2022

M.Sc.

Third Semester

CORE – 09

PHYSICS

Course Code: MPHC 3.11

(Embedded Systems: Introduction to Microcontrollers)

Total Mark: 70 *Pass Mark: 28*

Time: 3 hours

Answer five *questions, taking* one *from each unit.*

UNIT–I

1. (a) Give three differences between a microcontroller and a microprocessor. 3
   (b) Draw the pin diagram of 8085 microprocessor and describe the function of each set of pins. 5
   (c) Name the different types of flag registers of 8085 microprocessor 2
   (d) Write an assembly program for 8085 μP to add two numbers. 4

2. (a) Convert $(3A6)_{16}$ to binary and decimal number. 2
   (b) Draw the internal architecture of 8085 microprocessor and explain the function of the different registers of 8085 μP. 8
   (c) Explain briefly the three different instruction word size for 8085 microprocessor with the help of examples for each type. Write an assembly program to get 05 H in accumulator A and move it to register B. 3+1=4

UNIT–II

3. (a) Draw the pin diagram of 8051 microcontroller and describe the function of each set of pins. 5
   (b) Briefly explain the program status word (PSW) of 8051 microcontroller. 3
   (c) What is a T-state? In total how many T-states does a machine cycle have. 2

(d) Differentiate between maskable and non-maskable interrupts. 2

(e) If 8051 μC is operated with 12 MHz oscillator, find the execution time for the instruction: ADD A, 45H. 2

4. (a) Draw the internal architecture of 8051 microcontroller and explain in brief the functions of each register and unit. 3+7=10

(b) Explain the different types of interrupts in 8051 microcontroller. 4

UNIT–III

5. (a) Explain the different addressing modes in 8051 microcontroller with the help of examples for each type. 8

(b) Write an 8051 program in C to send values 00-FF to port P1. 2

(c) Write an 8051 program in C to get a byte of data from P0. Make the program in such a way that if the data size is less than 100, send it to P1, otherwise send it to P2. 4

6. (a) Explain in detail the arithmetic and logical instructions of 8051 microcontroller. Provide example(s) for each type. 8

(b) Write an 8051 C program to send hex values for ASCII characters of 0,1,2,3,4,5, A, B, C and D to port P1. 2

(c) Write an 8051 C program to toggle all the bits of P1 continuously. 2

(d) Briefly explain the organization of program memory in 8051 microcontroller. 2

UNIT–IV

7. (a) Explain in detail TNOP register and TCON register. 6

(b) With the help of block diagram, explain synchronous serial communication and asynchronous serial communication. 4

(c) Define baud rate. Calculate the bit transmission rate for a baud rate of 9600. 1+1=2

(d) Define simplex, half duplex and full duplex serial communication links. 2

8. (a) Explain in detail the three special function registers used ofr serial communication in 8051 microcontroller. 6

(b) Classify the different types of interrupts. Explain the different types of interrut in 8051 microcontroller. What are the two registers that controls the operation of all the five interrupts? 6

(c) Explain in brief interrupt enable register (IE) and interrupt priority register (IP). 2

UNIT–V

9. (a) Describe the structure of an embedded program. 5

(b) Explain the embedded product development life cycle (EDLC). 4

(c) Explain the concept of infinite loop. 3

(d) What do you mean by debugging a program? 2

10. (a) Explain the pin diagram of Arduino microcontroller. 5

(b) Explain the internal architecture of Arduino microcontroller. 5

(c) Write a C program for Arduino microcontroller to blink two LEDs with a delay of 350 ms. 4

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