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

(An Autonomous Institution affiliated to VTU, Belagavi)

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

Semester End Examination; August - 2023

Microcontroller

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:
*CO1: **Apply** the knowledge of 8-bit processor to understand the 16-bit processor*
*CO2: **Apply** the concepts of 8-bit processor to **analyze** instruction sets and other features in MSP430.*
*CO3: Discuss and **Analyze** the different peripheral components associated with MSP430*
*CO4: To **develop** logical skills to write programs in MSP430 for the given Engineering Problems*
*CO5: To **analyze** the developed code using modern engineering tools.*

***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
	I : PART - A	**10**		
1 a.	Define embedded system and give examples.	2	L1	CO1
b.	Draw the instruction format of single and double operand.	2	L3	CO2
c.	Define interrupt and ISR.	2	L1	CO3
d.	What are the features of Watchdog timer?	2	L2	CO3
e.	What are the factors that affect the accuracy of the ADC?	2	L3	CO4
	II : PART - B	**90**		
	UNIT - I	**18**		
2 a.	Explain the anatomy of a typical small microcontroller with neat block diagram.	9	L2	CO2
b.	Sketch the functional block diagram of MSP430 microcontroller and briefly explain its architecture.	9	L2	CO1
c.	Show the memory map of F2013 MSP430 and explain it briefly.	9	L2	CO2
	UNIT - II	**18**		
3 a.	With an example, explain the different addressing modes of data available for MSP430.	9	L2	CO2
b.	Indicate the different arithmetic instructions available for MSP430 and with example explain their operation briefly.	9	L3	CO2
c.	Explain the clock system of MSP430 with the help of its simplified block diagram.	9	L2	CO2
	UNIT - III	**18**		
4 a.	What happens when an interrupt is requested? Explain sequence of events.	9	L2	CO2
b.	Write an assembly language program to toggle LED's with period of 0.5 s using interrupts generated by Timer-A in Up-mode.	9	L2	CO2
c.	Explain the low power modes of operation associated with MSP430.	9	L3	CO4

Contd…2

	UNIT - IV	**18**		
5 a.	With control register, explain the operation and uses of watchdog timer in MSP430.	9	L2	CO3
b.	Differentiate between the capture and compare mode of operations of Timer_A of MSP430.	9	L2	CO3
c.	Explain Timer_B with help of simplified block diagram.	9	L2	CO3
	UNIT - V	**18**		
6 a.	Explain the architecture and operation of comparator_A+ of MSP430 with the help of a block diagram.	9	L2	CO3
b.	What are the general issues encountered in analog to digital conversion?	9	L2	CO3
c.	Explain ADC-10 with relevant block diagram.	9	L3	CO3

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