

VALLIAMMAI ENGINEERING COLLEGE

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Department of Electronics and Instrumentation Engineering

Question Bank

EE6502 MICROPROCESSORS AND MICROCONTROLLERS

UNIT-I 8085 PROCESSOR

Part-A

1. What are the flags available in 8085 processor? **(BT-1)**
2. Explain the function of program counter in 8085 microprocessor. **(BT-4)**
3. Give the control and status signals of 8085 microprocessor and mention its need. **(BT-2)**
4. Explain the following signals of 8085: RST 7.5, READY. **(BT-4)**
5. Show the schematic to generate separate read/write control signals for memory and I/O related signals in 8085. **(BT-3)**
6. Illustrate the functions of the two status signals S0 and S1 in 8085. **(BT-3)**
7. Specify the four control signals commonly used by the 8085 MPU. **(BT-1)**
8. What is stack and what is the function of stack pointer? **(BT-1)**
9. Give two applications of 8085. **(BT-2)**
10. Calculate the execution time of an instruction MVI A,82H in 8085 runs at 2 MHz. **(BT-3)**
11. Give the various machine cycles of 8085. **(BT-2)**
12. If the memory address of the last location of a 1Kbyte memory chip is FBFFH, What is the starting address? **(BT-6)**
13. Differentiate I/O mapped I/O and Memory mapped I/O. **(BT-4)**
14. Draw the schematic of latching low-order address bus in 8085 microprocessor. **(BT-2)**
15. What are the interrupts available in 8085? **(BT-1)**
16. Compare software and hardware interrupts. **(BT-5)**
17. Give the function of ALE signal in 8085 microprocessor. **(BT-2)**
18. Define polling. **(BT-1)**
19. What is meant by level triggered input? Which of the interrupts in 8085 are level triggered? **(BT-1)**
20. Explain the function of keyboard interrupts. **(BT-5)**

PART B

1. Draw the pin configuration of 8085 and explain the purpose of each signal. **(BT-1)** (16)
2. Deduce the functional description of 8085 Microprocessor with neat diagram. **(BT-5)** (16)
3. Describe the hardware architecture of 8085 microprocessor with a neat block diagram. **(BT-1)** (16)
4. (i) Draw the timing diagram of Opcode fetch machine cycle and explain. **(BT-4)** (8)
(ii) Draw and explain the timing diagram of memory write operation. **(BT-4)** (8)
5. (i) Describe in detail about memory interfacing using 8085. **(BT-1)** (8)
(ii) Draw and explain the flag register of 8085 in brief. **(BT-1)** (8)
6. (i) Draw the timing diagram for memory read cycle and explain. **(BT-4)** (8)
(ii) Draw and explain the timing diagram for MVI A,32H. **(BT-4)** (8)
7. (i) Illustrate the execution of instruction CALL 4322H with timing diagram. Assume the relevant details. **(BT-3)** (8)
(ii) Illustrate about the bus structure of 8085 processor. **(BT-3)** (8)
8. Design an interface circuit for microprocessor controlled system to meet the following specifications. (16)
(a) 74LS138: 3to 8 decoder.
(b) 2732 (4K x 8): EPROM- address range should begin at 0000h and additional 4K memory space should be available for future expansion.
(c) 6116 (2K x 8): CMOS R/W memory **(BT-6)**
9. Discuss with flow diagram how an instruction is fetched and executed in an 8085 processor. **(BT-2)** (16)
10. (i) Discuss in detail about the I/O read and write operation of 8085 processor with timing diagram. **(BT-2)** (8)
(ii) Discuss briefly the input and output interfacing techniques used in 8085 microprocessor. **(BT-2)** (8)
11. Explain an 8085 interrupt process and mention the difference between a maskable and a non maskable interrupts. **(BT-2)** (16)
12. (i) Draw and explain the timing diagram for SHLD 16-bit address. **(BT-4)** (8)
(ii) Explain the interpretation of the accumulator bit pattern for SIM and RIM instruction. **(BT-4)** (8)
13. (i) What are the data transfer mechanism supported by 8085 processor? **(BT-1)** (8)
(ii) Write short notes on RST (RESTART) instructions. **(BT-1)** (8)
14. (i) How many flags are there in flag Register? Examine the significance of each. **(BT-3)** (8)
(ii) Two machine codes 3EH and 32H are stored in memory locations 2000H and 2001H respectively. The first machine code 3EH represents the opcode to load a data byte in the accumulator and the second code 32H represents the data byte to be loaded in the accumulator. Illustrate and explain the bus timings of 8085 as these machine codes are executed. **(BT-3)** (8)

