PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY 2025

Date: 26-05-2025   **Time:** 01:00 pm – 04:00 pm

School: SOE	Program: B. Tech (VLSI)	
Course Code: ECE3119	Course Name: Microcontroller and Computer Architecture	
Semester: IV	Max Marks: 100	Weightage: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	28	26	24	20	

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.   **10Q x 2M=20M**

1.	On power-up, the 8051 uses RAM location _____ as the first location of the stack. On power-up, the 8051 uses bank ___ for registers R0–R7.	2 Marks	L1	CO1
2.	PSW is a bit addressable register. Which register bank is used if we alter RS0 and RS1 of the PSW by the following two instructions? SETB PSW.3 SETB PSW.4	2 Marks	L1	CO2
3.	8051 supports various addressing modes and instruction set. Which of the following is (are) illegal? (a) MOV R3,#500 (b) MOV R1,#50 (c) MOV R7,#00 (d) MOV A,#255H	2 Marks	L3	CO2
4.	Addressing modes helps accessing of the data and program. Write a program to copy the value 55H into RAM memory locations 40H using direct addressing mode.	2 Marks	L2	CO1
5.	Instruction set helps in creating programs and perform various operations. Write any two examples for logical instruction	2 Marks	L1	CO2
6.	Stack memory is usually the RAM memory. What are the two important operations performed on stack?	2 Marks	L1	CO2
7.	Flag bits are the indicators of the status after the arithmetic operations are executed. Name the two instructions used to check the status of carry flag.	2 Marks	L2	CO1

8.	Jump instructions change the flow of the program. Explain the DJNZ instruction present in 8051 assembly level programming	2 Marks	L2	CO2
9.	Ports are the interfaces which connect the external devices to the microcontroller. Write a value 24h to P2 in assembly level programming	2 Marks	L3	CO3
10.	8051 supports bitwise instructions to manipulate individual bits. Write an instruction to makes pin P2.1 high while leaving other bits of P2 unchanged.	2 Marks	L3	CO3

Part B

Answer the Questions.   **Total Marks 80M**

11.	a.	An embedded system is a combination of computer hardware and software designed for a specific function. With a neat block diagram explain the architecture of 8051 microcontroller	12 Marks	L1	CO1
	b.	A "programming device" tool, like a computer or handheld device, used to write and transfer code to a programmable device. Recognize the differences between a microcontroller and a general-purpose microprocessor.	8 Marks	L1	CO1
		Or			
12.	a.	Design a µController system using 8051, 16k bytes of ROM & 32k bytes of RAM using 8K size memory chips. Interface the memory such that starting address for ROM is 0000H & RAM is 8000H	12 Marks	L3	CO1
	b.	ALP is a low-level programming language that provides direct control over a microprocessor's hardware, allowing developers to create programs with precise instructions Write An ALP to transfer the block of 10 data's from 20h to 30h to external location 1020h to 1030h.	8 Marks	L2	CO1

13.	a.	The 8051 microcontroller mainly has two timers they are Timer 0 and Timer 1. These are used as both timers as well as counters. Find the timer's clock frequency and its period for various 8051-based systems, with the following crystal frequencies. (a) 12 MHz (b) 16 MHz (c) 11.0592 MHz	6 Marks	L2	CO2
	b.	The TMOD (Timer Mode Register) is a special function register in the 8051 microcontroller. Assuming XTAL = 11.0592 MHz, write a program to generate a square wave of 50 Hz frequency on pin P2.3., Timer 1, 16-bit mode	14 Marks	L3	CO2
		Or			

14.	a.	To make the timers and counters work, you need to set up TCON and TMOD properly.
		i. Draw the TMOD register and indicate the use of e ach bit ii. Indicate which mode and which timer are selected for
		    each of the following:
		    (a) MOV TMOD,#01H (b) MOV TMOD,#20H (c) MOV TMOD,#12H.
			10 Marks	L3	CO2

	b.	Generate a rectangular wave of 2KHz, with 60% duty cycle in P1.2. Assume crystal frequency as 11.0592MHz, use Timer 0 in Mode 1 operation. Show the delay calculation.	**10 Marks**	L3	CO2

15.	a.	Serial communication is a communication method that uses one or two transmission lines to send and receive data. Contrast synchronous versus asynchronous communication. Contrast half- versus full-duplex transmission. Explain the process of data framing.	**14 Marks**	L1	CO3
	b.	A microcontroller can be connected to another microcontroller or to a PC and exchange data using the serial communication protocol. What is the RS232 protocol? Explain the RS232 pins in detail.	**6 Marks**	L1	CO3
Or					
16.	a.	Serial communication is the process of sending data one bit at a time, sequentially, over a communication channel or computer bus. Write an 8051 program to transfer serially the message "We love India " continuously at a 19,600 baud rate.	**12 Marks**	L3	CO3
	b.	For XTAL = 24 MHz, find the TH1 value (in both decimal and hex) for each of the following baud rates. (a) 9,600 (b) 4,800 (c) 1,200 (d) 300	**8 Marks**	L3	CO3

17.	a.	A physical device that stores data or information temporarily or permanently in it is called memory. It's a device where data is stored and processed. What are Cache Memories and Summarize the Cache mapping Technique.	**10 Marks**	L3	CO4
	b.	Memory is the storage place for the instructions and data, a computer needs to reach quickly. Recall Memory Hierarchy? What are the various types of Read Only Memories?	**10 Marks**	L3	CO4
Or					
18.	a.	Interfacing devices handle the input and output of data, allowing systems to interact with the external world. Apply a C program to interface DAC to 8051 microcontroller and generate a ramp and triangular wave	**10 Marks**	L3	CO4
	b.	Microcontrollers use interfacing devices to connect with peripherals like sensors, LCD displays, motors, and other microcontrollers. Apply a C program to Interface dc motor to 8051 microcontroller	**10 Marks**	L3	CO4