

UNIT I - THE 8086 MICROPROCESSOR			
Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.			
PART - A			
S.No.	Questions	BT Level	Competence
1	Identify the difference between a MP and CPU.	BTL 1	Remembering
2	Recall about Stack Register.	BTL 1	Remembering
3	List the flag register in 8086.	BTL 1	Remembering
4	Define stack segment register.	BTL 1	Remembering
5	What are the assembler directives there in 8086?	BTL 1	Remembering
6	Outline the different type of addressing modes of 8086	BTL 1	Remembering
7	Express physical address generated in 8086?	BTL 2	Understanding
8	State in your own words the 8086 instructions used for BCD arithmetic.	BTL 2	Understanding
9	Classify the program control instructions available in 8086	BTL 2	Understanding
10	Describe about program counter and stack pointer register in 8086.	BTL 2	Understanding
11	Show how the 2 byte INT instruction can be applied for debugging.	BTL 3	Applying
12	How would you use carry and zero flags that reflect the result of the instruction CMP BX, CX?	BTL 3	Applying
13	Mention any four miscellaneous instructions in 16 bit processor.	BTL 3	Applying
14	Point out the string instructions available in 8086.	BTL 4	Analyzing
15	The offset address of data is 341BH and the data segment value is 123AH. Examine the physical address of the data.	BTL 4	Analyzing
16	Infer about procedures.	BTL 4	Analyzing
17	Briefly describe the term Macros.	BTL 5	Evaluating
18	Conclude about modular programming.	BTL 5	Evaluating
19	Elaborate on any four string instructions.	BTL 6	Creating
20	Formulate the theory for why string primitives are used.	BTL 6	Creating
PART – B			
1	(i) Outline the use of the following assembler directives: DD, ASSUME, EQU. (6) (ii) Explain about the Interrupt handling process in 8086. (7)	BTL 1	Remembering
2	(i) Write an 8086 ALP to convert BCD data to Binary data. (6) (ii) Identify the conditions which cause the 8086 to perform type 0 and type 1 interrupt. (7)	BTL 2	Understanding
3	(i) Describe the internal architecture of 8086 Microprocessor with neat diagrams. (8)	BTL 1	Remembering

	(ii) Recall about assembler directives. (5)		
4	Examine the various addressing modes available in 8086. Explain each mode with an example. (13)	BTL 4	Analyzing
5	(i) Explain the data transfer, arithmetic and branch instructions of 8086 microprocessor with examples. (7) (ii) Analyze an 8086 ALP to find the sum of numbers in an array of 10 elements. (6)	BTL 4	Analyzing
6	Define interrupts and their types. Write in detail about interrupt service routine. (13)	BTL 1	Remembering
7	Point out the Procedures, Macros and Interrupt Service Routines. (13)	BTL 4	Analyzing
8	(i) Distinguish between call and subroutine. (5) (ii) Give an example for the 8086 instructions: AAA, CWD, JNBE, LAHF, MOVS, RCL, ROL and SAHF. (8)	BTL 2	Understanding
9	(i) Write an 8086 ALP to check whether the given string is palindrome or not. (6) (ii) Criticize about instruction formats and instruction execution timing. (7)	BTL 5	Evaluating
10	Deduce functional description of 8086 microprocessor with a neat diagram. (13)	BTL 4	Analyzing
11	(i) How does one define and call macro parameters of 8086 microprocessor? (6) (ii) Express the operand formats for the addressing modes with examples. (7)	BTL 2	Understanding
12	Illustrate the classification of 8086 instructions based on its word length. (13)	BTL 3	Applying
13	(i) Generalize the concept of byte and string manipulation with an example. (7) (ii) Develop a program to transfer 50 bytes of data from memory location starting from 2000H to 3000H using the string instruction MOVSB. (6)	BTL 6	Creating
14	(i) List the need for modular programming. (5) (ii) Relate how to create and execute a program using modules. (8)	BTL 1	Remembering
PART – C			
1	Develop an algorithm and write ALP for sort a given array in Ascending and Descending order with array of length 10 using 8086 Microprocessor. (15)	BTL 6	Creating
2	(i) What do you mean by assembler directives? Explain SEGMENT, TYPE and OFFSET with suitable examples. (8) (ii) Summarize an 8086 ALP to compare two strings of same length. (7)	BTL 5	Evaluating
3	Write an assembly language program for performing the Multiplication and Division of 16 bit numbers using 8086 Microprocessor. (15)	BTL 5	Evaluating
4	(i) Explain in about the indirect addressing mode in 8086. (5) (ii) Design an ALP in 8086 to multiply two 16-bit numbers (10)	BTL 6	Creating

