REG.NO.:

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF ELECTRONICS ENGINEERING
CONTINUOUS ASSESSMENT TEST - 2
WINTER SEMESTER 2025-2026

SLOT: C1+TC1

Programme Name & Branch : B.TECH CSE
Course Code and Course Name : BECE204L- MICROPROCESSORS & MICRCONTROLLERS
Faculty Name(s) : DR. NAUSHAD MANZOOR LASKAR (COURSE COORDINATOR)
Class Number(s) :VL2025260501053/1014/1018/1022/1055/1024/1020/1035/1057/1039/1028/1059/1043/1030/1046/1061/1064/1033/1068/1070/1072/1066/1074/1076/1049/1078

Date of Examination :
Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction(s):

Q. No	Question	M	CO	BL

1.	In a smart home LED controller using an 8051 microcontroller with XTAL frequency 11.0592 MHz, pin P1.2 is connected to a wall switch (SW). Monitor the SW continuously and develop an Assembly Language Program (ALP) to perform the following tasks:
	• If SW = 0, Timer 1 operating in Mode 1 should be used to generate a 50% duty cycle square wave with a 10 ms period on the LED connected to pin P0.3.
	• If SW = 1, Timer 0 should be configured in Mode 2 to count the clock pulses applied at the T0 pin, and the count should be sent to Port 2, where 8-LEDs are connected.
	T=10ms, T_{delay}=5ms, THTL= EE00H
	Answer:
	`ORG 0000H`
	`SETB P1.2 ; make input`
	`MOV TMOD, #16H ; Timer 1 in mode 1 and counter 0, mode2`
	`Check: JNB P1.2, Timer ; Check if SW=1 (P1.2=1)`
	`SJMP Counter`
	`Timer:`
	`L1:MOV TH1, #EEH ; Load for 5ms`
	`MOV TL1, #00H`
	`CPL P0.3 ; LED high first half`
	`SETB TR1 ;start Timer 0`
	`AGAIN: JNB TF1,AGAIN ;monitor Timer 0 until TF0=1`
	`CLR TR1 ;stop Timer 0`
	`CLR TF1 ;clear Timer 0 flag`
	`SJMP Check`
	`Counter:`
	`MOV TH0,#00 ;clear TH1`
	`SETB P3.4 ;make T0 input`
	`SETB TR0 ;start the counter`
	`BACK: MOV A,TL0 ;get copy of count TL1`
	`MOV P2,A ;display it on port 2`
	`JNB TF0,BACK ;keep doing it if TF=0`
	`CLR TR0 ;stop the counter 1`
	`CLR TF0 ;make TF=0`
	`SJMP Check ;keep checking and doing it`
		10	4	

2.	In a real-time embedded system, two switches are connected to the MSB and LSB of Port 1 of an 8051 microcontroller. Analyze the input combinations and develop an Assembly Language Program (ALP) that continuously monitors these pins and performs the required operations as follows:
	• When MSB = 1 and LSB = 1, continuously transmit the character "CSE" a baud rate of 9600.
	• When MSB = 0 and LSB = 0, continuously receive the character "VIT" at a baud rate of 1200.
	Given XTAL = 11.0592 MHz, SMOD=1, 8-bit data, and 1 stop bit.
	
	Answer:
	`ORG 0000H`
	`MOV PCON, #80H ; Set SMOD=1`
	`MOV TMOD, #20H ; Timer1 Mode2 (auto-reload)`
	`MOV SCON, #50H ; Mode1, REN=1, TI=1 initially`
	`Monitor:JB P1.7,TRANSMIT_MODE ;`
	`JB P1.0,Monitor ;`
	`///.....RECEIVE_Mode: P1.7=0, P1.0=0......./// `
	`MOV TH1,#D0H (or -48 for 1200 BR with SMOD=1,)`
	`SETB TR1`
	`HERE: JNB RI,HERE`
	`MOV A, SBUF`
	`CLR RI`
	`SJMP Monitor ;keep checking and doing it`
	
	`TRANSMIT_MODE:`
	`JNB P1.0,Monitor ; P1.7=1, P1.0=1`
	`MOV TH1,#FAH (or -6 fo 9600 BR with SMOD=1,)`
	`SETB TR1`
	`AGAIN:MOV A,#"C"`
	`ACALL TRANS`
	`MOV A,#"S"`
	`ACALL TRANS`
	`MOV A,#"E"`
	`ACALL TRANS`
	`SJMP Monitor ;keep checking and doing it`
	`TRANS: MOV SBUF,A`
	`HERE: JNB TI,HERE`
	`CLR TI`
	`RET`
	`END`
		10	4	

3.	In a real-time embedded alert system, a pulse generator is connected to P3.2 and a switch is connected to P3.3 of the 8051 microcontroller, which remains normally high. A buzzer is interfaced with P1.1 to provide an audible alert, while an LED is connected to P2.2 to provide a visual indication. Analyze and design an 8051 Assembly Language Program (ALP) to accomplish the following operations: when a falling edge signal is detected at P3.2, the buzzer connected to P1.1 should be activated for 10 msec. Additionally, if the switch connected to P3.3 becomes low, the system should generate a 50 Hz square wave on P1.2 to turn the LED ON and OFF periodically. The program must ensure that the LED indication is triggered first, followed by the buzzer operation. Assume a crystal frequency of 12 MHz and clearly	10	4	

justify the interrupt configuration, timer calculations, and priority settings.

