



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	MICROPROCESSORS AND MICROCONTROLLERS
Course Code	:	A60430 (R15)
Class	:	III-B. Tech II Semester
Branch	:	Electronics and Communication Engineering
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Course Coordinators	:	Mrs. C Deepthi, Associate Professor
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OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

UNIT-I 8086 ARCHITECTURE			
PART-A (Short Answer Questions)			
S. No	Questions	Blooms Taxonomy Level	Course Outcome
1.	Define Microprocessor and mention the power supply & clock frequency of 8086	Understand	1
2.	List out few applications of microprocessor-based system.	Understand	1
3.	Explain hardware interrupts in 8086	Understand	1
4.	Discuss about pipelining.	Remember	1
5.	List out the general purpose registers of 8086.	Remember	1
6.	List out the interrupts of 8086.	Understand	1
7.	List out features of 8086 microprocessor.	Remember	1
8.	Name the functional units of 8086 microprocessor	Remember	1
9.	Explain the functions of an accumulator.	Understand	1
10.	Explain why 8086 internal architecture is divided into BIU & EU?	Understand	1
11.	Discuss the functions of BIU.	Understand	1

12.	Discuss the functions of EU.	Understand	1
13.	Name the special function registers of 8086.	Remember	1
14.	Describe the flag register of 8086.	Understand	1
15.	Discuss how physical address is generated in 8086.	Understand	1
16.	List out advantages of memory segmentation.	Remember	1
17.	Evaluate the physical address, if base address is 5200H & offset address is 4510H.	Remember	1
18.	Explain the physical memory organization of 8086.	Understand	1
19.	List the operating modes of 8086.	Remember	1
20.	List the minimum mode signals.	Remember	1
21.	List the maximum mode signals.	Remember	1
22.	Explain ALE, BHE/S7, DEN, DT/R.	Understand	1
23.	Explain READY, MN/MX, HOLD and HLDA.	Understand	1
24.	Indicate the interrupts of 8086.	Understand	1
25.	Write about the sources of interrupts.	Understand	1
26.	Explain how many addresses can generate by 16 bit address bus.	Remember	1

PART-B (Long Answer Questions)

S. No	Questions	Blooms Taxonomy Level	Course Outcome
1	Explain the architecture of 8086 with neat diagram.	Understand	1
2	Compare 8085 & 8086 microprocessors.	Remember	1
3	Write the size of 8086 instruction queue and explain how does queue speed up the processing.	Remember	1
4	Explain general purpose & special purpose registers of 8086.	Understand	1
5	Explain the flag register of 8086.	Remember	1
6	Discuss memory segmentation & mention its advantages.	Remember	1
7	Describe the 8086 microprocessor pin-diagram.	Understand	1
8	Discuss about the functions of the following pins. a) TEST b) RQ/GT0 & RQ/GT1 c) QS0 & QS1 d) S0, S1, S2	Understand	1
9	Explain minimum mode configuration of 8086 microprocessor.	Understand	1
10	Explain minimum mode control signals of 8086.	Remember	1
11	Explain maximum mode configuration of 8086 microprocessor.	Remember	1
12	Explain maximum mode control signals of 8086.	Understand	1
13	Explain the read & write timing diagrams for maximum mode	Remember	1
14	Explain the read & write timing diagrams for minimum mode configuration.	Remember	1
15	Describe the function of the following signals. a) NMI b) \overline{LOCK} c) \overline{TEST} d) RESET	Understand	1
16	Describe the interrupts of 8086.	Understand	1

PART-C (Analytical Questions)

1	Calculate the effective address & physical address of the following instructions. (a) IMUL AX, [BP + BX - 8D] (b) SBB AL, ES:[SI + 5D] (c) PUSH AX (d) AND AH, [SI + 42D] (e) CMPSB	Remember	1
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	(f) CMPB 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.		
2	Calculate the physical address is represented by i) 4370:561EH ii) 7A32:0028H	Remember	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.	Remember	1
4	Identify 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=10000h	Understand	1

