VALLIAMMAI ENGINEERING COLLEGE

S.R.M. Nagar Kattankulathur-603203

Department of Electronics and Instrumentation Engineering

Question Bank

SUBJECT CODE / NAME: ET7102 / MICROCONTROLLER BASED SYSTEM DESIGN

BRANCH   : M.E. (C&I)   YEAR / SEM   :   I / I

………………………………………………………………………………

UNIT-I

8051 ARCHITECTURE

PART – A

1. What is the function of the bits PSW.3 & PSW.4?

2. Find the value of the PSW register after the execution of the instructions.

    MOV A, #95

    ADD A, #120

3. What is the use of SFR in 8051?

4. List all the SFRs involved in 8051.

5. What are the addressing modes supported by 8051?

6. Write one instruction each using the following addressing modes.

    a. Immediate

    b. Register

    c. Register indirect

    d. Direct

7. List out the instructions set available in 8051.

8. What do these instructions do in 8051 micro controller?

    a. SETB 86H

    b. CLR 87H

    c. SETB 92H

d. SETB 0A7H

9. What should be loaded in TCON register to start Timer0 & Timer1?

10. How is the TMOD register modified to make each of the timers operate as counters?.

11. What is the use of TCON register?

12. What is meant by the term ISR?

13. How many interrupts are there in 8051? What are they?

14. Which is the highest priority interrupt of 8051?

15. Which port in micro controller is bit addressable?

16. For the SCON register, brief the function of the 8 bit.

17. If the crystal frequency is 22MHz, what will be the baud rate of

a. TH1=-3

b. TH1=-12 with SMOD= 0 & SMOD=1.

18. What is the use of PCON register?

19. What is the use of TSCON register?

20. How does 8051 differentiate internal and external memory.

PART-B

1.   Explain in detail the architecture of 8051 with a neat diagram.   (8)

2.   Discuss in detail about memory organization & the explanation of memory in 8051
       with a neat diagram.   (8)

3.   Discuss in detail about the mode1 , mode2 and counter junction of timer.   (8)

4.   How do you program the 8051 to transfer data serially?   (8)

5.   Discuss in detail with a neat block diagram, the architecture of 8051.Give its pin
      diagram also. Briefly explain the role of timers in counting external event using 8051
      micro controller.   (16)

6.   Briefly explain the JMP & CALL instruction available in 8051.   (16)

7.   Discuss in detail about the instructions set of 8051.   (16)

8.   Discuss in detail the various modes of operation of timers. Write a detailed note on
      how instructions are handled by 8051.   (16)

9. With a neat diagram explain the internal structure of P0 & P1 available in 8051.   (8)

10.   Explain the various addressing modes of 8051 with suitable examples.   (8)

11. Briefly explain the different addressing modes of 8051 with example.   (8)

12. Draw & explain the internal architectural block diagram of 8051.   (8)

13. Discuss about external hardware interrupt in 8051.   (16)

14. Briefly discuss about the serial communication in 8051 microcontroller.   (16)

UNIT-II
8051 PROGRAMMING
PART- A

1. What is the result of the following code & where it is kept?

    MOV R4,#25H

    MOV A,#1FH

    ADD A,R4

2. Find the content of register A after the execution of the following code.

    CLR A

    ORA A,#99H

    CPL A

3. Write a program to add two sixteen bit numbers.

4. Explain the instruction MUL available in 8051.

5. What is the error in the following code?

    MOV P1,#0FH

    CPL P1

6. A switch SW is connected to pin P1.4 .Write a program to output 00 on port1 if SW=0
    and output FFH on port1if SW=1.

7. Write a program to multiply two numbers stored in RAM locations 35H and 36H, and
    store the result in the next two locations.