UNIT II - 8086 SYSTEM BUS STRUCTURE

8086 signals – Basic configurations – System bus timing – System design using 8086 – IO programming – Introduction to Multiprogramming – System Bus Structure - Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.			
PART – A			
S.No.	Questions	BT Level	Competence
1	Define Bus.	BTL 1	Remembering
2	State about External & Internal Bus.	BTL 1	Remembering
3	How would you explain two modes of operation in 8086?	BTL 1	Remembering
4	What is the need of LOCK signal?	BTL 1	Remembering
5	Can you recall about Multiprogramming?	BTL 1	Remembering
6	State the queue status of QS ₁ and QS ₀ .	BTL 1	Remembering
7	Draw the timing diagram of Interrupt acknowledgement on a minimum mode system.	BTL 2	Understanding
8	Classify the I/O programming.	BTL 2	Understanding
9	Discuss about Semaphore.	BTL 2	Understanding
10	Compare minimum mode and maximum mode of operation.	BTL 2	Understanding
11	Illustrate the states of process management?	BTL 3	Applying
12	Write some examples of advanced processors.	BTL 3	Applying
13	Show your understanding on bus request, bus Grant and cycle Stealing?	BTL 3	Applying
14	List the advantages of multiprocessor configurations.	BTL 4	Analyzing
15	Point out the merits of independent request scheme.	BTL 4	Analyzing
16	Analyze the need for co-processor.	BTL 4	Analyzing
17	Mention the bus allocation schemes in multiprocessor configurations.	BTL 5	Evaluating
18	How does the main processor distinguish its instructions from the co-processor instructions when it fetches the instructions from memory?	BTL 5	Evaluating
19	Elaborate on the difference between closely and loosely coupled configurations	BTL 6	Creating
20	Design how synchronization is made between 8086 and its co-processor.	BTL 6	Creating
PART – B			
1	Examine all the pin functions of 8086 processor configured in the maximum mode. (13)	BTL 4	Analyzing
2	Discuss about the signals involved in minimum mode operation of 8086 with a microprocessor based system with the timing diagram. (13)	BTL 2	Understanding
3	How would you explain the system bus timing of 8086? (13)	BTL 4	Analyzing
4	(i) Describe the maximum mode configuration of 8086 by with a neat diagram. (7) (ii) Mention the functions of various signals of 8086. (6)	BTL 2	Understanding
5	With necessary diagrams, examine the operations of I/O programming in detail. (13)	BTL 1	Remembering
6	Identify the following: (i) Programmed I/O (7)	BTL 1	Remembering