UNIT-II

INSTRUCTION SET AND ASSEMBLY LANGUAGE PROGRAMMING OF 8086

PART-A (Short Answer Questions)

1	Define addressing mode. Write the names of 8086 addressing modes.	Remember	2
2	Discuss about the immediate addressing mode of 8086 with example.	Understand	2
3	Explain the use of relative plus addressing mode.	Remember	2
4	Explain the instruction formats in 8086.	Understand	2
5	Define an instruction, opcode and operands.	Remember	2
6	Discuss the following instructions of 8086. a) ADC b) AAS c) IMUL d) CBW	Understand	2
7	Explain the meaning of following instructions. a) MOV BX,[1234H] b) ADC AX,BX	Understand	2
8	Discuss the instructions which will not affect flag registers.	Remember	2
9	Explain ESC, NOP and LOCK instructions of 8086.	Remember	2
10	Explain PUSH & POP instructions.	Understand	2
11	Explain XLAT instructions.	Remember	2
12	Describe the 16- bit registers are present in 8086.	Understand	2
13	Distinguish the TEST & logical AND instructions.	Remember	2
14	Explain stack pointer and instruction pointer.	Understand	2
15	Distinguish the ADD & INC instructions.	Understand	2
16	Explain IN & OUT instructions.	Understand	2
17	Write any two address transfer instructions.	Remember	2
18	Give two conditional jump instructions with an example.	Understand	2
19	Explain NEG, COMP instructions.	Understand	2
20	Define assembler directive. Give any two examples.	Remember	2
21	Explain DAA and AAA instructions.	Understand	2
22	Explain MUL and DIV instructions.	Remember	2
23	Explain rotate instructions.	Remember	2
24	Explain Shift instructions.	Understand	2
25	Define procedure and macro.	Understand	2

PART-B(Long Answer Questions)

1	Discuss the instructions formats of 8086.	Understand	2
2	Explain the various addressing modes of 8086 with examples.	Understand	2
3	Explain arithmetic instructions of 8086 examples.	Understand	2
4	Explain data transfer instructions of 8086 with examples.	Understand	2

5	Distinguish procedures and macros.	Understand	2
6	Write short notes on JUMP instructions with examples.	Remember	2
7	Explain the following instructions: a) WAIT b) HLT c) ESC d) NOP	Understand	2
8	Write the uses of Shift & rotate instructions.	Remember	2
9	Differentiate jump & loop instructions.	Understand	2
10	Write short notes on string instructions.	Remember	2
11	Write an assembly language program to reverse the given string "1,2,3,4,5".	Remember	2
12	Write the logical instructions available in 8086.	Remember	2

PART-C (Analytical Questions)

1	Write an assembly language program to convert unpacked BCD to ASCII.	Understand	3
2	Write an assembly language program to sort the given values in ascending order.	Remember	3
3	Write an assembly language program to insert a byte into the give array.	Remember	3
4	Write a delay loop which produces a delay of 500μsec on an 8086 with 5-MHz clock.	Understand	3
5	Write an assembly language program to find factorial of a given number.	Remember	3
6	Write an assembly language program to find sum of squares.	Understand	3
7	Write an assembly language program to find number of positive & negative numbers from a given array.	Remember	3
8	Write an assembly language program to convert ASCII to BCD.	Understand	3
9	Write an ALP to find cube of an 8-bit hexadecimal number.	Remember	3
10	Write an ALP to display 'IARE MPMC LAB' on the screen.	Understand	3
11	Write an ALP to convert a given sixteen bit binary number to its gray equivalent.	Remember	3

UNIT-III I/O INTERFACING WITH ADVANCED DEVICES

PART-A (Short Answer Questions)

