



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fourth Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; Sep. / Oct. - 2023

Microcontrollers

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Apply basic computer knowledge to study the internal organization and instruction set of Microcontrollers.

CO2: Analyze different instructions set to write ALP's on logical, data transfer and mathematical operations.

CO3: Analyze timers, counters and serial/parallel communication to interface the 8051 Microcontroller.

CO4: Execute ALP/ C Programs using Microcontroller kit /suitable simulation platform.

Note: I) PART - A is compulsory. Two marks for each question.

II) PART - B: Answer any **Two** sub questions (from a, b, c) for a Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
1 a.	Mention the internal RAM and ROM capacity of 8051.	2	L1	CO1	PO1
b.	Explain the following instructions: i) MOVC A, @(A+DPTR) ii) MOV A, @DPTR	2	L2	CO2	PO2
c.	What happens if the GATE bit is set in TMOD register?	2	L1	CO3	PO2
d.	Define Baud rate.	2	L1	CO3	PO2
e.	What is ISR?	2	L1	CO3	PO2
II : PART - B		90			
UNIT - I		18			
2 a.	Sketch the functional block diagram of 8051 and write down only the features of the same.	9	L2	CO1	PO1
b.	i) Explain Von-Neumann and Harvard CPU architectures used in microcontrollers	6	L2	CO1	PO1
	ii) Differentiate between RISC and CISC	3	L2	CO1	PO1
c.	i) With neat sketch, explain the internal memory structure of 8051.	6	L2	CO1	PO1
	ii) With example, explain PUSH and POP instructions.	3	L2	CO2	PO2
UNIT - II		18			
3 a.	i) Explain different types of addressing modes with example.	6			
	ii) Mention the differences between AJMP and LJMP.	3	L2	CO2	PO2
b.	i) Move ten 8-bit data from location 45h to 54h, add 02 to each of them and save the result in data RAM location 79h down to 70h.	6			
	ii) Show how -56 and -128 negative numbers are represented in 8051	3	L3	CO2	PO2

c. i) Write an ALP to find the largest number in a group of ten numbers.	6			
ii) What is subroutine? Mention the differences between LCALL and ACALL instructions.	3	L3	CO2	PO2
UNIT - III				
18				
4 a. i) Draw the TMOD register in 8051 and explain each bit.	6			
ii) Mention the programming steps that are involved in MODE 1 operation.	3	L2	CO3	PO2
b. I) Use timer '0' to generate a square wave of 50% duty cycle on P1.5 bit.	6	L3	CO3	PO2
II) Indicate which mode and which timer are selected after the execution of the following instructions:				
i) MOV TMOD, #01h	3	L3	CO3	PO2
ii) MOV TMOD, #20h				
iii) MOV TMOD, #12h				
c. Write ALP for 8051 such that LED connected to port, flash at 0.5 sec rate when line P2.0 goes high. Use timer '0' for generating delay. Assume XTAL = 12 MHz.	9	L3	CO3	PO2
UNIT - IV				
18				
5 a. i) Explain the methods involved in serial data communication.	6			
ii) Mention the differences between serial and parallel communication.	3	L2	CO3	PO2
b. I) With neat flow chart, examine RS 232 handshaking signals.	6			
II) With XTAL =11.0592 MHz, find the TH1 values needed to have following baud rates:	3	L2	CO3	PO2
i) 9600 ii) 2400				
c. i) Write a program to receive data which has been sent in serial form and send it out to Port '0' in parallel form. Also save the data in RAM location 60h.	6	L2	CO3	PO2
ii) Mention the ways for doubling the baud rate in 8051.	3	L2	CO3	PO2
UNIT - V				
18				
6 a. i) Mention the interrupt priority upon reset in 8051.	4			
ii) Write a program that displays 'Y' at port 0 and 'N' at port 2 and also generate a square of 10 kHz, with timer 0 in mode 2 at port pin P1.2. XTAL = 22 MHz.	5	L2	CO3	PO2
b. Write a 'C' program to interface the stepper motor (Anti-clock wise rotation) with 8051.	9	L3	CO3	PO2
c. Write a 'C' program to interface the DC motor with 8051.	9	L3	CO3	PO2