	(ii)Interrupt I/O (6)		
7	Point out and explain the following: (i)Memory Management and Virtual Memory (5) (ii)Multiprogramming (4) (iii)Semaphore (4)	BTL 4	Analyzing
8	(i) Design the block diagram of Polling method. (8) (ii) Compare closely coupled configuration with loosely coupled configuration. (5)	BTL 5	Evaluating
9	(i) Draw the block diagram of daisy chaining method and explain. (7) (ii) Mention the advantages of multiprocessor configurations. (6)	BTL 3	Applying
10	Develop the different schemes used for establishing priority in multiprocessor configuration. (13)	BTL 6	Creating
11	(i) Sketch the synchronous diagram between 8086 and its Coprocessor. (6) (ii) Show how the interprocessor communication through shared memory. (7)	BTL 3	Applying
12	State the closely coupled configuration of multi-processor configuration with suitable diagram. (13)	BTL 1	Remembering
13	(i) Define loosely coupled system. (6) (ii)Explain the schemes used for establishing priority. (7)	BTL 1	Remembering
14	Paraphrase the hardware enhancements of 80186 and 80286 microprocessors compared to 8086. (13)	BTL 2	Understanding
PART – C			
1	(i) Write down the comparison of minimum mode and maximum mode pins. (8) (i) Draw the timing diagram for the execution of the 8086 MOV instructions. (7)	BTL 6	Creating
2	Summarize the timing diagram of memory read and memory write operations of 8086 microprocessor and explain in detail. (15)	BTL 6	Creating
3	Assess the various schemes used to solve the bus arbitration problem in multiprocessors. (15)	BTL 5	Evaluating
4	(i) With necessary illustrations write the the execution steps of 8087 Coprocessor. (8) (ii) Explain the architecture of 80286. (7)	BTL 5	Evaluating

UNIT III - I/O INTERFACING			
Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display, LCD display, Keyboard display interface and Alarm Controller.			
PART – A			
S.No.	Questions	BT Level	Competence
1	State the advantage and disadvantage of parallel communication over serial communication.	BTL 1	Remembering
2	Define the terms A/D & D/A convertor.	BTL 1	Remembering
3	List the four display modes of 8279 keyboard and display controller	BTL 1	Remembering
4	Name the applications of programmable interval timer.	BTL 1	Remembering
5	Outline the different peripheral interfacing used with 8086.	BTL 1	Remembering
6	Write the various modes of 8254 timer.	BTL 1	Remembering
7	Classify the output modes used in 8279.	BTL 2	Understanding
8	What frequency transmit clock (TxC) is required by an 8251 in order for it to transmit data at 4800 Baud with a Baud rate factor of 16?	BTL 2	Understanding
9	Summarize the modes used by the DMA processor to transfer data.	BTL 2	Understanding
10	What is meant by key bouncing?	BTL 2	Understanding
11	How would you use terminal count register?	BTL 3	Applying
12	Draw the format of Read back Command register of 8254.	BTL 3	Applying
13	Mention the applications of 8251 IC chip?	BTL 3	Applying
14	Point out the uses of handshake signals in mode-2 configurations of 8255.	BTL 4	Analyzing
15	Examine the features of mode 1 used in 8255?	BTL 4	Analyzing
16	Categorize the basic modes of operation of 8255?	BTL 4	Analyzing
17	State your idea on the different types of command words used in 8259?	BTL 5	Evaluating
18	Evaluate your opinion on the operating modes of 8259A?	BTL 5	Evaluating
19	Elaborate the purpose of control word written to control register in 8255.	BTL 6	Creating
20	Invent how many address lines and data lines are necessary for accessing 32K X 8 memory?	BTL 6	Creating
PART – B			
1	With neat block diagram, explain the description and function of 8259. (13)	BTL 4	Analyzing