1	Explain why I/O interface required for 8086.	Understand	4
2	List out the features of the 8255 (PPI).	Remember	4
3	Write how many port lines are present in 8255.	Remember	4
4	Discuss in how many modes 8255 can be operated.	Understand	4
5	Explain BSR mode of operation.	Understand	4
6	Write how many I/O modes of operations present in 8255.	Remember	4
7	What are the internal devices of 8255	Remember	4
8	Discuss the operation of Mode 0 in 8255	Understand	4
9	Write the applications of DAC	Remember	4
10	Discuss the operation of Mode 1 in 8255	Remember	4
11	Discuss the operation of Mode 2 in 8255	Understand	4
12	What is programmable peripheral device	Understand	4
13	Write the control word format for BSR mode.	Remember	4
14	Write the control word format for I/O mode.	Remember	4
15	Write in which mode of I/O operation Bi-directional data transfer takes place explain.	Remember	4
16	Calculate the control port address of 8255 if the base address	Remember	4

	is FFF0H.		
17	Explain the function of handshaking signals.	Understand	4
18	Define Memory mapped I/O.	Understand	4
19	Define I/O mapped I/O.	Understand	4
20	Explain the purpose of CE or CS pin on a memory chip.	Remember	4
21	Write the input for chip select.	Remember	4
22	Discuss the need for ADC.	Understand	4
23	List out the methods available for ADC.	Remember	4
24	Explain key bouncing.	Understand	4
25	Discuss in an 8086 based system, the maximum number of input output devices can be connected using I/O mapped I/O method is?	Remember	4
26	Explain in BSR mode of 8255 PPI which port can be set or reset.	Remember	4
27	Define Programmable interrupt controller?	Understand	4
28	Explain how high power devices are interfaced to 8086 using 8255 PPI.	Remember	4
29	What is the setting time of DAC 0800	Remember	4
31	Define interrupt vector table.	Understand	4
32	Define interrupt service routine.	Understand	4
33	Distinguish the difference between mask able and non-mask able interrupts?	Remember	4
34	List out the interrupts of 8086.	Understand	4
35	Write the priorities of 8086 interrupts.	Understand	4
36	List out the uses of INT-03H interrupt.	Remember	4
37	List different type of DOS interrupts?	Understand	4
38	List different types of BIOS interrupt?	Understand	4
39	Define serial communication.	Understand	4
40	Define parallel communication.	Remember	4
41	Discuss about TXC (Input terminal).	Remember	4
42	Define simplex communication with example.	Understand	4
43	Explain control word register (CWR).	Understand	4
44	Define half duplex communication with example.	Remember	4
45	Define full duplex communication with examples.	Understand	4
46	Discuss about C/D (Input terminal).	Remember	4
47	Discuss about synchronous communication.	Understand	4
48	List out the serial communication standards.	Remember	4
49	What are the data transfer schemes.	Understand	4
50	Features of 8251 USART.	Remember	4
51	Types of control words in 8251.	Understand	4
52	Discuss SYNDET/BD terminal.	Understand	4
53	Discuss about RXRDY terminal.	Remember	4
54	Discuss about Asynchronous communication.	Understand	4
55	Classify the various types of serial communications.	Understand	4
56	Explain the basic requirement of Programmable interrupt controller.	Understand	4
57	While executing main program, if two or more interrupts occur, then the sequence of appearance of interrupts is called?	Understand	4
58	Discuss once the processor responds to an INTR signal, the IF is automatically.	Understand	4
59	Discuss which external interrupt has highest priority .	Understand	4

