain the pins of 8251 USART (Universal Synchronous Asynchronous Receiver Transmitter) by drawing pin diagram.	Understand	The learner to Remember the pin diagram and Understand the functionality of all signal to communicate microprocessor and peripherals	CO 7
13.	Explain the synchronous mode transmitter and receiver data formats of 8251.	Understand	The learner to Remember different types of communication and Understand what type of communication is performed in computers and peripherals and then explain how to convert the data and transmit	CO 7
14.	Outline the pin structure of RS232C and explain about most commonly used signals.	Understand	The learner to Remember the pin diagram and Understand the functionality of all signal and Explain the way of communicating DTE and DCE using handshaking signals	CO 7
15.	Explain the logic to convert TTL to RS232C with neat diagram.	Understand	The learner to Remember the voltage levels of TTL and RS232 and Explain why to convert the levels before transmitting	CO 7
16.	Explain the logic to convert RS232C to TTL conversion.	Understand	The learner to Remember the voltage levels of TTL and RS232 and Explain why to convert the levels before receiving	CO 7
17.	Outline Mode Instruction formats in Asynchronous and synchronous modes.	Understand	The learner to Recall the architecture and Understand about each bit in the register then Explain how to set the function of 8251 in Asynchronous and synchronous modes	CO 7
18.	Explain about the following i. Command instruction format	Understand	The learner to Recall the architecture and Understand about each bit in	CO 7

	ii. Status Read Instruction format		the register then Explain how to set the operation of 8251 and how to see internal status of 8251	
19.	Illustrate about the following pins of 8251A i. Syndet/BD ii. RXRDY iii. CTS iv. TXRDY	Understand	The learner to Remember the pin diagram and Understand the function of each pin	CO 7
20.	Explain the operation of Interfacing 8251 USART with 8086 with a neat sketch.	Understand	The learner to Remember different types of communication and Understand what type of communication is performed in computers and peripherals and then Explain how to convert the data and transmit	CO 7
PART - C (ANALYTICAL QUESTIONS)				
1	Explain the process of calculating physical address from where the ISR will start.	Understand	The learner to Understand about segment address and offset address Recall the formula or procedure of physical address and Apply it for calculating physical address	CO 6
2	Illustrate the process of Interrupt sequence in 8086 microprocessor.	Understand	The learner to Understand the process of halting main program temporarily and executing ISR by Recalling Interrupt Vector Table Concept during interrupt request	CO 6
3	Explain the flow chart of Initialization sequence (ICWs) of 8259A.	Understand	The learner to Explain how to program 8259 and what is the sequence to be followed to initialize 8259	CO 6
4	What is the necessity of cascading interrupt controller, and calculate the number of slave and master Interrupt Controllers required when 64 inputs are present.	Understand	The learner to Remember the pin diagram of PIC and then Explain the need of cascading with the help of interfacing diagram	CO 6
5	Explain how the data transfer is performed between memory and I/O devices in the presence of DMA controller and in the absence of DMA controller.	Understand	The learner to Understand the need of DMA controller and then Explain the data transfer between memory and I/O	CO 6
CIE-II				
6	List out the electrical characteristics of RS-232 serial communication standard.	Remember	---	CO 7
7	Explain the communication process between DCE and DTE.	Understand	The learner to understand the functioning of RS-232 pins and then explain communication process using handshaking signals	CO 7
8	Illustrate on different Handshaking signals in the RS232 protocol.	Understand	The learner to understand the functioning of RS-232 pins and then explain communication process between DTE and DCE using handshaking signals	CO 7
9	Compare different serial communication standards.	Understand	The learner to understand about serial communication and able to	CO 7

			identify the communication standard based on requirements	
10	Explain the need of RS232 between a Computer and a Modem with the help of neat diagram.	Understand	The learner to Remember communication standards, understand the functioning of RS-232 pins and then explain communication process between DTE and DCE using handshaking signals	CO 7

MODULE-IV

ADVANCED MICROPROCESSORS

Part - A (Short Answer Questions)