2	(i) With a block diagram design how 8255 functions in different modes to accommodate different kind of I/O devices. (5) (ii) Formulate the control word for the 8255 functions in different modes to accommodate different kind of I/O devices. a. To connect one input device and one output device in the strobe mode. (4) b. To connect two input devices in the strobe mode. (4)	BTL 6	Creating
3	(i) Discuss how to interface an LCD display with 8086 microprocessor. (7) (ii) Write a program to display a character using LCD display. (6)	BTL 2	Understanding
4	With neat diagram, describe the internal structure of key board and display controller. (13)	BTL 1	Remembering
5	(i) How do you interface a keyboard and the display using keyboard/display controller? (6) (ii) Discuss about memory and I/O interfacing. (7)	BTL 2	Understanding
6	Relate how to interface a DMA controller with a microprocessor? Assess how DMA controller transfers large amount of data from one memory locations to another memory location. (13)	BTL 5	Evaluating
7	(i) Infer and explain the block diagram of ADC converter. (7) (ii) How is A/D converter interfaced with 8086? (6)	BTL 3	Applying
8	Discuss how a PIC, 8259 is interfaced to an 8086 based system. How does 8259 service an interrupt? (13)	BTL 2	Understanding
9	(i) List the different DMA transfer modes supported by a DMA controller and explain these modes. (7) (ii) Describe the internal architectural diagram of the 8237 and explain how it functions as a DMA controller. (6)	BTL 1	Remembering
10	Outline the features and explain the operation of 8254 Programmable Interval Timer with diagram, and also explain the various modes of operation. (13)	BTL 4	Analyzing
11	List the steps involved in interfacing an alarm controller with 8086 microprocessor and explain in detail. (13)	BTL 1	Remembering
12	(i) Manipulate DAC converter with block diagram. (7) (ii) How is D/A converter interfaced with 8086? (6)	BTL 3	Applying
13	(i) Draw the block diagram of traffic light control system using 8086. (7) (ii) Write the algorithm and ALP for traffic light control system. (6)	BTL 1	Remembering
14	Explain the operation of serial communication interface with a neat diagram. (13)	BTL 4	Analyzing
PART – C			
1	(i) Justify how D/A and A/D interfacing done with 8086 with an application. (8) (ii) What is DMA? Generalize the concepts of DMA based data transfer using DMA controller. (7)	BTL 6	Creating

2	(i) What is known as PPI, What is the use of interfacing the same in 8086? (5) (ii) Draw and explain the block diagram of alarm controller using 8086. (10)	BTL 6	Creating
3	Summarize the following: (i) Modes of operation of timer. (8) (ii) Operation of interrupt controller. (7)	BTL 5	Evaluating
4	Explain the 8251 USART with neat block diagram and its mode word, command word and status word.(15)	BTL 5	Evaluating

UNIT IV-MICROCONTROLLER

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins- Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

PART – A

S.No.	Questions	BT Level	Competence
1	Write the size of memory systems used in 8051 microcontroller?	BTL 1	Remembering
2	Identify the different operand types used in 8051	BTL 1	Remembering
3	List the counters available in 8051	BTL 1	Remembering
4	Label the register bank of 8051.	BTL 1	Remembering
5	Name the number of ports are bit addressable in 8051.	BTL 1	Remembering
6	Describe hardware and software interrupts in 8051. Mention Its vector addresses.	BTL 1	Remembering
7	Outline the words the power down mode of 8051.	BTL 2	Understanding
8	Classify operand addressing mode in 8051.	BTL 2	Understanding
9	Summarize the place a specific value in the DPTR register.	BTL 2	Understanding
10	What is meant by PSW in 8051?	BTL 2	Understanding
11	Illustrate the CJNE, DJNZ instruction.	BTL 3	Applying
12	Predict the port used as multifunction port and list the signals.	BTL 3	Applying
13	Show the bit manipulation instructions? Give two examples.	BTL 3	Applying
14	Distinguish between microprocessor & micro controller.	BTL 4	Analyzing
15	Examine the features of 8051 microcontroller.	BTL 4	Analyzing
16	Classify the data types of 8051	BTL 4	Analyzing
17	Assess about SFR available in 8051.	BTL 5	Evaluating
18	Summarize the features of 16-bit microcontroller.	BTL 5	Evaluating
19	Elaborate that how to set 8051 in idle mode?	BTL 6	Creating
20	Discuss about single bit instruction? Give example.	BTL 6	Creating

