CBCS SCHEME

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21EI/BM42

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Embedded Controllers

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Compare 8051 microcontroller with 8052 and 8031 microcontroller. **(04 Marks)**

b. With a architectural block diagram, explain 8051 microcontroller. **(10 Marks)**

c. Define pulse, machine cycle and state in 8051 microcontroller. Explain with a diagram oscillator and clock circuit. **(06 Marks)**

OR

2 a. With a diagram, explain the design of vannueman architecture and Harvard architecture. **(06 Marks)**

b. Discuss the following in 8051 micro controller :
(i) Program status word register.
(ii) External RAM and ROM connected to 8051 microcontroller. **(08 Marks)**

c. What is an SFR in 8051 micro controller? List out all the SFR used in the microcontroller. **(06 Marks)**

Module-2

3 a. Differentiate between Jump and Loop instructions. Explain with suitable instruction example (i) conditional and unconditional jump (ii) ACALL and LCALL. **(08 Marks)**

b. Write a program to copy a block of 10 bytes of data from RAM locations starting at 35 H to RAM locations starting at 65 H. **(06 Marks)**

c. Write ALP for Register A having packed BCD. Convert packed BCD which is in Register A to two ASCII numbers and place them in R_2 and R_6. **(06 Marks)**

OR

4 a. Discuss the advantages and disadvantages of Register indirect addressing mode. List out the instruction examples of Register Indirect Addressing mode. **(06 Marks)**

b. Write ALP, (i) To create a square wave of 50% duty cycle an bit 0 of part 1 (ii) To create a square wave of 66% duty cycle on bit 3 of port 1. **(08 Marks)**

c. Write ALP, (i) To make P_1 as input port (ii) To get a byte of Hex data in the range of 00-FFH from port P_1 and convert it to decimal. Save the digits in R7, R6 and R5, where the least significant digit is in R7. **(06 Marks)**

Module-3

5 a. Write an 8051 C program to toggle all the bits of port P0, P1 and P2 continuously with 250 ms delay. Use the EX-OR operator, with XTAL = 11.0592 MHz. **(08 Marks)**

b. Write a C program to send out the value 44 H serially one bit at a time via P1.0.The LSB should go out first. **(06 Marks)**

c. With a diagram, explain RAM data space usage by the 8051 C compiler. **(06 Marks)**

OR

6 a. What is data serialization? Discuss the two ways to transfer a byte of data serially in C 8051. List out the different Bit wise logical operators in 8051 C. **(08 Marks)**

b. Write a C program to send out the value 44H serially one bit at a time via P1.0. The MSB should go out first. **(06 Marks)**

c. Write an 8051C program to calculate the checksum byte for the data 25H, 62H, 3FH and 52H. Use port P2 for data and for checksum byte use port P1. **(06 Marks)**

Module-4

7 a. With a bit format, explain the following SFR : (i) SCON register (ii) PCON register. **(08 Marks)**

b. Write a 8051 assembly and C program to generate a delay of 12 μs using Timer 1 in mode 1 with XTAL frequency of 22 MHz. **(08 Marks)**

c. With an example, explain data framing in serial communication of 8051. **(04 Marks)**

OR

8 a. Discuss the importance of TI Flag and RI Flag in serial communication of 8051. **(08 Marks)**

b. Write ALP to generate a square wave of 50% duty cycle on the port P1.5 bit. Timer 0, mode 1 is used to generate the time delay. Write assembly program, with initial value FFF2H. **(06 Marks)**

c. Write an 8051 C program to toggle all bits of Port P_2 continuously every 500 ms. User Timer 1, Mode 1 and initial value A5FEH to create the delay. **(06 Marks)**

Module-5

9 a. With a bit format of SFR, explain interrupt enable register and interrupt priority register. **(08 Marks)**

b. What is stepper motor? Explain with a diagram the interfacing of 8051 to stepper motor. **(06 Marks)**

c. With an example, explain enabling and disabling of an interrupt in 8051. **(06 Marks)**

OR

10 a. Write a C program using Interrupts to do the following :
(i) Receive data serially and send it to port P0
(ii) Read port P1, Transmit data serially and give a copy to port P2
(iii) Make Timer 0. Generate a square wave of 5 kHz frequency in Port P0.1.
Assume XTAL = 11.0592 MHz, baud rate 4800. **(10 Marks)**

b. With a diagram, explain Interfacing of ADC0804 with 8051 microcontroller. **(10 Marks)**

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