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Fourth Semester B.E. Degree Examination, June/July 08
Microcontrollers

3

Time: 3 hrs. Max. Marks:100

Note : Answer any FIVE questions choosing at least TWO from each part.

Part – A

1. a. Explain the differences between the following :
 i) RISC and CISC processors ii) Harvard and Von-Neumann architectures. (08 Marks)
 b. With the help of timing diagram, explain how to interface 8K EPROM and 4K RAM to 8051 microcontroller. (07 Marks)
 c. Explain TCON and TMOD registers of 8051, with the help of timer/counter control logic. (05 Marks)
2. a. Write a program to put the number 34h in registers R4, R5, R6 and R7 using different addressing modes. (06 Marks)
 b. Explain the operation performed by the following instructions :
 i) SWAP A ii) MOV c, b iii) DA A iv) SUBB A, Sr (06 Marks)
 c. Write a program to swap the contents of registers R7 and R6 in register block 0, in four different ways. (08 Marks)
3. a. Explain different ranges for jmp instruction available in 8051 microcontroller. (08 Marks)
 b. Explain with a neat diagram, the significance of stack memory, whenever a CALL instruction is executed by the 8051 microcontroller. (05 Marks)
 c. Write a program to find the address of the first two internal RAM locations between 20h to 60 h, which contains consecutive numbers. If so, set the carry flag to 1 else clear the flag, using a subroutine. (07 Marks)
4. a. Write an 8051 C program to toggle all the bits of P1, P2 and P0 continuously with a 250 ms delay. Use sfr keyword to declare the port addresses. (06 Marks)
 b. Explain with an example, bit-wise logic operators for 8051 C. (06 Marks)
 c. A switch (SW) is connected to P2.0 port pin. Write a C program to send out the value 44H serially one bit at a time via P1.0, depending upon the switch condition : When SW = 0 ; LSB should go out first, When SW = 1 ; MSB should go out first (08 Marks)

Part – B

5. a. Explain the steps to program timers in mode1 and write an 8051 program to generate a square wave of 50% duty cycle on the pin P1.5 (06 Marks)
 b. Assume that a 1 Hz frequency pulse is connected to input pin P3.4. Write an 8051 program to display counter 1 on an LCD. Set the initial value to get one minute delay. (06 Marks)
 c. A switch is connected to the pin P1.2. Write an 8051 C program to monitor the switch and create the following frequencies on pin P1.7
 i) When SW = 0 ; 500 Hz ii) When SW = 1 ; 750 Hz
 Use timer 0, mode 1 for both of them. (08 Marks)
6. a. List the advantages of serial communication over parallel communication. (06 Marks)
 b. Write an 8051 program to send the message "The Earth is beautiful", to the serial port continuously. Assume XTAL = 11.0592 MHz, 9600 baud rate, 8-bit data and one stop bit. (08 Marks)
 c. Write an 8051 program to send the text string "Good Luck" to serial #1 of the DS 89C4X0. Set the band rate at 9600, 8 bit data and 1 stop bit. (06 Marks)
7. a. What are edge triggered interrupts? How to set INT0 as level triggered interrupt and INT1 as edge triggered interrupt, explain with the help of SFR related to it. (08 Marks)
 b. Write an 8051 C program using interrupts to do the following :
 i) Receive the data serially and send it to P0 ii) Read port P1 transmit data serially and give a copy to P2 iii) Make T0 to generate a square wave of 5 kHz frequency on P0.1. Assume that XTAL = 11.0592 MHz, set the baud rate at 4800. (12 Marks)
8. a. Draw the block schematic of DAC 0808 interfaced to 8051 at port P1 and write an 8051 program to generate sine wave. (10 Marks)
 b. How to interface DC motor to 8051 microcontroller using opto isolator? Write a C Program to move DC motor with 25% duty cycle pulse. (10 Marks)

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Fourth Semester B.E. Degree Examination, Dec 08 / Jan 09
Microcontrollers

Time: 3 hrs.

Max. Marks:100

Note : Answer FIVE full questions, selecting atleast TWO questions from each part.