PART – B

1	Illustrate in detail about the architecture of 8051 microcontroller with neat diagram. (13)	BTL 4	Analyzing
2	Write an ALP using 8051 instructions to receive bytes of data serially and put them in P1. Set the baud rate at 4800, 8-bit data, and 1 stop bit. (13)	BTL 6	Creating
3	(i) Give PSW of 8051 and describe the uses of each bit. (6) (ii) Summarize the functions of the following signals in 8051: RST, EA, PSEN and ALE. (7)	BTL 2	Understanding
4	Describe the memory organization and SFR area of 8051 microcontroller. (13)	BTL 4	Analyzing

5	(i) Demonstrate in detail about arithmetic and control instruction set in 8051. (7) (ii) Write a program to multiply the given number 48H and 30H using 8051. (6)	BTL 3	Applying
6	Outline the I/O ports of 8051 microcontroller in detail. (13)	BTL 4	Analyzing
7	(i) Discuss in brief the various registers in 8051 microcontroller. (6) (ii) Discuss the internal memory organization of 8051 microcontroller. (7)	BTL 2	Understanding
8	Recognize the different addressing modes in 8051 microcontroller with an example. (13)	BTL 1	Remembering
9	(i) Tabulate the comparisons of CALL, RET and PUSH, POP instructions. (7) (ii) Describe the following 8051 instructions with an example: DA, MUL, SWAP and SJMP. (6)	BTL 1	Remembering
10	State and explain the working of the 8051 microcontroller. (13)	BTL 2	Understanding
11	(i) Describe the function of 8051 microcontroller instructions for performing data transfer and logical operations with suitable examples. (7) (ii) Identify the rotate and swap instructions with an example for each. (6)	BTL 1	Remembering
12	(i) Explain in detail about the SFR's in 8051. (7) (ii) Write an ALP in 8051 to convert a 16 bit binary number to ASCII. (6)	BTL 1	Remembering
13	Draw the pin diagram of 8051 microcontroller and explain the functions of each bit. (13)	BTL 3	Applying
14	Write an 8051 ALP to create a square wave of 66% duty cycle on bit 3 of port 1. (13)	BTL 5	Evaluating
PART – C			
1	(i) Write a brief note on external data move operations in 8051. (8) (ii) Write an 8051 ALP to add three BCD numbers stored in internal RAM locations 25H, 26H and 27H and put the result in RAM locations 31H (MSB) and 30H (LSB). Use Register R0 to store the intermediate result. (7)	BTL 6	Creating
2	Compose the functions of the signals present in 8051 with necessary diagrams. (15)	BTL 6	Creating
3	(i) Summarize block diagram how to access external memory devices in an 8051 based system. (8) (ii) Explain the Boolean processing capabilities of an 8051 microcontroller. (7)	BTL 5	Evaluating
4	(i) What are the functional blocks available in 8051? Explain with a block diagram. (8) (ii) Tabulate the program control instructions of 8051 and explain any five of them. (7)	BTL 5	Evaluating