UNIT – II - PROGRAMMING OF 8085 PROCESSOR

Part-A

1. State the addressing mode of the SHLD instruction and how it works. **(BT-1)**
2. If the clock frequency is 5 MHz, Evaluate the time required to execute an instruction having 18 T-states. **(BT-5)**
3. List the different machine control instructions used in 8085 microprocessor. **(BT-1)**
4. What is wait state? When the 8085 processor will enter the wait state? **(BT-1)**
5. If the 8085 adds 87H and 79H, show the contents of the accumulator and the status of S, Z and CY flags. **(BT-3)**
6. Point out the similarity and difference between compare and subtract instructions. **(BT-4)**
7. State the purpose and importance of NOP instruction. **(BT-1)**
8. Illustrate the function of 8085 instruction: CPI and RRC. **(BT-3)**
9. Differentiate CALL and JUMP instruction. **(BT-4)**
10. Develop an ALP to add 5 data bytes stored in memory locations starting at 4500H and display the sum in next memory location. **(BT-6)**
11. Develop an assembly level program in 8085 to check whether the content of accumulator is even or odd. **(BT-6)**
12. What is meant by look up table? **(BT-1)**
13. Discuss how time delay is generated using subroutines? **(BT-2)**
14. What is meant by nested subroutine? **(BT-1)**
15. Give the instructions associated with subroutines. **(BT-2)**
16. Explain the function of stack. **(BT-4)**
17. Differentiate cascade stack and memory stack. **(BT-2)**
18. Explain any two stack related instructions in 8085 microprocessor. **(BT-5)**
19. Examine the purpose of the I/O instructions IN and OUT. **(BT-3)**
20. Describe the operation carried out when 8085 executes RST0 instruction. **(BT-2)**

PART B

1. Describe with suitable example the instruction format and different addressing modes of 8085 processor. **(BT-1)** (16)
2. Explain the operations carried out when 8085 executes the instruction,
(i) MOV A, M (ii) XCHG (iii) DAD B (iv) DAA **(BT-4)** (16)
3. (i) Describe with suitable examples the data transfer and control instructions in 8085 microprocessor. **(BT-2)** (8)
(ii) Describe the categories of instructions used for data manipulation in 8085 μ p. **(BT-2)** (8)
4. (i) Write short notes on branching operations available in 8085. **(BT-1)** (8)
(ii) Compare the similarities and differences of CALL and RET instructions with PUSH and POP instructions. **(BT-4)** (8)
5. (i) Evaluate the contents of registers A, B, C and D and the flag status ie (S,Z and CY) as the following instructions are executed. **(BT-5)**
MVI A,00H
MVI B, F8H
MOV C,A
MOV D,B
HLT (8)
(ii) Explain the following instructions LXI, CMC, RLC, RAL. **(BT-4)** (8)
6. (i) Illustrate a program with a flowchart to multiply two 8-bit numbers. **(BT-3)** (8)
(ii) Illustrate an 8085 ALP to count continuously in hexadecimal from FFH to 00H in a system with a 0.5 μ s clock period. Use register C to set up 1ms delay between each count and display the numbers. **(BT-5)** (8)
7. (i) Write a program to obtain 1's complement of 16-bit number stored at location FC15(H) and FC16(H).Store the result at location FC17 (H) and FC18 (H).MSB should be in location FC16(H) and FC18(H). **(BT-6)** (8)
(ii) Develop an ALP to load the hexadecimal numbers 9BH and A7H in registers D and E respectively and add the numbers. If the sum is greater than FFH display 01H at output port 00H; Otherwise display the sum.**(BT-6)** (8)