8. Program Timer 1 to generate a square of 10KHz.Assume XTAL=20MHz.

9. Under what conditions are the TI and RI bits raised?

10. What is the function of SBUF register?

11. State the significance of RTOS.

12. Define task.

13. Give the format of IE register.

14. Explain PUSH and POP instruction

15. What is baud rate?

16. What is IP register in 8051?

17. Add 25H and 70H and find the contents of AC, CY flags.

18. Give the role of watchdog timer.

19. Write a C18 program to set bit RB0 and send it to RC7 after inverting it.

20. Mention the importance of RTOs for real time applications

PART-B

1.   Write a program to bring in a byte of data serially one bit at a time via P1.0.   (4)

2.   Write a program to toggle the bits of P1, while creating a time delay of 200ms.   (8)

3.   Write a program to get a value from P1 & send the square of its value

to P2 continuously.   (4)

4. Briefly explain the interrupt programming available in 8051 micro controller.   (8)

5. Write a program in 8051 to implement the function $D=B^2-4*A*C$.   (8)

6. Write an assembly language program for 8051 to transfer letter "A" serially at 4800

baud rate continuously. Assume all other required details.   (8)

7.   Explain the interrupt structure of 8051 micro controller. Explain how interrupts

are prioritized.   (8)

8. Write 8051 assembly language program to read data from P1 when negative

edge triggered at INT0 & supply the data to P2 by masking the upper 4 bits.   (8)

9. Explain the types of JUMP & CALL instruction of 8051 with example.   (8)

10. Write an assembly language program in 8051 to generate a delay of 10ms.   (8)

11. Explain the mode2 operation in serial data COM of 8051 with an assembly

language program.   (16)

12. A square wave is being generated at pin P1.2. This square wave is sent to a

   receiver connected in serial form to the 8051.Write an assembly language program

    that performs the above task.   (8)

13. Assume that 5 BCD data items are stored in RAM locations starting at 40H.

   Write a program to find sum of all the numbers.   (8)

14. What value should be loaded into timer register so as to have a time delay of 5 ms.

   write a program to create a pulse width of 5 ms on pin P2.3.Assume crystal

   frequency to be 11.0592MHz?   (16)

15. Discuss in detail about the 2 different RTOS for 8051.   (16)

16. Briefly explain the implementation of digital thermometer using RTOS.   (8)

17. Discuss in detail about the two different RTOS for 8051.   (8)

18. Write a program in 8051 to transfer the message HELLO serially at 9600 baud,

   8 bit data,1 stop bit.   (8)

19. Write a program to glow LED for a fraction of second when external interrupt INT0 is

   activated.   (8)

20. Explain in detail about branching instructions of 8051.   (8)

UNIT – III

PIC MICROCONTROLLER

PART-A

1. What are the groups of instruction set in PIC micro controller?

2. Using the instruction of PIC micro controller convert BCD to hex.

3. Name the addressing modes of PIC micro controller.

4. What type of architecture is there in PIC micro controller?

5. List the functions of I/O port in PIC micro controller.

6. What are modes of operation of timers in PIC micro controller?

7. What is instruction pipe lining?

8. What are the benefits of having RISC architecture?

9. Give the role of watch dog timer in PIC micro controller.

10. Write the importance of RTOS for real time application.

11. Write an assembly language program for BCD to ASCII conversion using PIC instruction set.

12. Draw the instruction pipe line & mention its significance.

13. What is RISC?

14. Mention the few features of Harvard architecture.

15. How do you make a port as I/P & O/P port in PIC micro controller?

16. Write one example for immediate & direct addressing mode in PIC micro controller.

17. Write a C18 program to toggle all the bits of Port A continuously.

18. Write an assembly language program for BCD to binary conversion using PIC.

19. Write a C18 program to set bit RB0 and send it to RC7 after inverting it.

20. What is RISC architecture?

PART – B

1. With a neat diagram discuss in detail about the architecture of PIC micro controller. (16)

2. Discuss in detail about the function of various port pin of PIC micro controller   (16)

3. Explain the different addressing modes of PIC micro controller.   (8)

4. Discuss in detail about the memory organization of PIC micro controller.   (16)

5. Discuss about the various function of PORT in PIC micro controller.   (8)

6. Write a program to read the data, convert to ASCII and displays it in a micro controller.

(8)

7. Write a program in PIC micro controller to multiplying 'N' byte numbers.   (8)

8. Explain the RAM and ROM allocation PIC C18 compiler.   (8)

9. Write an assembly language program to add two numbers stored in location 07H & 08H.

(8)

10. A switch is connected to pin RC6. Write a program to check the status of SW and do the following.

   ➢ If SW =0, send letter 'N' to PORTA.
   ➢ If SW=1, send letter 'Y' to PORTA   (8)