1.	What are the Salient features of 80186 advanced microprocessor.	Remember	---	CO 8
2.	What are the Salient features of 80286 advanced microprocessor.	Remember	---	CO 8
3.	List out the basic features of 80386 advanced microprocessor.	Remember	---	CO 8
4.	Define virtual memory.	Understand	The learner to Understand Memory management capability by recalling the concept of memory segmentation	CO 9
5.	Outline the flag register format of 80286 advanced microprocessor.	Understand	The learner to Understand the ALU operations of microprocessor by remembering the register format.	CO 8
6.	What are different interrupts available in 80286 advanced Microprocessor.	Remember	---	CO 8
7.	List out the registers in Register Organization of 80386?	Remember	---	CO 8
8.	List out different Signals of 80386.	Remember	---	CO 8
9.	List out the advantage of pages in paging.	Understand	The learner to Recall static memory allocation and dynamic memory allocation, understand the advantages of dynamic memory allocation and explain how it is used in paging	CO 9
10.	Write different operating modes of 80386 microprocessor.	Remember	---	CO 8
11.	What is Real address mode?	Remember	---	CO 8
12.	What is protected address mode?	Remember	---	CO 8
13.	Why segmentation mechanism is preferred in advanced microprocessors.	Understand	The learner to Recall static memory allocation and its drawbacks understand about dynamic memory allocation	CO 9
14.	List out the features of Pentium Processor.	Remember	---	CO 8
15.	What is the importance of branch prediction in Pentium Processor.	Understand	The learner to Understand the concept of pipelining and then explain how to improve the flow in an instruction pipeline	CO 8
16.	Distinguish between RISC and CISC processors.	Understand	The learner to Understand the set of instructions in a processor and then explain why RISC architecture is	CO 8

			Better compared to CISC architecture	
17.	List out the basic features of RISC Processors.	Remember	---	CO 8
18.	What are different issues involved in RISC based processors.	Understand	The learner to Understand architecture of RISC processors and then explain the difficulty in Designing compiler and requirement of hardware.	CO 8
19.	How pipelining processes is performed in RISC processors.	Understand	The learner to Recall what is pipelining Understand how to finish an execution for every clock cycle to enhance performance	CO 8
20.	List out the performance issues in pipelined systems.	Understand	The learner to Understand instruction execution in pipelining process and then explain the limitations in it	CO 8
PART – B (LONG ANSWER QUESTIONS)				
1.	Draw and explore the flag register of 80286 advanced microprocessor in detail.	Understand	The learner to Recall the ALU operations and Understand the excitation of bits in flag registers of 80286 microprocessor and then explain how to know the status of ALU.	CO 8
2.	List out the four major processing units in an 80286 microprocessor and briefly describe the function of each unit.	Understand	The learner to Remember the architecture of 80286 microprocessor , Understand about each block and explain how the instruction will be Processed and executed	CO 8
3.	Illustrate the Operating Modes of 80286 advanced microprocessor.	Understand	The learner to identify two operating modes of 80286 and Understand about memory addressability in physical memory and virtual memory	CO 8
4.	Explain about the architecture of 80386 advanced microprocessor with neat diagram.	Understand	The learner to Remember the architecture of 80386 microprocessor , Understand about each block and explain how the instruction will be Processed and executed	CO 8
5.	Illustrate about the basic concept of 80386 advanced microprocessor paging system.	Understand	The learner to Understand about paging concept and then explain how this paging unit converts linear address into physical address in 80386 microprocessor	CO 9
6.	Illustrate about different addressing modes supported by 80386 processor.	Understand	The learner to Remember different addressing modes of 80386 and Understand the way of accessing operands for assembly language programming	CO 8
7.	Explain the following signal functions of 80386. i. BE0-BE3 ii. W/R iii. D/C iv. ADS	Understand	The learner to Remember the Pin configuration of 80386 and Understand specific function of each signal when they are enabled or disabled	CO 8