- 8 Express a two digit BCD number stored in memory into hexadecimal number. Use the NEAR procedure call. **(BT-2)** (16)
- 9 Develop a program to transfer 50 bytes of data from memory location starting from 2000H to 3000H using the string instruction MOVSB. **(BT-6)** (16)
10. (i) Assume the SP register contains 2099H, register B contains 32H and register C contains 57H. Write the instructions to save the contents of the BC register pair on the stack and specify the register contents (SP, B and C) after execution. **(BT-2)** (8)
- (ii) Illustrate a program to find the two's complement of a 16 bit data with example. **(BT-3)** (8)
11. (i) Write an ALP using 8085 instructions to implement a hexadecimal to 7-segment decoder using look-up table method. **(BT-3)** (8)
- (ii) Write the 8085 ALP for modulo 10 counter with flowchart. **(BT-3)** (8)
12. (i) Illustrate with a suitable 8085 assembly language program, the use of subroutine instructions. **(BT-3)** (8)
- (ii) Develop an 8085 assembly language program to sort numbers in ascending order. **(BT-6)** (8)
13. (i) Develop an assembly language program based on 8085 microprocessor instruction set to search the smallest data in a set. **(BT-6)** (8)
- (ii) Describe what is meant by counting, looping and indexing. **(BT-1)** (8)
14. (i) Explain briefly about subroutine with example. **(BT-5)** (8)
- (ii) Describe with suitable example the operation of stack. **(BT-1)** (8)

UNIT- III 8051 MICRO CONTROLLER

Part - A

1. What are the addressing modes of 8051 microcontroller? **(BT-1)**
2. Which ports of 8051 are bit addressable? **(BT-1)**
3. What are the main features of 8051 microcontroller? **(BT-1)**
4. List the on-chip peripherals of 8051 microcontroller. **(BT-1)**
5. Illustrate the alternative functions assigned to Port 3 pins of 8051 microcontroller. **(BT-3)**
6. What is meant by SFR in 8051? Give an example. **(BT-1)**
7. Name the flags available in 8051. **(BT-1)**
8. Explain why Port 0 needs pull-up resistors? **(BT-4)**
9. Distinguish between microprocessor and microcontroller. **(BT-2)**
10. Write the vector address and priority sequence of 8051 interrupts. **(BT-1)**
11. Quantify the number of register banks in 8051 and say how the CPU knows which bank is currently in use. **(BT-3)**
12. Illustrate the function of R-registers in microcontrollers. **(BT-3)**
13. Explain the purpose of overflow flag in microcontroller. **(BT-5)**
14. Explain about instruction pipelining. **(BT-4)**
15. Write the purpose of PSEN and EA in microcontroller. **(BT-6)**
16. Give the interrupt sources in 8051 microcontroller. **(BT-2)**
17. Analyze the purpose of timing diagram in 8051 microcontroller. **(BT-4)**
18. Summarize the functions of TMOD register in 8051. **(BT-5)**
19. Differentiate the given 8051 instruction: MOVC and MOVX. **(BT-2)**
20. What do you understand by bit addressable RAM in 8051 microcontroller? **(BT-2)**

PART B

1. Describe with a neat block diagram the architecture of 8051 microcontroller. **(BT-1)** (16)
2. Explain in detail about the pin diagram of 8051 microcontroller. **(BT-4)** (16)
3. (i) Name the register set of 8051 and also discuss how memory and I/O addressing is done in 8051. **(BT-2)** (8)
(ii) Illustrate how to interface 8051 with RS232 connectors via the MAX 232 Chip with a neat diagram. **(BT-3)** (8)
4. (i) Elaborate the Boolean processing capabilities of a 8051 microcontroller. **(BT-2)** (8)
(ii) Illustrate with block diagram how to access external memory devices in an 8051 based system. **(BT-3)** (8)
5. (i) Explain the I/O ports and their functions of 8051 microcontroller. **(BT-4)** (8)
(ii) Illustrate the different modes with which the timer/counter in 8051 can be programmed. **(BT-3)** (8)
6. Discuss the addressing modes of 8051 microcontroller with suitable examples. **(BT-2)** (16)
7. (i) Describe in detail the different methods of memory address decoding in 8051. **(BT-1)** (8)
(ii) Describe the operation of stack in 8051. **(BT-1)** (8)
8. Describe briefly about interrupts used in 8051 microcontroller. **(BT-1)** (16)
9. Discuss in detail about the memory organization of 8051 microcontroller and explain. **(BT-2)**. (16)
10. (i) Explain how internal timers are used to generate time delay by using 8051 microcontroller. **(BT-4)** (8)
(ii) Show how serial communication is performed in 8051 microcontroller. **(BT-3)** (8)
11. Explain the programming concepts of 8051 in comparison with 80805. **(BT-5)** (16)
12. Describe in detail about the special function registers in 8051 microcontroller. **(BT-4)** (16)
13. Design an 8051 based system with 16 K bytes of program ROM and 16 K bytes of data ROM. **(BT-6)** (16)
14. What are the functional blocks available in 8051? Explain with a block diagram. **(BT-1)** (16)