PART - A

1. a. Differentiate between a microprocessor and a microcontroller. (06 Marks)
b. List the salient features of 8051 microcontroller. (06 Marks)
c. Explain the memory organization in 8051 controller. (08 Marks)
2. a. Explain the following instructions with suitable examples.
i) SWAP ii) MOVX iii) XCHD iv) DA A. (06 Marks)
b. Write an assembly language programme using 8051 mnemonics to convert 2 digit BCD to binary. (06 Marks)
c. What is a stack? Explain with examples the PUSH and POP instructions. (08 Marks)
3. a. Differentiate between a counter and timer. Explain the timer modes of operation in 8051. (06 Marks)
b. Name and explain the significance of interrupt of 8051 controllers. (06 Marks)
c. Write a 8051 C program to toggle all bits of port P0 continuously. Use timer 0 to generate the delay of 1 sec between each toggle. (08 Marks)
4. a. Differentiate between JMP and call instruction. Explain with suitable examples the different ranges associated with call instructions. (06 Marks)
b. Explain with suitable examples Lcall and Scall instruction in 8051. (06 Marks)
c. Write an assembly language program to realize an exclusive OR gate. Assume P1.0 and P1.1 as inputs and P2.0 as output bit. (08 Marks)

PART - B

5. a. Write an 8051C program to transfer the message "Good morning" serially at 9600 baud, 8 bit data, 1 stop bit. (06 Marks)
b. Explain serial port of 8051. Explain the significance of SCOM register in detail. (06 Marks)
c. What is the use of MODEM in serial communication? Describe different types of modulation techniques used in MODEM. (08 Marks)
6. a. What is key bouncing? How it is eliminated? (04 Marks)
b. Show a simple keyboard interface with a port of 8051 and explain its operation. (06 Marks)
c. With suitable hardware and software features, explain an interface of 7 segment display in multiplexed connection. (10 Marks)
7. a. Explain the salient features of an ADC. What are the signals of importance while interfacing such an ADC to a 8051 controller? (10 Marks)
b. Show a scheme of interfacing an 8-bit ADC to a 8051 controller. Write the software required to obtain the output from such an interface. Discuss practical application. (10 Marks)

- 8 a. Show an interface of 8051 controller with a stepper motor drive circuit and explain its principles of operation. (10 Marks)
- b. Write an 8051 assembly language program to (step) control stepper motor using connections given in fig. 8(b) below.

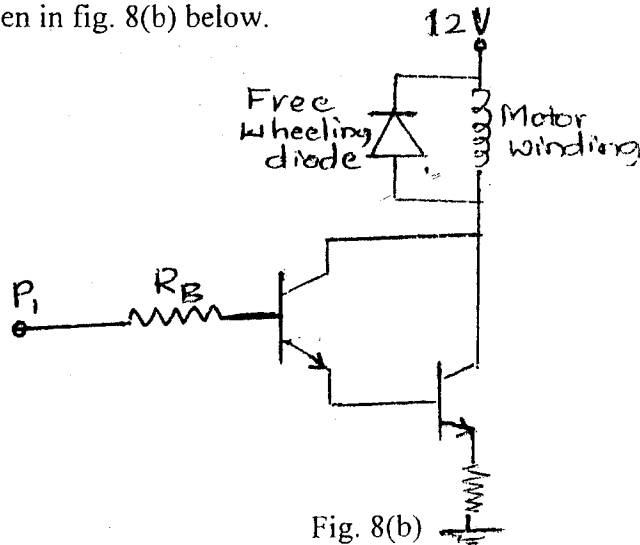


Fig. 8(b)

Assume code sequence is stored in a memory location pointed by DPTR code. Use suitable delay routine, comment on each of instruction used. (10 Marks)

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Fourth Semester B.E. Degree Examination, June-July 2009
Microcontrollers

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions choosing at least two questions from each unit.

PART - A

- 1 a. Define microcontroller and differentiate the RISC and CISC processors. (05 Marks)
 b. With the neat block diagram, explain the architecture of 8051. (10 Marks)
 c. Show the neat schematic interface 8K External Data RAM to 8051. (05 Marks)
- 2 a. What is addressing mode? Explain different addressing modes with examples. (09 Marks)
 b. Specify the memory area for bit level logical instructions used in 8051 and list bit level logical instructions. (05 Marks)
 c. Write an Assembly language program to add two input data's of 16-bit result in three different addressing modes. (06 Marks)
- 3 a. Explain the following instructions with their function byte and cycle used :
 i) CJNE dest, source target ; ii) A call target
 iii) DJNZ R₁,rel ; iv) SWAP A ; v) DA A (10 Marks)
 b. Explain the different types of Jump instructions in 8051. (06 Marks)
 c. What is interrupt? List different interrupts using 8051 with their ISR address. (04 Marks)
- 4 a. Write a C-program to toggle all bits of P₀ and P₂ continuously with 250m sec delay. Use inverting operator. (08 Marks)
 b. What is data serialization? Explain different types with examples. (06 Marks)
 c. Write a 8051 C-program to convert a given hex-data OFFls in to its equivalent decimal data and display the result digits on P₀, P₁ and P₂ (06 Marks)

