VIT
Vellore Institute of Technology
CHENNAI

Reg. Number: 23BCE1792

Continuous Assessment Test(CAT) – I - AUG 2024

Programme	:	B.Tech (BCE/BPS/BAI/BRS)	Semester	:	FS24-25
Course Code & Course Title	:	BECE204L; Microprocessors and Microcontrollers	Class Number	:	CH2024250100330, CH2024250100332, CH2024250100334, CH2024250100336, CH2024250100338, CH2024250100513
Faculty	:	Dr. Subhashini N, Dr. Rahul Narasimhan, Dr. Manoj Kumar R, Dr. Balakrishnan R, Dr. Karthikeyan P R Dr. Richards Joe Stanislaus	Slot	:	D1+TD1
Duration	:	90 min	Max. Mark		50

General Instructions: < Use this space to provide additional information such as graph sheet, data book etc.>

- Write only your registration number on the question paper in the box provided and do not write other information.
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks	Blooms Taxonomy Level
1.		Find the value to be loaded into register R1 (XX) in the given 8051 ASM program such that it creates a delay of 2 seconds. Assume that the crystal frequency is 33 MHz.	5	L4

Instruction	No. of Machine Cycle
MOV R1, #XX	1
Loop3: MOV R2, #200	1
Loop2: MOV R3, #200	1
Loop1: DJNZ R3, Loop1	2
DJNZ R2, Loop2	2
DJNZ R1, Loop3	2
RET	2

2.		A computer is connected to 8051 microcontroller through serial port. Write an assembly language program for 8051 microcontroller, to transmit an emergency message "ALERT!" repeatedly to the computer. Use a baud rate of 9600 bps, where the clock frequency of the microcontroller is 11.0592 MHz."	5	L3
3.		a) Explain RAM organization of 8051 microcontroller.(7) b) Briefly explain the Special function registers in 8051 microcontroller. (3)	10	L1
4.		A parking lot has a capacity of parking 10 cars and has one green LED and one red LED to indicate space availability. If the	10	L4

		parking lot has a minimum of one vacant space, a green led glows as an indicator and red LED is off. If the parking lot has no vacant space, the green LED switches off and a red LED is switched on. An 8051 microcontroller is used for the counting the number of cars available at a given time. Write an assembly language program using 8051 microcontroller to count the number of cars entering the parking lot using counter of 8051. Implement the functionality of green LED connected at P1.5 and red LED connected at P1.6.		
5.		Complete the following table by specifying the memory location affected and the value stored at that location after the execution of each line in the given program.	10	L3

	ORG 0000H	Address of the Memory location	Value stored at the memory location
Line1	MOV A, #18H		
Line2	MOV R3,#1BH		
Line3	XRL A,R3		
Line4	MOV 31,A		
Line5	SETB 27		
Line6	RLC A		
Line7	MOV 26,#33H		
Line8	MOV PSW, #18h		
Line9	MOV R4,31		
Line10	PUSH 3		
Line11	POP 22		
	END		

6.		Write an assembly langunge program for 8051 microcontroller to connect the status of 8 switches in Port P0 to 8 LEDs connected to port P1. If the hexadecimal value in the ports is greater than 0C4H, then assign the value of 01H to R2. If the value in the ports is smaller or equal to 0C4H, then assign the value of 02H to R2 register. Iterate the complete process within an infinite loop.	10	L4

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Reg. Number 23BCE1828

Continuous Assessment Test(CAT) – I - AUG 2024

Programme	:	B.Tech (BCE/IIPS/IIAI/IIRS)	Semester	:	FS 2024-25
Course Code & Course Title	:	BECE204L; Microprocessors and Microcontrollers	Class Number	:	CH2024250100340, CH2024250100342, CH2024250100344, CH2024250100346, CH2024250100348, CH2024250100350, CH2024250100352, CH2024250100354
Faculty	:	Dr. N.Subhashini, Dr. Rahul Narasimhan, Dr. Manoj Kumar R, Dr. Balakrishnan R, Dr. Saravana Kumar R, Dr. Karthikeyan P R, Dr. Idayachandran G, Dr Vydeki D	Slot	:	D2+TD2
Duration	:	90 Minutes	Max. Mark		50

General Instructions: < Use this space to provide additional information such as graph sheet, data book etc >

- Write only your registration number on the question paper in the box provided and do not write other information.
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Answer all questions

Q. No	Sub Sec.	Description	Marks	Blooms Taxonomy Level
1.		For the assembly language program given below, find the register content and Flag register value after executing each line of the program.	10	L3