UNIT – IV PERIPHERAL INTERFACING

Part - A

1. What are different peripheral interfacing used with 8085 microprocessor? **(BT-1)**
2. What are the output terminals in USART 8251? **(BT-1)**
3. Show the mode instruction format of 8251 peripheral device. **(BT-3)**
4. Distinguish between synchronous and asynchronous transmission. **(BT-2)**
5. Explain how data is transmitted in asynchronous serial communication. **(BT-5)**
6. What are the functions of USART? **(BT-1)**
7. What is the need for 8259 PIC? **(BT-1)**
8. Illustrate the salient features of Intel 8259 PIC. **(BT-3)**
9. Mention the use of ISR and PR registers in 8259 PIC. **(BT-3)**
10. Point out the operating modes in 8253 timer/Counter. **(BT-4)**
11. Define the Strobed I/O mode of 8255 Programmable peripheral interface. **(BT-1)**
12. Give the operation modes of 8255. **(BT-2)**
13. Explain what is meant by key debouncing? **(BT-5)**
14. Differentiate between two key lockout and N-key rollover modes in 8279. **(BT-4)**
15. Give the applications of D/A converter interfacing with 8255. **(BT-2)**
16. Draw the 3-bit digital to analog converter block and plot its analog output. **(BT-2)**
17. Mention the categories of Digital to Analog converters. **(BT-4)**
18. What is handshaking and what are handshake signals? **(BT-1)**
19. What are the control signals to be used, if 8051 Microcontroller demands interfacing of external memory? **(BT-6)**
20. Explain how wait states can be introduced in the machine cycle using READY signal to interface slow memory devices? **(BT-5)**

PART B

- 1 Explain how the 8255A programmable peripheral interface chip can be used with the 8085 for reading and writing parallel data from and to I/O devices. **(BT-4)** (16)
2. (i) Explain the architecture, functions and registers of the 8255 PPI. **(BT-4)** (8)
(ii) Describe how programmable timer is interfaced with 8085. **(BT-1)** (8)
3. Explain the internal architecture and programming of 8259 Programmable Interrupt Controller. **(BT-5)** (16)
4. Discuss how a PIC, 8259 is interfaced to an 8085 based system. How does 8259 service an interrupt? **(BT-2)** (16)
5. Discuss the various modes of operation of the programmable interval timer, 8254 **(BT-2)** (16)
6. (i) Illustrate briefly the block diagram of 8254 timer. **(BT-3)** (8)
(ii) Describe with neat sketch about block diagram and function of 8237. **(BT-1)** (8)
7. (i) With neat functional block diagram describe the functions of 8251 USART. **(BT-1)** (8)
(ii) Demonstrate how the serial data transfer can be performed using 8251 USART. **(BT-3)** (8)
8. With a neat diagram Discuss briefly about the internal architecture and registers of 8279 keyboard/ display controller. **(BT-2)** (16)
9. Describe how keyboard and Display controller is interfaced to 8085. **(BT-1)** (16)
10. Interface an 8 bit ADC with 8085 microprocessor and write the algorithm and assembly language program to get 500 digital equivalent data of analog samples taken at every one millisecond and store them in memory. Make suitable assumptions. **(BT-6)** (16)
11. (i) Explain with neat sketch, the A/D converter interfacing with 8085 microprocessor. **(BT-4)** (8)
(ii) Explain the interfacing of D/A converter with 8085 microprocessor. **(BT-4)** (8)
12. (i) Describe with neat sketch, the A/D converter interfacing with 8051. **(BT-1)** (8)
(ii) Explain the interfacing of D/A converter with 8051 microcontroller with neat diagram. **(BT-4)** (8)
13. Describe how keyboard and display controller is interfaced to 8051. **(BT-1)** (16)
14. (i) Illustrate the operation of 8255 PPI Port A programmed as input and output in mode 1 with necessary handshaking signals. **(BT-3)** (8)
(ii) Illustrate the features of DMA controller. **(BT-3)** (8)

