

CBCS SCHEME

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17EE52

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020 Microcontroller

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Draw the block diagram of 8051 μ C. Explain the working of:
- (i) Program counter and data pointer
 - (ii) Accumulator and register B
 - (iii) Register bank, stack and stack pointer
- (10 Marks)
- b. Draw and explain program status word register of 8051 μ C. Calculate the status of carry, auxiliary carry and parity flags after the addition of (i) 55h and 52h (ii) 91h and 92h. What is the hexadecimal sum in each case?
- (10 Marks)

OR

- 2 a. Explain register indirect addressing mode. State its advantages. (05 Marks)
- b. Explain indexed addressing mode with MOVC and MOVX instructions. (05 Marks)
- c. What is memory address decoding? Explain the steps in interfacing memory chips to μ C. Develop the interfacing circuit to connect 4K \times 8 memory IC using logic gates as decoder. Assume the memory address from 3000 h to 3FFF h. (10 Marks)

Module-2

- 3 a. Define assembler directive. Explain DB and ORG directives. (05 Marks)
- b. Write a program to multiply 35 by 10 using repeated addition. Save the result in R6. Neglect carry. (05 Marks)
- c. Explain the working of MUL AB and DIV AB instructions. (05 Marks)
- d. State the following instructions as valid or invalid. Give reasons:
- (i) MOV A, @ R4
 - (ii) PUSH R0
 - (iii) MOV R5, R6
 - (iv) POP 00h
 - (v) MOV P1, #0FFh
- (05 Marks)

OR

- 4 a. Explain the working of port 0 as input port. State its dual role. (05 Marks)
- b. Calculate the delay for the following program. Assume clock frequency as 11.0592 MHz.

Machine cycle

MOV R3, #255	1
GO: NOP	1
NOP	1
DJNZ R3, GO	2
RET	1

(05 Marks)

- c. How the following numbers are represented in 8051?
- (i) 4 (ii) -4 (iii) 82 (iv) -82 (v) -128 (05 Marks)
- d. Explain the working of overflow flag. After the addition of +45 with +04, what is the status of overflow flag and what is the sum, according to μ C? (05 Marks)

Module-3

- 5 a. State and explain the advantages of using 'C' program for 8051 μ C. (05 Marks)
- b. Write 8051 'C' program to toggle bit D7 of port 0, 60,000 times. (05 Marks)
- c. Explain the differences between sbit, bit and sfr declarations. (05 Marks)
- d. Write 8051 'C' program to convert ASCII digits '9' and '2' to packed BCD and display it on port P2. (05 Marks)

OR

- 6 a. Explain the bit status of TMOD register. (05 Marks)
 b. Write an assembly program to generate square wave with ON time = 5 ms and OFF time = 20 ms on all pins of port-1. Use Timer0 in Mode1. Assume crystal frequency = 11.0592 MHz. Calculate the duty cycle. Explain TH0, TL0 and TMOD calculations. (10 Marks)
 c. Explain the characteristics and operations of mode-2 program in 8051 timer. (05 Marks)

Module-4

- 7 a. Explain the bit status of SCON register. With XTAL = 11.0592 MHz, calculate the TH1 value needed for the baud rates; (i) 9600 (ii) 2400. (10 Marks)
 b. A square wave is being generated at pin P1.2. This square wave is to be sent to a receiver connected in serial form to 8051. Write an assembly language program for this. Explain the calculations of TMOD, SCON, TH1 value. Assume Timer0 and Timer1 in Mode2. Assume baud rate = 9600 and XTAL = 11.0592 MHz. (10 Marks)

OR

- 8 a. Compare interrupts versus polling methods, in 8051 interrupts. (05 Marks)
 b. Explain the 6 interrupts in 8051. Also state its ROM location. (05 Marks)
 c. Write an assembly program to get data continuously from port 0 and send it to port P1 while simultaneously creating a square wave of 200 μ s period on P2.1 Use Timer0 to create square wave. Assume XTAL = 11.0592 MHz. Explain IE, TMOD, TH0 calculations. (10 Marks)

Module-5

- 9 a. State advantages of LCD over multi-segment LEDs. Explain the architecture and working of 14 pin LCD. Draw its schematic diagram. (10 Marks)
 b. Explain the interfacing circuit of DAC to 8051 μ C. If $I_{ref} = 2$ mA, calculate the DAC output if all the inputs to DAC are high. (05 Marks)
 c. Calculate V_0 of sawtooth wave (with respect to DAC interface) with the following program. Assume $R_F = 5$ K Ω in I/V converter in DAC circuit interfacing. [Refer fig.Q9(c)]

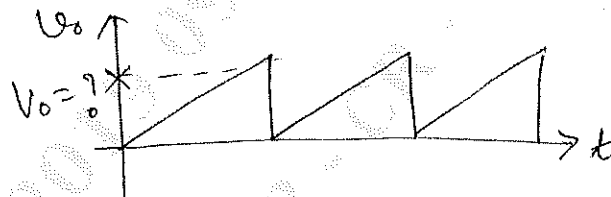


Fig.Q9(c)

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Program: MOV A, #00h
        MOV P1, A
GO: INC A
        SJMP GO
  
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(05 Marks)

OR

- 10 a. Explain the construction and working of stepper motor. Also explain 2- ϕ , 4 step stepping sequence, step angle and steps per revolution. (10 Marks)
 b. Explain the control word format of 8255 IC. What is the control word for all the ports as output ports? (05 Marks)
 c. Explain the principle of opto isolator and its purpose in interfacing to 8051 μ C. (05 Marks)
