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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; July / August - 2022

Microcontroller

Time: 3 hrs *Max. Marks: 100*

Course Outcome

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. One question from each unit for maximum of 2 marks.*
*ii) PART-B: Answer any **TWO** sub questions (from a, b, c) from each unit for a Maximum of 18 marks.*

Q. No.	Questions	Marks	BLs	COs
	PART - A			
1 a.	Differentiate between microcontroller based systems with embedded system.	2	L1	CO1
b.	Explain the operation performed by the instruction: MOV.W R4, O×0136	2	L2	CO2
c.	What is Reset? Mention the different types of resets in MSP430.	2	L2	CO2
d.	What is the main function of the watchdog Timer? Mention any one applications of WDT.	2	L1	CO1
e.	Mention the role of comparator in ADC.	2	L1	CO1
	PART - B			
	UNIT - I			
1 a.	Explain the architecture of MSP-430 micro controller with its functional block diagram.	9	L2	CO2
b.	List the features of MSP-430 that makes it suitable for low power and portable applications.	9	L2	CO3
c.	Explain the function of the following pins: i) NMI ii) ACLK and SMCLK iii) SCLK, SDO and SCL iv) XIN and XOUT v) $\overline{\text{RST}}$	9	L2	CO2
	UNIT - II			
2 a.	Explain the machine code format-1 of MSP-430 and also write the machine code for the instruction ADD.W R5, R6.	9	L3	CO3
b.	What is addressing mode? With an example, explain the addressing modes of MSP430 microcontroller.	9	L2	CO2
c.	Write an assembly language program to count number of ones and zeros in an 8-bit number.	9	L3	CO4

Contd…2

UNIT – III

3 a.	Explain interrupt response structure of MSP-430.	9	L2	CO3
b.	Write an assembly language program to toggle LED's with period of 0.5 sec using interrupts generated by Timer-A in up-mode.	9	L3	CO4
c.	Explain the various low power operating modes of MSP-430 microcontroller.	9	L2	CO2

UNIT - IV

4 a.	Along with the suitable format explain control register used in Timer-A.	9	L2	CO3
b.	Draw the simplified block diagram of Basic Timer-1 and explain its operation. Also draw the control register format of BTCTL.	9	L3	CO3
c.	Describe the Control register RTCCTL along with the format.	9	L2	CO3

UNIT - V

5 a.	With the help of neat block diagram explain the operation of ADC – 10.	9	L2	CO2
b.	With a neat diagram explain the architecture of comparator_A+ of MSP-430.	9	L2	CO2
c.	List the principal distinctions between ADC 10 and ADC 12 successive approximation ADC's.	9	L2	CO3

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