	v. NA vi. BS16			
8.	Illustrate about the Real mode and protected mode concepts of 80386 Microprocessor.	Understand	The learner to Remember the operating modes of 80386 Microprocessor and explain the procedure of calculating physical address in both the modes	CO 8
9.	Outline the FLAG register format of 80386 processor and explain the function of each flag.	Understand	The learner to Recall the ALU operations and Understand the excitation of bits in flag registers of 80386 microprocessor.	CO 8
10.	Explain in detail about Register Organization of 80386 advanced Microprocessor.	Understand	The learner to Understand the architecture of 80386 microprocessor and Identify different registers and then explain which register will hold data, starting address, offset address.	CO 8
11.	Explain briefly about segmentation and paging concepts in 80386 processor.	Understand	The learner to Understand about four processing units in the architecture and then explain how to convert linear address into physical address and how to have memory management	CO 9
12.	Outline the features of Pentium processors.	Understand	The learner to Remember the features of Pentium processor and explain how these features are better compared to basic processors	CO 8
13.	Demonstrate on Branch Prediction Process in Pentium Processor.	Understand	The learner to Understand the concept of pipelining and then explain how to improve the flow in a instruction pipeline	CO 8
14.	Compare RISC and CISC Processors.	Understand	The learner Understand both the architectures and identify which is better by knowing its advantages and disadvantages	CO 8
15.	What are the advantages of RISC processor over CISC Processor.	Understand	The learner Understand both the architectures and identify which is better by knowing its advantages and disadvantages	CO 8
16.	Explain about the Design issues of RISC Processors.	Understand	The learner to Understand architecture of RISC processors and then explain the difficulty in Designing compiler and requirement of hardware	CO 8
17.	What are different performance issues in pipelined systems.	Understand	The learner to Understand about pipeline latency, imbalance about pipeline stages, pipeline overhead and then explain how all these are reducing the performance	CO 8
18.	Distinguish between 80286 and 80386 Microprocessors.	Understand	The learner to Identify the difference between the processors with respect to their features and architecture	CO 8
19.	What are the advantages of 80386 over 80286 Microprocessors.	Understand	The learner to Identify the difference between the processors with respect to their features and architecture and then explain how 80386 microprocessor is advanced	CO 8

20.	Define Segmentation and what the advantages of segmentation process are.	Understand	The learner to Understand about dividing main memory into segments and then explain how this segmentation process leads to memory management	CO 9
PART - C (ANALYTICAL QUESTIONS)				
1.	Explain about the four functional blocks of 80286 advanced microprocessor.	Understand	The learner to Remember the architecture of 80286 microprocessor, Understand about each block and explain how the instruction will be Processed and executed	CO 9
2.	Illustrate about the Machine Status Word (MSW) in 80286 advanced microprocessor.	Understand	The learner to Recall the ALU operations and Understand the excitation of bits in flag registers of 80286 microprocessor.	CO 8
3.	Illustrate about the following signals available in 80286. i. PEREQ ii. PEACK iii. CODE/INTA iv. CAPs v. BUSY vi. ERROR	Understand	The learner to Remember the Pin configuration of 80286 and Understand specific function of each signal when it is enabled and disabled	CO 8
4	Demonstrate about the physical address formation in real address mode.	Understand	The learner to explain the procedure of calculating physical address in real mode by recalling the procedure of 8086	CO 8
5.	Explain about the physical address formation in protected virtual address mode (PVAM).	Understand	The learner to explain the procedure of calculating physical address in protected virtual address mode by drawing the neat diagram	CO 8
6.	Illustrate the Page Table and Page Directory Entry by drawing neat formats.	Understand	The learner to Remember the register formats of page table and page directory, Understand how to divide the memory in to fixed size pages and explain how to handle the information of each page	CO 9
7.	Demonstrate on Register Windowing and Massive Pipelining Issues in RISC Processors.	Understand	The learner to Understand the design issues in RISC processor and explain them related to performance	CO 8
8.	Explain about Instruction Latency and Dependency Issues in Pipelined Systems.	Understand	The learner to Understand the design issues in RISC processor and explain them related to performance	CO 8
9.	Illustrate about the importance of paging and segmentation Concept in 80386 advanced processor.	Understand	The learner to Understand about four processing units in the architecture and then explain how to convert linear address into physical address and how to have memory management	CO 9
10.	Demonstrate about the physical address formation in Protected address mode.	Understand	The learner to Understand the procedure of calculating physical address in protected address mode and explain by drawing the neat diagram	CO 8

MODULE-V

8051 MICROCONTROLLER ARCHITECTURE

Part - A (Short Answer Questions)