Program	Register Content	CY	P
ORG 0000H SETB PSW.7			
MOV A,#45			
MOV B,#12H			
MUL AB			
MOV B,#10			
DIV AB			
MOV A,#-100			
ADD A,#-50			
MOV A,#120			
ADD A, #30 END			

2.		(a). Write an 8051 ALP to count the number of 1s and 0s in a given 8 bit number. Store the number of 0s in R2 and number of 1s in R3. (b). Write an 8051 assembly language program to compare the value in register A with a constant value 25H . If the value in A is greater than 25H, turn on an LED connected to port P1.0; otherwise, turn it off.	10	L4
3.		Explain in detail the architecture of 8051 with neat diagram and explain how the instruction is fetched, decoded and executed.	10	L1
4.		A switch (SW) is connected to pin P1.2. Write an 8051 program to monitor the switch and generate a square waveform on pin P2.3 based on the following conditions (i) when SW=0, generates 2kHz on P2.3 (ii) When SW=1, generates 50kHz on P2.3. Use Timer 0 in mode 1 for both conditions and assume oscillator frequency to be 11.059MHz.	10	L4
5.		Write a program for the 8051 to receive bytes of data serially, and put them in P2, set the baud rate at 1200bps, 8-bit data, and 1 stop bit.	5	L3
6.		Write a program to copy the value 33H into RAM memory location 40H using (a) immediate addressing mode, (b) direct addressing mode, (c) register addressing mode, (d) register indirect addressing mode, and (e) indexed addressing mode.	5	L3
		••••••••••All the best ••••••••••••		

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Reg. Number	

Continuous Assessment Test (CAT) – 1 - AUGUST 2024

Programme	:	B.Tech. (CSE)	Semester	:	Fall 2024-25
Course Code & Course Title	:	BECE204L & Microprocessors and Microcontrollers	Class Number	:	CH2024250100369
Faculty	:	Dr. M. Jagannath	Slot	:	G1 + TG1
Duration	:	90 Minutes	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
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Answer all questions

<table>
<tr><th>Q. No</th><th>Sub Sec.</th><th>Description</th><th>Marks</th><th>Blooms Taxonomy Level</th></tr>
<tr><td>1.</td><td></td><td>Compare and contrast the Von-Neumann and Harvard architectures of computer memory with schematic diagrams.</td><td>5</td><td>L2</td></tr>
<tr><td>2.</td><td></td><td>The initial values stored in the registers of 8051 are given in Table 1.
Table 1
<table>
<tr><td>A</td><td>B</td><td>R0</td><td>R1</td><td>R2</td><td>R3</td><td>R4</td><td>R5</td><td>R6</td><td>R7</td><td>PSW</td></tr>
<tr><td>02H</td><td>05H</td><td>02H</td><td>ECH</td><td>30H</td><td>06H</td><td>00H</td><td>35H</td><td>0FH</td><td>08H</td><td>00H</td></tr>
</table>
Check the program given in column 1 of Table 2 and answer column 2, column 3 and column 4. (Note: The register values will get updated after executing each instruction).
Table 2
<table>
<tr><th></th><th>Addressing Mode</th><th>PSW Register Value</th><th>Output</th></tr>
<tr><td>MUL AB</td><td></td><td></td><td></td></tr>
<tr><td>ADD A, R7</td><td></td><td></td><td></td></tr>
<tr><td>SUBB A, 06H</td><td></td><td></td><td></td></tr>
<tr><td>XRL 05H, #06H</td><td></td><td></td><td></td></tr>
<tr><td>ORL A, @R0</td><td></td><td></td><td></td></tr>
</table></td><td>15</td><td>L3</td></tr>
<tr><td>3.</td><td></td><td>Write an 8051 assembly language program to control the 4-way traffic signals as per the sequence.
Sequence 1: Lane-1 and Lane-3 are GREEN, Lane-2 and Lane-4 are RED
Sequence-2: Lane-1 and Lane-3 are GREEN, Lane-2 and Lane-4 are YELLOW
Sequence-3: Lane-1 and Lane-3 are RED, Lane-2 and Lane-4 are GREEN</td><td>15</td><td>L4</td></tr>
</table>

Sequence-4: Lane-1 and Lane-3 are **YELLOW**, Lane-2 and Lane-4 are **RED**

Repeat the sequence indefinitely. (Note: Every sequence will have a delay. The delay time of RED and GREEN will be 5 times greater than YELLOW). Table 3 gives the details of ports used for connecting coloured LEDs to all lanes.