UNIT V- INTERFACING MICROCONTROLLER

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD &

Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation.			
PART – A			
S.No.	Questions	BT Level	Competence
1	What are the types of sensors used for interfacing?	BTL 1	Remembering
2	Mention the advantages of microprocessor based system design?	BTL 1	Remembering
3	List out the classifications of stepper motor.	BTL 1	Remembering
4	How to change the stepper motor direction?	BTL 1	Remembering
5	Identify the features of serial port in Mode-0.	BTL 1	Remembering
6	Show the difference microprocessor and microcontroller.	BTL 1	Remembering
7	State in your own words how is stepper motor interfaced with 8051?	BTL 2	Understanding
8	What is the main idea of PWM in motor control using microcontroller?	BTL 2	Understanding
9	Describe the special functions registers controls the serial communication of 8051?	BTL 2	Understanding
10	Summarize the interrupt service routine.	BTL 2	Understanding
11	Sketch the ADC interfaced with 8051.	BTL 3	Applying
12	Discover the difference between polling and interrupt.	BTL 3	Applying
13	Illustrate your understanding on interrupt priority in 8051?	BTL 3	Applying
14	Analyze the use of SBUF register.	BTL 4	Analyzing
15	Point out the various types of memory.	BTL 4	Analyzing
16	Distinguish between Timer and Counter.	BTL 4	Analyzing
17	Compare successive approximation ADC with integrating type ADC.	BTL 5	Evaluating
18	Examine your opinion on registers associated with timer programming in 8051.	BTL 5	Evaluating
19	Elaborate about the priority level of the interrupt sources in 8051?	BTL 6	Creating
20	Discuss about baud rate of 8051.	BTL 6	Creating
PART – B			
1	(i) Discuss about serial port interface of 8051. (6) (ii) Discuss the various operating modes for serial port of 8051 microcontroller. (7)	BTL 2	Understanding
2	(i) Show how to interface an LCD display with μ C. (7) (ii) Demonstrate a program to display a character using LCD display. (6)	BTL 3	Applying
3	(i) How does the timer operate in 8051 in mode 2? Explain with suitable diagram. (7) (ii) Assuming XTAL= 11.0592 MHz, write an 8051 ALP to generate a square wave of 50 Hz frequency on pin P2.3. (6)	BTL 6	Creating
4	Describe about interrupt programming with respect to 8051 microcontroller with neat diagram. (13)	BTL 1	Remembering
5	(i) Mention the modes of serial communication in 8051. Demonstrate about the setting up of serial port modes. (7) (ii) Which event can trigger interrupts, and what happens?(6)	BTL 3	Applying

6	(i) Compare the different modes of operation of timers/counters in 8051 microcontroller with its associated register. (7) (ii) Analyze how to interface a 16 X 2 LCD display using 8051 microcontroller. (6)	BTL 4	Analyzing
7	Give short notes on (i) Sensor Interface (6) (ii) Display Interface (7)	BTL 2	Understanding
8	With a neat circuit diagram, explain how 4x4 Keypad is interfaced with 8051 microcontroller and write 8051 ALP for keypad scanning. (13)	BTL 4	Analyzing
9	(i) What are the functions of timers/counters? (6) (ii) Define the 16 bit timer mode and 8 bit auto reload mode of 8051 microcontroller. (7)	BTL 1	Remembering
10	(i) Illustrate the TMOD function register and its timer modes of operations. (7) (ii) Compare and contrast the IE and IP register in 8051. (6)	BTL 4	Analyzing
11	(i) How to transfer data between a PC and microcontroller using serial communication? Draw the necessary diagrams. (7) (ii) Show how to interface an 8 bit ADC with 8051 microcontroller. (6)	BTL 3	Applying
12	Describe the basic operation of a stepper motor and also discuss how to interface a stepper motor to 8051. (13)	BTL 1	Remembering
13	Evaluate about the various interrupts and their associated priorities in 8051 microcontroller. (13)	BTL 5	Evaluating
14	(i) Discuss how a DAC is interfaced with 8051 μ C. (7) (ii) With diagram, describe the operation of R-2R method of D/A converter. (6)	BTL 2	Understanding
PART – C			
1	(i) Explain how an LCD and Keyboard is interfaced with 8051. (8) (ii) Write about serial port interface of 8051 in detail. (7)	BTL 5	Evaluating
2	(i) Generalize the different methods of memory address decoding in 8051 microcontroller. (8) (ii) Develop an 8051 program to monitor P1 continuously the value 63H. It should get out of the monitoring only if P1=63H. (7)	BTL 6	Creating
3	Draw the diagram to interface a stepper motor with 8051 microcontroller and explain. Write its ALP to run the stepper motor in both forward and reverse direction with delay. (15)	BTL 5	Evaluating
4	You are provided with 4x4 matrix key board, a microcontroller and a seven segment display. Design a system which has to display the hexadecimal code of the corresponding key pressed. Assume all other relevant details. Give a program for your design. (15)	BTL 6	Creating