1.	Compare microprocessor and microcontroller.	Understand	The learner to identify the difference with respect to their features and area of applications.	CO 1
2.	What is the significance of EA line of 8051 microcontroller?	Understand	The learner to Remember the pins of 8051 microcontroller and explain how to read program from external memory	CO 1
3.	What is the size of the on-chip program memory and on-chip data memory of 8051 microcontroller	Understand	The learner to Understand about memory organization of 8051 microcontroller	CO 10
4.	List out the advantages of using a microcontroller in place of a microprocessor.	Understand	The learner to Remember the feature of microprocessor and microcontroller and Understand the limitations in microprocessor	CO 1
5.	How does DPTR function in 8051 microcontroller.	Understand	The learner to Remember the pins available in 8051 microcontroller, and understand the function of Data pointer when it is enabled and disabled	CO 1
6.	List the applications of 8051 microcontroller.	Understand	The learner to Remember the feature of 8051 microcontroller and Understand the area of application	CO 1
7.	What are the features of 8051 microcontroller.	Remember	---	CO 1
8.	What are the functions of ALE and PSEN signals in 8051 microcontroller.	Understand	The learner to Remember the pins of 8051 microcontroller and explain the function of pins when they are enabled and disabled	CO 1
9.	How does XTAL1 and XTAL2 in 8051 microcontroller function.	Understand	The learner to Remember the pins of 8051 microcontroller and explain how to produce clock frequency	CO 1
10.	List all the register banks in 8051 microcontroller.	Remember	---	CO 10
11.	What are the ports that are used to address external memory in 8051?	Remember	---	CO 10
12.	Compare the features different types of Microcontrollers.	Remember	---	CO 1
13.	Outline the format of Interrupt Enable Register in 8051 Microcontroller.	Understand	The learner to Remember registers of 8051 Microcontroller and explain how to enable and disable the interrupts	CO 10
14.	List all the general purpose registers in 8051 Microcontroller.	Remember	---	CO 10
15.	What is different Special purpose registers available in 8051 Microcontroller.	Remember	---	CO 10
16.	Compare Timer and Counter.	Understand	The learner to Understand about function of timer and Counter by Recalling how to generate delays	CO 10
17.	List out different types of interrupts available in 8051 Microcontroller.	Remember	---	CO 5

18.	What are different Modes of timer operation.	Remember	---	CO 10
19.	Distinguish between internal and external interrupts in 8051 Microcontroller.	Understand	The learner to Remember the interrupts that are available in 8051 Microcontroller and Understand about the function of each interrupt	CO 5
20.	What is the function of the following registers. (i) PCON (ii) IP	Understand	The learner to Remember registers of 8051 Microcontroller and Understand the function of registers	CO 10

PART – B (LONG ANSWER QUESTIONS)

1.	Explain the architecture of 8051 micro controller.	Understand	The learner to Remember the architecture and Understand the function of each block	CO 1
2.	Illustrate about Interrupt enable register and Interrupt Priority register in 8051 Microcontroller	Understand	The learner to Recall what is interrupt and Understand register formats and then Explain how to enable and disable interrupts and how to change the priorities of interrupts using these registers	CO 10
3.	Explain the concept of serial communication in 8051 and hence describe how SCON register is configured.	Understand	The learner to Recall the basics of serial communication, Understand about SCON register format and then explain how to program start bit, stop bit and data bits	CO 10
4.	How to interface 8-bit Analog to Digital Converter (ADC) with 8051 microcontroller. Explain.	Apply	The learner to Recall operation of ADC and Microcontroller Understand about types of communication and Apply interfacing in between to communicate	CO 10
5.	Demonstrate about the external memories in 8051 and draw the diagram to interface external memories to 8051.	Understand	The learner to Recall Classification of memories and Understand the concept of memory organization in 8051 Microcontroller and the requirement of external memory	CO 10
6.	Explain about the register set of 8051 Microcontroller with examples.	Understand	The learner to Understand Register organization of 8051 Microcontroller and Explain in what way each register can be used for programming	CO 10
7.	What are different methods to access external memory devices in an 8051 based system.	Understand	The learner to Recall Classification of memories and Understand different methods to access external memory for storing complex programs	CO 10
8.	Explain the operation of I/O ports in 8051 with neat sketch.	Understand	The learner to Understand about different ports of 8051 microcontroller and then Explain the pin occupation of each port	CO 10
9.	Outline the functional diagram of 8051 Microcontroller and explain the Input /Output lines.	Understand	The learner to Understand the block diagram of 8051 Microcontroller and Explain about all I/O ports and the pin occupation of each port	CO 1
10.	List out the features of 8051 microcontroller and compare it with 8086 microprocessor.	Understand	The learner to Recall the features of 8086 microprocessor and	CO 1