UNIT – IV

PERIPHERAL OF PIC MICROCONTROLLER

PART – A

1. Using PIC micro controller how is analog signal is converted into digital signal?

2. What is flash memory?

3. What are interrupts available in PIC micro controller

4. Which port will support for external interrupt in PIC.

5. Draw the bit pattern for configuring the USART.

6. What is the main function I^2C interface?

7. What are the main difference flash memory & EEPROM?

8. Mention the special functions of PORTA.

9. Why flash memory is mostly preferred than other memory?

10. What is key debouncing?

11. Draw the instruction pipeline and mention its significance

12. What is the role of watch Dog timer in PIC microcontroller?

13. What are the timer modes in PIC?

14. List the function of I/O ports in PIC.

15. What is C Compiler?

16. List the features of USART.

17. List out the features of CCP module

18. What is CCP module

19. List the pins/signals used for ADC interfacing.

20. List the pins/signals used for Sensor interfacing

PART-B

1. Explain in detail about the compare and capture mode of the PIC micro controller with a neat diagram.   (8)

2. Discuss in detail about the following

---

      a. DAC

      b. Timers

      c. Interrupt   (16)

3. Write a detailed note on the FLASH & EEPROM memories.   (8)

4. Explain the UART in PIC micro controller.   (8)

5. Write a detailed note on I^2C bus.   (8)

6. Discuss the role of MP-LAB in PIC programming.   (8)

7. Write a detailed note on ADC0804 chip.   (8)

8. Write a short notes on ADC interfacing in PIC micro controller.   (8)

9. Briefly explain the I^2C interfacing using PIC micro controller. Give the special

    function register involved & the corresponding wave form.   (16)

10. Draw and explain compare, capture and PWM module 1 & 2 of PIC micro controller

    with their associative register.   (6)

11. Write short notes on CCP modules.   (8)

12. Briefly explain the sensor interfacing using PIC micro controller.   (8)

13. Determine the pulse width of positive going pulse to RC2/CCP1 pin of P1 micro

    controller. Assume that OSC=4MHz and that the pulse width is less than 65,535µs and

    longer than 300µs. Write an assembly language program for the given specification

     using PIC instruction set.   (8)

14. Draw and explain the architecture of on chip ADC of PIC micro controller in detail and

    write a suitable assembly language program for configuring the ADC.   (16)

UNIT – V

SYSTEM DESIGN – CASE STUDY

PART – A

1. While programming for LCD display, what initialization has to be done?

2. What are the aspects taken into account while keyboard is integrated?

3. For the H-bridge configured connected to a motor, how do control signal are applied

    from the micro controller.

4. What is key debouncing?

5. What is meant by data acquisition system?

6. What are the advantages of LCD over LED display?

7. What is meant by resolution of a converter?

8. What is PWM, and how it is used in DC motor control?

9. List out the signals used in keypad interfacing.

10. Give the gate signals for converters.

11. Give the gate signals for inverters.

12. List the control signls for controlling AC appliances

13. List the control signls for controlling DC appliances

14. How frequency is measured?

15. What is the role of counter in frequency measurement?

16. List the features of Data acquisition system.

17. Give various blocks of Data acquisition system

18. Draw the block diagram for time measurement.

19. What is the importance of Gate signals in interfacing.

20. What are controlling signals?

PART-B

1. With a neat flow chart, write a program for keyboard interfacing for 8051.

2. Write a program for micro controller control signal for converter.

3. Write a program to interface motor with a micro controller for controlling its speed.

4. Explain the speed control of DC motor using PIC micro controller with suitable diagram.

5. Explain how to interface LCD with micro controller with an assembly language program.

6. Draw and discuss a scheme for micro controller based multi channel data acquisition system.

7. With a neat diagram, explain how a 4×4 keyboard is interfaced with 8051 and write 8051 assembly language program for keyboard scanning.

8. Draw and explain the PIC micro controller based data acquisition system. Write an assembly language program for realizing temperature control for thermometer using PIC data acquisition system

9. Draw a neat diagram of matrix keyboard connected to the port of micro controller

10. Draw a flow chart & write a program to identify the key code press which has numerals from '0' to '9' and characters from 'A' to 'F'.

11. Explain the PWM pulse generation using micro controller.

PREPARED BY : V. SURESH KUMAR / A.P.(Sr.G).