60	Discuss which internal interrupt has highest priority.	Remember	4
PART-B (Long Answer Questions)			
1	Write an ALP to interface stepper motor with 8086.	Remember	4
2	Explain the control word format of 8255 in I/O & BSR mode.	Understand	4
3	Write a program for 8-bit ADC to sample analog input & store the digital value in memory.	Remember	4
4	Write an ALP to generate square wave.	Remember	4
5	Describe the block diagram of successive approximation method and explain.	Understand	4
6	Explain the interfacing diagram of ADC with 8255.	Understand	4
7	Explain how a stepper motor is interfaced to 8086.	Understand	4
8	Explain how a display device interfaced with 8086.	Remember	4
9	Discuss how a 4×4 key board matrix is connected to 8255.	Understand	4
10	Explain how the physical memory of 8086 is organized.	Understand	4
11	Explain the interrupt vector table.	Understand	5
12	Write short notes on interrupt service routine.	Remember	5
13	Construct an Interface of two 4k×8 EPROMS & and two 4k×8 RAM chips with 8086. Select suitable memory map.	Remember	5
14	Explain about the programmed I/O & interrupt driven I/O.	Understand	4
15	Explain the interrupt sequence in 8086 system.	Understand	5
16	Write short notes on 5 types of interrupts supported by 8086.	Remember	5
17	Describe the 8251 with neat block diagram.	Understand	5
18	Discuss how 8251 is used for serial communication of data.	Understand	5
19	Explain the advantages of using the USART	Understand	5
20	Discuss the types of serial communication.	Understand	6
21	Explain the interfacing of 8251 with 8086 with necessary circuit diagram.	Understand	6
22	Discuss the data transmission standards and their specifications.	Understand	6
23	Explain the pin structure of RS232C & also discuss about voltage & current specifications of RS 232C.	Remember	6
24	Describe the logic diagram to convert TTL to RS232C conversion and RS232C to TTL conversion.	Understand	6
PART-C (Analytical Questions)			
1	Illustrate the status register of 8251 for the given statement. Read status register and wait for DSR and TxRDY to become active. One active, get character from PC keyboard using INT B8H (keyboard routine).	Understand	4
2	Write an ALP for to transfer the data serially.	Remember	6
3	Identify the errors in receiving the data from asynchronous mode of operation using 8251.	Remember	6
4	Write the sequence of instructions required to initialize 8251 at address A0H and A1H for the configuration below. i)Character length – 8 bits.	Remember	6

UNIT-IV			
INTRODUCTION TO 8051 MICROCONTROLLERS			
PART-A (Short Answer Questions)			
1	Write the differences between microprocessor and microcontroller.	Remember	7
2	Discuss which ports of 8051 are bit addressable.	Understand	7
3	Explain why Port 0 needs pull-up resistors.	Understand	7
4	Write out of 128 bytes of RAM in the 8051, how many bytes are bit addressable? List them.	Remember	7
5	Explain how to save the status of P2.7 in RAM location 31.	Understand	7
6	List out the types of addressing modes in microcontroller.	Remember	7
7	Discuss about I/O port expansion.	Understand	7
8	Explain how external interrupts are serviced in 8051	Understand	7
9	Discuss the flag pattern available in 8051.	Understand	7
10	Write the value of register A after each of the following instructions. MOV A,#26H	Remember	7
11	List out the on-chip resources available in the 8051 microcontroller?	Remember	7
12	Write the number of register banks in 8051 and say how the CPU knows which bank is currently in use.	Remember	7
13	Explain the controls signals to be used,	Understand	7
14	Write the function of the bits PSW.3 & PSW.4.	Remember	7
15	Distinguish polling and interrupt mechanism. Find the value of the PSW register after the execution of the instructions.	Understand	7
16	Explain the use of SFR in 8051.	Understand	7
17	List all the SFRs involved in 8051.	Remember	7
18	Write the addressing modes supported by 8051.	Remember	7
PART-B (Long Answer Questions)			
1	Discuss the register set of 8051 and also discuss how memory and I/O addressing is done in 8051.	Understand	7
2	Discuss internal architecture of 8051 microcontroller in detail.	Understand	7
3	Describe the five addressing modes of 8051 microcontroller with example.	Understand	7
4	Sketch and illustrate how to access external memory devices in an 8051 based system.	Understand	7
5	Discuss the internal memory organization of the 8051 microcontroller.	Remember	7
6	Design an 8051 based system with 16 K bytes of program ROM and 16 K bytes of data ROM.	Understand	7
7	Discuss about the memory organization and special function registers in 8051 microcontroller.	Understand	7
9	Describe the operation of I/O ports in 8051 with neat sketch.	Remember	7
10	Demonstrate the functioning of A & B registers of 8051.	Understand	7
11	List the format of PSW register of 8051 and explain each bit.	Remember	7
PART-C (Analytical Questions)			
1	Write 8051 program to convert packed BCD number available in accumulator, into two ASCII numbers and save the min internal RAM locations 48H and 49H.	Remember	7
2	Develop 8051 program to move a block of data from external program memory to external data memory.	Remember	7
3	Use PUSH instruction to put the number 82H in RAM	Understand	7