PART - B

- 5 a. Explain T mod and T con registers with its bit pattern. (08 Marks)
 b. Explain mode-2 programming with neat sketch and specify the program steps. (06 Marks)
 c. Assuming that clock pulses are Fed in to Pty T₁, write a program for counter-1 in mode-2 to count pulses and display the state of TL₁ count on P₂ (06 Marks)
- 6 a. Explain RS-323 hand shaking signals and specify the purpose of max-232 while interfacing. (07 Marks)
 b. Write 8051 program to transfer serially the message "VTU BELGAUM" continuously at a band rate of 9600. (07 Marks)
 c. Explain the importance of TI and RI Flags. (06 Marks)
- 7 a. Explain IE and IP registers with their bit pattern and show how priorities change with example. (10 Marks)
 b. Write 8051 interrupt program to do the following :
 i) Receive data serially P₂ and sent it to P₁ continuously.
 ii) Make timer-0 to generate a square wave of 5KHz frequency at port Po.1.
 Assume XTAL – 11.059MH_z at a band of 9600. (10 Marks)
- 8 a. Explain the registers and pins of LCD and write an ALP to display message "HELLO" as LCD displays. (10 Marks)
 b. Describe the 8051 connection to stepper motor and write an Assembly language program to rotate the motor clockwise for 180°. Assuming motor specification 1.8°/step (10 Marks)

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Fourth Semester B.E. Degree Examination, Dec.09/Jan.10
Microcontrollers

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. What is a microcontroller? With a neat block diagram explain, Harvard architecture. Distinguish between i) microcontroller and microprocessor, and ii) Harvard architecture and Von Neumton's architecture. (10 Marks)
- b. With a neat block diagram, explain the function of each block of 8051 microcontroller architecture. (10 Marks)
- 2 a. Mention the addressing modes of 8051 microcontroller. Explain each of them with an example for each. (08 Marks)
- b. Correct the following instructions, if found to have any wrong syntax. Explain the operation of corrected instructions.
i) MOV #C,0A ii) MOV A,RS1 iii) MOV A,@R7 iv) MOV 0346H,@RO
v) XCHG B,@R3. (05 Marks)
- c. Show the stack contents, SP contents & contents of any register affected after each step of the following sequence of operations.
MOV SP,#70H
MOV R5,#30H
MOV A,#44H
ADD A,R5
MOV R4,A
PUSH 4
PUSH 5
POP 4. (07 Marks)
- 3 a. With the relevant figure, write a sequence of events that occur in 8051 microcontroller when the CALL and RET instructions are executed. (06 Marks)
- b. Write an ALP in 8051 to find the largest number among the 12, 8 bit numbers stored in the internal RAM. (07 Marks)
- c. Write an ALP in 8051 to perform the following operation:
 $Z=(X1+Y1)*(X2+Y2)$ where, X1, X2, Y1 and Y2 are the 8 bit hexadecimal numbers stored in the RAM locations. Write a subroutine for the addition and assume that each addition result with 8 bit number. (07 Marks)
- 4 a. Discuss the data types in 8051 C. (06 Marks)
- b. What are the ways to create time delay? Discuss the factors affecting the accuracy of the time delay. Write a function in C to create a time delay. (08 Marks)
- c. Write a C program in 8051 to convert packed BCD Ox39 to ASCII and display the bytes on p1 and p2. (06 Marks)

PART – B

- 5 a. What is the difference between timer and counter? Explain the function of each bit in the TMOD. (04 Marks)
- b. Write an ALP to generate square wave on pin P1.5 of 500 Hz (approximately) with a subroutine to provide a time delay of 30.38 μ s using timer 0. Assume that crystal frequency of 8051 is 11.0592Hz. (10 Marks)
- c. In what way timer/counter mode2 programming is different from mode 0 and mode 1? (06 Marks)

Important Note: 1. On completing your answers, draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8=50, will be treated as malpractice.

- 6 a. Explain full duplex, half duplex and simplex serial data transfer. (06 Marks)
- b. Write the steps required for programming 8051 to transfer data serially. (08 Marks)
- c. Write a C program for the 8051 to transfer the letter "C" serially at 9600 baud continuously. Use 8 bit data and 1 stop bit. (06 Marks)

- 7 a. What are Interrupts and Interrupt Subroutines? Explain the interrupts that are present in 8051. (06 Marks)
- b. Discuss what happens if interrupts INTO, INT1 and TF1 are activated at the same time. Assume priority levels set by the power up reset. Program the IP register to assign the highest priority to INT1 and then discuss what happens if INTO, INT1 and TF1 are activated at the same time. Assume that external hardware interrupts are edge triggered. (06 Marks)
- c. What is a level triggered interrupt? How to get the edge triggered interrupt? Explain the procedure to sample the low level triggered interrupt and edge triggered interrupt. (08 Marks)