			Understand in what way 8051 microcontroller differs from it	
11.	List out the features of Special Function Registers of 8051 Microcontroller. Explain.	Understand	The learner to Understand Register organization of 8051 Microcontroller and then Explain the purpose Special Function Registers	CO 10
12.	Outline the PSW register format in 8051 and give example instructions which effect the respective flags.	Understand	The learner to Remember Flag Register Format and Understand the excitation of bits in flag register during ALU operations	CO 10
13.	Illustrate about the internal and external data memory organization of 8051	Understand	The learner to Recall Classification of memories and Understand at what condition we have to use these memories	CO 10
14.	List out the various 16 bit registers of 8051 and write the operation with examples.	Understand	The learner to Understand Register organization of 8051 Microcontroller , Identify 16 bit registers and then Explain the performance of each register	CO 10
15.	Demonstrate on the interrupt management system in 8051 microcontroller.	Understand	The learner to Recall what is interrupt and Understand about interrupt handling mechanism	CO 5
16.	Discuss about serial communication in 8051 microcontroller.	Understand	The learner to Recall the types of communication and Understand about serial communication and its standards and Explain why it is preferred	CO 10
17.	Explain mode 2 of serial communication in 8051 microcontroller.	Understand	The learner to Recall the types of communication and Understand about serial communication and its standards and Explain about mode 2 with respect to baud rate	CO 10
18.	Compare mode 1, mode 3 of timer operation with their applications.	Understand	The learner to Understand about Timers and their modes and Explain which mode is suitable for applications	CO 10
19.	Describe mode 0 of serial communication in 8051 microcontroller.	Understand	The learner to Recall the types of communication and Understand about serial communication and its standards and Explain about mode 0 with respect to baud rate	CO 10
20.	Explore how communication at variable baud rates can be done in 8051 microcontroller.	Understand	The learner to Recall the types of communication and Understand about serial communication and its standards and Explain about mode 0, mode1, mode 2, mode3 with respect to baud rate	CO 10

PART - C (ANALYTICAL QUESTIONS)

1.	How interrupts are handled in 8051 microcontroller corresponding with SFR's.	Understand	The learner to Recall what is Interrupt and Understand Interrupt handling mechanism and Explain how the interrupts will be handled by special function registers	CO 5
2.	Explain the following important operational features of 8051 in detail. i) PSW ii) TMOD iii) TCON iv) SCON	Understand	The learner to Recall 8051 microcontroller memory organization and Understand about Special function Registers and then	CO 10

			Explain how to program and control different hardware peripherals	
3.	What is key bouncing and Explain how keyboard is interfaced with 8051 microcontroller with neat sketch.	Apply	The learner to Understand about keyboard and microcontroller then Explain with a diagram how to Construct an interfacing between them	CO 10
4.	Demonstrate how a digital to analog converter is interfaced with 8051 microcontroller with neat schematic.	Apply	The learner to Understand about DAC and microcontroller then Explain with a diagram how to Construct an interfacing between them	CO 10
5.	How communication at variable baud rates can be done in 8051 microcontroller. Explain.	Understand	The learner to Recall the types of communication and Understand about serial communication and its standards and Explain about mode 0, mode1, mode 2, mode3 with respect to baud rate	CO 10
6.	Illustrate about mode 0 of serial communication in 8051 microcontroller.	Understand	The learner to Recall the types of communication and Understand about serial communication and its standards and Explain about mode 0 with respect to baud rate	CO 10
7.	How to interface 8051 microcontroller with ADC Explain with schematic.	Apply	The learner to Understand about ADC and microcontroller then Explain with a diagram how to Construct an interfacing between them	CO 10
8.	Compare timer & counter? Analyze the 16-bit timer mode and 8-bit auto-reload mode of 8051 microcontroller.	Understand	The learner to identify the difference between timers and counters Understand about Special Function Registers of 8051 microcontroller	CO 10
9.	Explain the operation of TCON & PCON registers in 8051 with an example.	Understand	The learner to Recall 8051 microcontroller memory organization and Understand about Special function Registers and then Explain how to program and control different hardware peripherals	CO 10
10.	How to interface an LCD display With microcontroller. Explain with neat sketch.	Apply	The learner to Understand about LCD display and microcontroller then Explain with a diagram how to Construct an interfacing between them	CO 10

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