Question Paper

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIECES
IV SEMESTER B.Sc. (APPLIED SCIENCES) IN ENGINEERING
END SEMESTER THEORY EXAMINATION-APRIL/MAY 2019
MICROCONTROLLER AND APPLICATIONS [IMET 241 - S2]

Marks: 100   **Duration: 180 mins.**

Answer 5 out of 8 questions.

Missing data, if any, may be suitably assumed.

1)

A) Outline the complete internal memory organisation of 8051 micro controller. (6)

B) Illustrate the role of TCON registers in handling serial communication giving its bits details. (6)

C) Sketch the internal block schematic of 8051, list its salient features and briefly explain its register sets? (8)

2)

A) Develop an assembly language program to subtract a 16 bit number stored at memory locations 51H-52H from 55H-56H and store the result in locations 40H and 41H. Assume that the least significant byte of data or the result is stored in low address. If the result is positive, then store 00H, else store 01H in 42H. (6)

B) Consider that 1Hz external clock is being fed into pin T0 (P3.4). Develop an embedded C program for counter0 in mode 1 to count the pulses and display the TH0 and TL0 registers on P2 and P1 respectively. (8)

C) With respect to 8051, Explain the functionality of the following pins: (6)
   a) EA
   b) ALE
   c) RST

3)

A) For a campus placement, develop an embedded C program to identify if the first alphabet of the name of the candidate is Vowel or Consonant. Where the recruitment was conducted for 60 candidates. The results database is loaded into an 8051 based system as "YES" if the alphabet is a vowel serially at a baud rate of 9600. (6)

B) Consider the internal crystal frequency of a system to be 11.0592 MHz , deduct the baud rate for the following cases with SMOD=0 and SMOD=1: (6)
   a) TH1=-3
   b) TH1=-12

c) TH1=-24

C) Explain with proper examples various addressing modes of 8051. (8)

4)

A) Summarise the importance of TMOD SFR in timer/counter operation with necessary format. (6)

B) Program the 8051 micro controller in assembly language to bring data in via the serial port and put them in P1. Set the baud rate at 4800, 8-bit data and 1 stop bit. Use Timer 1 for baud rate generation. (8)

C) Can 8051 effectively handle complex instructions or not? Justify your answer. Compare and Contrast between RISC and CISC architecture. (6)

5)

A) Obtain the frequency of the pulse generated on P1.5 (6)

```
        MOV TMOD, #01H
HERE1 : MOV TL0, #0F2H
        MOV TH0,#0FFH
        CPL P1.5
        ACALL DELAY
        SJMP HERE1
DELAY :SETB TR0
        CLR TR0
        CLR TF0
        RET
```

B) Develop an assembly language program using interrupt to do the following: (8)

(a)Receive data serially and sent it to P0,
(b)Have P1 port read and transmitted serially, and a copy given to P2,
(c)Make timer 0 generate a square wave of 5kHz frequency on P0.1.

Assume that XTAL-11,0592Mhz Set the baud rate at 4800

C) Explain the use of various bit of SCON SFR. (6)

6)

A) Taking into consideration the start and stop bit, depict the mechanism employed by 8051 to transmit and receives a character serially using UART? (6)

B) Summarise the output content of the stack and registers of the following program: (6)
a) MOV R6,#25H
   MOV R1,#12H
   MOV R4,#0F3H
   PUSH 06
   PUSH 01

```
                PUSH 04
                POP 1

        b)  MOV 02 H, # 02 H
            MOV 01 H, # 03 H
            PUSH 2
            PUSH 1
            POP 3
            POP4
            STOP : SJMP STOP
```

C) Develop an embedded C 8051 program to toggle all the bits of port 0 and port 2 taking a delay of 250ms. Make use of SFR keywords to declare the port address. Consider XTAL = 11.0592 MHz (8)

7)

A) Synthesize an 8051 ALP to display 4-digit hexadecimal UP counter from 1F00H to 1F2EH with a programmed delay of 0.4secs in ports 1 & 2. Use 8051 instructions to generate the required delay. (8)

B) With regards to timers of 8051 (6)
a) Explain briefly the difference between the timers and counter operation mode.
b) Mode 2 operation

C) The interrupt priority register is set with the instruction MOV IP, #00001000B. Deduct the sequence in which the interrupts are serviced. Consider initial condition to be reset. (6)

8)

A) Compile the different functionality of port 3 in 8051 with suitable examples. (6)

B) Obtain the machine cycles required for the following code: (6)
```
        a)  MOV A, # 00H
            INC A
            MOV  RO, #40H
            ADD A, RO
            NOP

        b)  MOV A, #20H
            MOV B, #03H
            DEC B
            INC A
            AGAIN :ADD A, #20H
            DJNZ AGAIN
            STOP:SJMP STOP
```

C) With the help of a diagram, outline the interface between 8051 microcontroller and DAC, Also generate a periodic ramp wave of magnitude 5 V on Port 1 of 8051 by applying embedded C program. Assume XTAL = (8)

11.0592 MHz

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