- 8 a. Explain, with a block diagram step by step procedure involved to interface 4x4 matrix keyboard with 8051. (10 Marks)
- b. Discuss interfacing of ADC0804 with 8051 using timing diagram for ADC. (10 Marks)

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Fourth Semester B.E. Degree Examination, May/June 2010
Micro-Controllers

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer any FIVE full questions
selecting at least TWO questions from each part.
2. Standard notations are used.**

PART – A

1.
 - a. Give the basic block diagrams, of a microprocessor and a microcontroller and justify that a microcontroller is an onchip computer. (08 Marks)
 - b. What is Harvard architecture? Show that 8051 uses Harvard architecture. (06 Marks)
 - c. Briefly discuss the features of 8051 microcontroller. (06 Marks)

2.
 - a. Explain the following in brief, with respect to 8051 :
 - i) The pin that connects the external memory
 - ii) The port that has open-drain output
 - iii) Asynchronous input pins of microcontrollers
 - iv) The register that sequences the program execution
 - v) Program status word. (10 Marks)
 - b. Write the circuit diagram for Port1. Explain the input, output operations in 8051 using Port1. (10 Marks)

3.
 - a. Give the mode word, (TMOD) and the control word, (TCON) values to perform the following operations :
 - i) Timer 0 in auto reload mode
 - ii) Timer 1 in mode1. (06 Marks)
 - b. Explain the serial data interrupts TI and RI in 8051. (06 Marks)
 - c. Name the addressing modes of the following instructions :
 - i) `MOVC A, @ A + DPTR`
 - ii) `MULAB`
 - iii) `MOV B, #OFFh`
 - iv) `SUBB A, 45h`. (04 Marks)
 - d. Explain any two data transfer instructions and any one arithmetic instruction in 8051. (04 Marks)

4.
 - a. Name the instructions which perform bit level logical operations in 8051. Give an example to show bit level logic operation. (06 Marks)
 - b. Write an assembly program in 8051 to add two 16 bit numbers stored in external memory. After addition store the results in internal data memory. (06 Marks)
 - c. Write the result statement after execution of each instruction :


```
MOV 81 h, #30 h
MOV RO, #OAC h
PUSH 00
PUSH 00
POP 01
POP 80 h
MOV A, # OFF h
XRL A, 80 h
POP 82 h
POP 83 h
MOVX @ DPTR, A.
```

(08 Marks)

PART – B

- 5 a. Write an assembly program in 8051 to convert a given two digit hexadecimal number to its equivalent decimal number and send the result on to port 2 byte by byte. (06 Marks)
- b. How is a 'call' subroutine different from an interrupt service routine? Give an example to show call subroutine' operation in 8051. (06 Marks)
- c. What are the final numbers in A, B and OV flag after the execution?
 MOV A, # 7B h
 MOV OFO, #02 h
 MUL AB
 MOV B, # OFE h
 MUL AB. (04 Marks)
- d. Give the magnitude of different data types used in embedded 'C'. (04 Marks)
- 6 a. Write the block diagram to show mode 2 operation of timer 1, as a counter, also write the programming steps to perform the same. (06 Marks)
- b. Find the delay generated by timer 0 in the following code. Calculate the delay generated excluding the instruction overhead. What count has to be loaded in TLO and THO if delay has to be increased to 25 msec?
 CLR P2.3
 HERE : MOV TMOD, #01
 MOV TLO, # 3E h
 MOV THO, # 0 B8 h
 SETB P2.3
 SETB TRO
 AGAIN : JNB TFO, AGAIN
 CLR TFO
 CLR TRO
 CLR P2.3. (08 Marks)
- c. What is asynchronous serial communication? Explain the different modes of serial communication in 8051. (06 Marks)
- 7 a. Write 8051 'C' program to receive bytes of data serially and put them in P1. Set the baud rate as 4800, 8 bit data and one stop bit. (06 Marks)
- b. Explain the different interrupt vector addresses in 8051. (04 Marks)
- c. Write a 8051 'C' program that continuously gets a single bit of data from P1.7 and sends it to P1.0, which creates a square wave of 200 μ s period on pin P2.5. XTAL frequency = 11.0592 MHz. (10 Marks)
- 8 a. Interface LCD to 8051 and write a 8051 assembly /8051 'C' program to send 'M', 'A' 'S', 'T', 'E', 'R' to LCD display. (10 Marks)
- b. Show the interfacing of a stepper motor to 8051 and write 8051 assembly/8051 'C' program to rotate stepper motor 2 rotations clockwise and one rotation anticlockwise with appropriate delay. (10 Marks)
