Reg. No. : | E | N | G | G | T | R | E | E | . | C | O | M |

Question Paper Code : 51013

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Fourth Semester

Electrical and Electronics Engineering

EE 3404 – MICROPROCESSOR AND MICROCONTROLLER

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Calculate the number of memory chips needed to design 8 K-byte memory if the memory chip size is 1024 × 1.

2. Differentiate between the carry flag and auxiliary carry flag with suitable example.

3. What is the functionality of DAA instruction?

4. Write the differences between a memory mapped IO and IO mapped IO.

5. What is the significance of modem control signals in 8251?

6. Specify the value to be loaded into the control word of 8255, so that it is configured in MODE 0 with port A, port C as an output and port B as an input.

7. Differentiate 8085 microprocessor and 8051 microcontroller.

8. What are the interrupts available in 8051 microcontroller? Also mention the priority of those interrupts.

9. What is brownout reset?

10. Mention the functionality of DECFSZ f, d instruction.

PART B — (5 × 13 = 65 marks)

11. (a) The instruction code 01001111 (4FH) is stored in memory location 5005H. Illustrate the data flow with appropriate sketch and list the sequence of events when the instruction code is fetched by the 8085 MPU.

Or

(b) Two machine codes – 00111110 (3EH) and 00110010 (32H) are stored in memory locations 8000H and 8001H, 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 the bus timings as these machine codes are executed. Calculate the time required to execute the Opcode Fetch and the Memory Read cycles and the entire instruction cycle if the clock frequency is 2 MHz.

12. (a) (i) Load the bit pattern 91H in register B and 87H in register C. Mask all the bits except D0 from registers B and C. If D0 is at logic 1 in both registers, turn on the light connected to the D0 position of output port 01H; otherwise, turn off the light. (6)

(ii) Define addressing modes. Also, comment on the addressing modes supported in 8085 microprocessor with suitable examples. (7)

Or

(b) (i) Write instructions to clear the CY flag, to load number FFH in register B, and increment (B). If the CY flag is set, display 01 at the output port; otherwise, display the contents of register B. Explain your results. (6)

(ii) Write a subroutine to set the Zero flag and check whether the instruction JZ (Jump on Zero) functions properly, without modifying any register contents other than flags. (7)

13. (a) Discuss in detail about the various modes and operation of the programmable timer 8254 when it is interfaced with the 8085 processor.

Or

(b) Discuss in detail about the various modes of operation of the 8279 with various functional blocks and the control word registers.

14. (a) Briefly explain the methodology of interfacing and configuring an external memory with 8051 microcontrollers.

Or

(b) Discuss in detail about timer mode and control operations of 8051 microcontrollers with the relevant special function registers.

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15. (a) With a neat sketch, detail about the different functional blocks available in a PIC16 series of microcontrollers.

Or

(b) Briefly explain the process of configuring and programming the external interrupts in PIC16 Series MCU. Illustrate it with a real-time example.

PART C — (1 × 15 = 15 marks)

16. (a) Design a LED based binary counter using Timer0. Assume XTAL = 10 MHz, Microcontroller = 8051.

Or

(b) Detail the methodology of transferring/receiving a serial data with 8051 microcontrollers with a real time example.

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