Table 3

	RED	YELLOW	GREEN
Lane-1	P0.0	P0.1	P0.2
Lane-2	P1.0	P1.1	P1.2
Lane-3	P2.0	P2.1	P2.2
Lane-4	P3.0	P3.1	P3.2

4. Write an 8051 assembly language program to generate a square wave signal shown in Figure 1 at pin P1.0 using Timer 0 in Mode 1. Assume that the crystal frequency of the 8051 microcontroller is 12 MHz. — 15 — L3

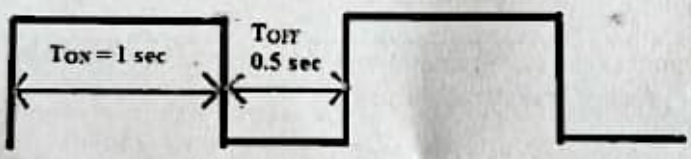

Figure 1

**********All the best **********

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(Deemed to be University under section 3 of UGC Act, 1956)
CHENNAI

Reg. Number:	

Continuous Assessment Test(CAT) – I - AUGUST 2024

Programme	:	B.Tech. (CSE)	Semester	:	Fall 2024-25
Course Code & Course Title	:	BECE204L & Microprocessors and Microcontrollers	Class Number	:	CH20242501003
Faculty	:	Dr. M. Jagannath	Slot	:	G2 + TG2
Duration	:	90 Minutes	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write othe information.
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Answer all questions

Q. No	Sub Sec.	Description	Marks	Blooms Taxonomy Level
1.		In what ways do the architectural differences between microcontroller-based and microprocessor-based systems influence their applications in embedded systems, and how might these differences impact design decisions when choosing between the two for a specific project?	5	L2
2.		Design an 8051 assembly language program that implements an 8-bit calculator. The program should execute different arithmetic operations based on the content stored in the memory location 60H (M). Specifically, if M = 0, the program should perform addition; if M = 1, it should perform subtraction; if M = 2, it should perform multiplication; and if M = 3, it should perform division. How would you structure the program to handle these operations and ensure correct execution for each possible value present in the memory location? Use Table 1 for read the input and store the output.	15	L3
3.		Write an 8051 assembly language program to control the water inflow to a tank using a float sensor as shown in Figure 1. The float sensor is connected to port pin P2.1, the motor controlling the inflow of water is connected to P2.2, and a GREEN LED is connected to P2.3, both of which are normally set to 1. If the sensor detects a high water level	15	L4

Table 1

INPUT		OUTPUT		
Memory Location	Value	Result	Memory Location	Value
D: 40H	CDH	Sum	D: 50H	?
D: 41H	ABH	Difference	D: 51H	?
		Product (lower-byte)	D: 52H	?
		Product (higher-byte)	D: 53H	?
		Quotient	D: 54H	?
		Remainder	D: 55H	?

P2.3 1
P2.2 1
P2.1 0 initially

(P2.1 = 1), the program should stop the motor by sending a 0 to P2.2 and turn off the GREEN LED. Additionally, the program should light up a RED LED connected to P2.4 to indicate that the tank is full. How would you implement this logic in 8051 assembly language, ensuring proper response to the sensor input?

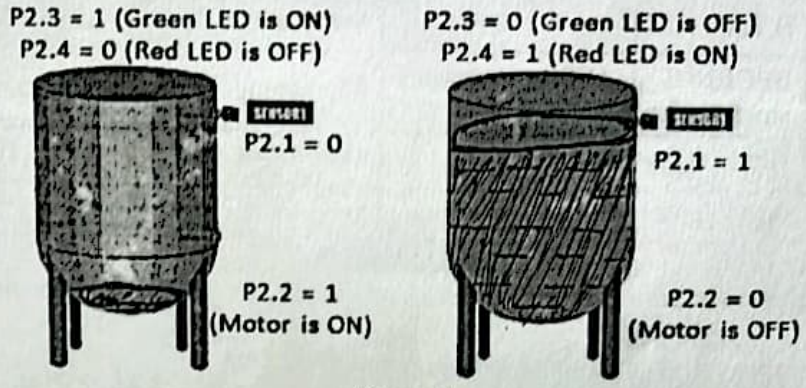

Figure 1

4.	(a)	Find the time delay of the given 8051 assembly language program. Assume the crystal frequency is 12 MHz. **[7 Marks]**	15	L3

Instruction	Number of Machine Cycle
MOV R1, #250	1
LABEL: MOV R2, #250	1
HERE: NOP	1
DJNZ R2, HERE	2
DJNZ R1, LABEL	2
RET	2

(b) Write an 8051 assembly language program to create the delay found in Q.No. 4(a) using Timer 0 in Mode 1. Assume the crystal frequency is 12 MHz. **[8 Marks]**

**********All the best **********