UNIT – V MICRO CONTROLLER PROGRAMMING & APPLICATIONS

Part – A

1. How is pulse generated from microcontroller for stepper motor control? **(BT-5)**
2. State the principle of microcontroller based stepper motor control system. **(BT-1)**
3. Write an ALP to receive input from port P1.5 and if it is high then an output 35H is sent to port 0. **(BT-6)**
4. What are I/O instructions in 8051 microcontroller? **(BT-1)**
5. LED is connected to pin P0.7, Write an assembly program to toggle the LED forever. **(BT-6)**
6. What is program status word? **(BT-1)**
7. Write the functions performed by JBC and CJNE instructions in 8051 microcontroller. **(BT-3)**
8. Deduce the control signals from 8051 microcontroller required for washing machine control. **(BT-5)**
9. Distinguish between MOV and MOVX instructions. **(BT-2)**
10. Name four Data Transfer Instructions. **(BT-1)**
11. How does 8051 differentiate between the external and internal program memory. **(BT-4)**
12. State how to save the status of P2.7 in RAM bit location 31? **(BT-4)**
13. Explain the instruction MUL available in 8051. **(BT-4)**
14. Show a block diagram of a closed loop system for the speed control of a servo motor. **(BT-3)**
15. What is multiplexed display? What is its advantage? **(BT-1)**
16. What is called read-modify-write? **(BT-1)**
17. Why do you need a driver in between the microcontroller and the stepper motor? **(BT-2)**
18. Show how to drive a solenoid or a motor winding from the output port pin of a microcontroller? **(BT-3)**
19. In a microcontroller based system on-chip ROM, why does the size of the ROM matter? **(BT-2)**
20. Discuss what happens in power down mode of a microcontroller? **(BT-2)**

PART B

1. Explain the function of 8051 microcontroller instructions for performing arithmetic and logical operations with suitable example. **(BT-5)** (16)
2. Explain with neat diagram the closed loop control of servo motor using microcontroller. **(BT-4)** (16)
3. (i) Tabulate the program control instructions of 8051 and explain any five of them **(BT-1)** (8)
(ii) Code a program to rotate stepper motor continuously using 8051. **(BT-3)** (8)
4. (i) Explain the different types of instructions set used in 8051 microcontroller. **(BT-4)** (8)
(ii) Explain the following 8051 instructions with example. **(BT-4)** (8)
DA, MUL, SWAP, SJMP.
5. (i) Write a 8051 ALP to copy 10 bytes of data stored from location 30H to another location starting from 50H. **(BT-6)** (8)
(ii) Explain an assembly language program based on 8051 microcontroller instruction set to perform four arithmetic operations on two 8 bit data. **(BT-4)** (8)
6. (i) Explain in detail the different methods of memory address decoding in 8051 **(BT-4)** (8)
(ii) Write a program to add two 16 bit numbers. The numbers are 8C8D and 8D8C. Place the sum in R7 and R6. R6 should have the lower byte. **(BT-6)** (8)
7. (i) Demonstrate with a neat diagram, a 4x4 keyboard interfacing with 8051 microcontroller. **(BT-3)** (8)
(ii) Discuss how to program and interface LCD to an 8051. **(BT-2)** (8)
8. With neat diagram, Illustrate the interfacing of Keyboard and display device with 8051 Microcontroller. **(BT-2)** (16)
9. Describe in detail about the microcontroller application in a closed loop control of servo motor. **(BT-1)** (16)
10. (i) Describe how does one control a stepper motor via opto isolator? Explain it with a neat diagram **(BT-1)** (8)
(ii) Assume that P1 is an input port connected to a temperature sensor. Write a program to read the temperature and test it for the value 75. According to the test

results, place the temperature value into the registers indicated by the following:

If $T=75$ then $A=75$

If $T<75$ then $R1=T$

If $T>75$ then $R2=T$

(BT-6)

(8)

11. Describe with neat diagram the stepper motor control using microcontroller. **(BT-1)** **(16)**
12. A switch (SW) is connected to pin P2.7. Write a ALP to monitor the status of SW and perform the following.
 - (i) If $SW = 0$, the stepper motor moves clockwise
 - (ii) If $SW = 1$, the stepper motor moves counter clockwise. **(BT-6)** **(16)**
13. Describe the control system design of washing machine using microcontroller programming. **(BT-1)** **(16)**
14. Design and explain the microcontroller based system to position a tool head at (x, y) co-ordinate using stepper motors. Assume the necessary parameters. **(BT-6)** **(16)**

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