Answer:

F=50Hz, T=20ms, T_{delay} = 10ms, THTL=D8F0H

```
ORG 0000H
LJMP MAIN

//……INT0 ISR……..…….//
SETB P1.1 ; Buzzer On
ACALL DELAY ; 10 ms delay
CLR P1.1
RETI

// ……INT1 ISR……..//
ORG 0013H
SETB P1.2 ; switch ON LED
ACALL DELAY ; 10ms delay
CLR P1.2  ; switch OFF LED
ACALL DELAY ; 10ms delay
RETI

//……MAIN PROGRAM……//
ORG 0030H
MAIN: MOV IE, #85H ; both INT1 and INT0
      MOV IP, #04H ;(OR SETB IP.2); FOR INT1 PRIORITY
      SETB TCON.0  ; INT0 EDGE TRIGGERED
  HERE: SJMP HERE
//……DELAY Subroutine……//
DELAY:
   MOV TMOD, #01H ;
   MOV TH0, #D8H ; Load for 10ms
   MOV TL0, #F0H
   SETB TR0                ;start Timer 0
AGAIN:    JNB    TF0,AGAIN       ;monitor Timer 0 until TF0=1
          CLR    TR0             ;stop Timer 0
          CLR    TF0             ;clear Timer 0 flag
          RET
```

4. In a smart air conditioning control system using an 8051 microcontroller, Port 2 is connected to a common cathode 7-segment display. Design an 8051 Assembly Language Program (ALP) to display the status "COoLInG" sequentially on the 7-segment display to indicate cooling operation. Each character should be displayed for 1 second before moving to the next character, and the sequence must repeat continuously in real time. Assume XTAL = 11.0592 MHz and use Timer 0 in Mode 1 to generate the delay.

10 | 4

Answer:

	C	O	o	L	I	n	G
Hex	39H	3FH	5CH	38H	06H	54H	3DH

```
ORG 0000H
START: MOV R0, #7
MOV DPTR, #200H
```

```
L1: CLR A
       MOVC A, @A+DPTR
       MOV P2, A
       ACALL DELAY
       INC DPTR
       DJNZ R0,L1
   SJMP START
//…… 5MS GENERATED IN Q.1 X 200 = 1000MS = 1 SEC……//
DELAY: MOV R1, #200 ;
MOV TMOD, #01H ;
L1:MOV TH0, #0EEH     ; Load for 5ms
   MOV TL0, #00H
   SETB TR0                ;start Timer 0
AGAIN:    JNB    TF0,AGAIN       ;monitor Timer 0 until TF0=1
          CLR    TR0             ;stop Timer 0
          CLR    TF0             ;clear Timer 0 flag
          DJNZ R1, L1
          RET
ORG 200H: DB 39H,3FH,5CH,38H,06H,54H,3DH
```

5. In the Riviera 2026 technical festival organized by VIT Vellore, participant event badges use AT89C51 microcontrollers with 16×2 LCD (data lines port P1, control lines port P2) to display the event string "RIVIERA" in reverse order starting from 2nd row, last position as an interactive icebreaker animation during registration check-in. The program should display each character for a fraction of delay before the next number is displayed to engage students while verifying badge functionality.

10 | 4

Answer:

```
ORG 0000H
MOV A,#38H
ACALL COMNWRT
ACALL DELAY
MOV A,#0EH
ACALL COMNWRT
ACALL DELAY
MOV A,#01H
ACALL COMNWRT
ACALL DELAY
MOV A,#04H
ACALL COMNWRT
ACALL DELAY
MOV A,#CFH
ACALL COMNWRT
ACALL DELAY
START: MOV R0, #7
MOV DPTR, #200H
L1:    CLR A
       MOVC A, @A+DPTR
       ACALL DATAWRT
       ACALL DELAY
       INC DPTR
       DJNZ R0, L1
       SJMP START

COMNWRT:  MOV P1,A
CLR P2.0
CLR P2.1
SETB P2.2
ACALL DELAY
CLR P2.2
RET

DATAWRT: MOV P1,A
SETB P2.0
CLR P2.1
SETB P2.2
ACALL DELAY
CLR P2.2
RET

DELAY: MOV R3,#255
HERE: DJNZ R3,HERE
RET


ORG 200H: DB "RIVIERA"
          END
```

****