	locations 34H to 37H. also write same program without PUSH instruction.		
4	Generate 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.	Remember	7
5	Write 8051 program to OR the contents of port 1 and port 2, put the result in external RAM location 0102h.	Remember	7
UNIT-V 8051 Real Time Control			
PART-A (Short Answer Questions)			
1	Discuss the clock source for the timers.	Understand	8
2	Explain the use of EA bit.	Understand	8
3	Discuss the function of the TMOD register.	Understand	8
4	Explain the maximum delay that can be generated with the crystal frequency of 22MHz.	Remember	8
5	Explain auto reload mode is allowed in which mode of the timer.	Understand	8
6	Find out the roll over value for the timer in Mode 0, Mode 1 and Mode 2.	Understand	8
7	Discuss what steps are followed when we need to turn on any timer.	Remember	8
8	Discuss if Timer 0 is to be used as a counter, then at what particular pin clock pulse need to be applied.	Understand	8
9	Discuss in the instruction “MOV TH1,#-3”, what is the value that is being loaded in the TH1 register ?	Remember	8
10	What is the counting rate of a machine cycle in correlation to the oscillator frequency for timers.	Understand	8
11	Explain Which special function register play a vital role in the timer/counter mode selection process by allocating the bits in it.	Understand	8
12	Discuss how many machine cycle/s is / are executed by the counters in 8051 in order to detect '1' to '0' transition at the external pin.	Remember	8
13	Classify the types of communication with examples.	Remember	8
14	What are the contents of the IE register, when the interrupt of the memory location 0x00 is caused?	Understand	8
15	Explain which pin of the external hardware is said to exhibit INT0 interrupt.	Understand	8
16	Which bit of the IE register is used to enable TxD/RxD interrupt.	Understand	8
17	Describe which register is used to make the pulse a level or a edge triggered pulse.	Understand	8
18	Classify the external interrupts of 8051.	Remember	8
19	Discuss which bits are control the external interrupts.	Understand	8
20	Differentiate serial and parallel communication.	Remember	8
PART-B (Long Answer Questions)			
1	Explain the register IE format of 8051	Understand	8
2	Classify the interrupt sources of 8051?	Remember	8
3	Explain about interrupt priority (IP).	Understand	8
4	Explain about TCON & PCON operation with an example.	Understand	8

5	Discuss the vector address and priority sequence of 8051 interrupts.	Understand	8
6	Explain the timers/counters in 8051.	Understand	8
7	Discuss about timer/counter modes operation.	Remember	8
8	Explain TMOD operation with an example.	Understand	8
9	What are the standards of serial communication.	Understand	8
10	Classify the types of serial communication with examples.	Remember	8
PART-C (Analytical Questions)			
1	Write an assembly language program to interface serial communication to 8051	Understand	8
2	Write program to transmit a character say 'A' continuously based on interrupt. The microcontroller uses a clock of 12MHz with a baud rate of 1202. The program is executed following a hardware reset.	Remember	8
3	Write an assembly language program to exchange the content of FFh and FF00h.	Understand	8
4	Write a program instruction to load a byte in a memory location 9000H and increment the content of the memory location.	Remember	8

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