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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; Sep. / Oct. - 2023
Microcontroller

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Apply the knowledge of logic design to understand the concept of 16-bit Microcontroller (MC), its instruction set, addressing modes and other features.

CO2: Understand working of different peripheral components associated with MSP430 MC.

CO3: Develop logical skills to write programs using MSP430 instruction set and by using 'C' for the given Engineering Problems.

CO4: Analyze the developed code using modern engineering tools.

CO5: Interface hardware modules to F2013 MC and develop interfacing programs in C Programming language.

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.	Differentiate between high level language and low level language.	2	L1	CO1	PO1
b.	Write the instruction to perform decimal add with carry.	2	L1	CO1	PO1
c.	What happens when a subroutine is called?	2	L2	CO2	PO2
d.	Mention function of watchdog timer.	2	L2	CO2	PO2
e.	Define comparator_A ⁺ .	2	L2	CO2	PO2
II : PART - B		90			
UNIT - I		18			
2 a.	Write a functional block diagram of MSP430F2003 microcontroller and explain.	9	L2	CO2	PO2
b.	Explain clock generator and the exceptions of MSP430 μ C.	9	L2	CO2	PO2
c.	What is embedded system? Give an example. Describe the approaches to embedded system.	9	L1	CO1	PO1
UNIT - II		18	L2	CO2	PO1
3 a.	What is addressing mode? Explain different addressing modes in MSP430.	9	L2	CO2	PO2
b.	Explain arithmetic and logical instruction with two operands. Give example.	9	L1	CO1	PO1
c.	Write a program in C and in assembly language for copying a string "Good morning" from its memory location to another memory location.	9	L3	CO3	PO3

UNIT - III		18			
4 a.	With example, explain complete stack frame for a subroutine with a parameter passed and returning a result.	9	L3	CO3	PO3
b.	What happens when an interrupt is requested? Explain sequence of events.	9	L2	CO2	PO2
c.	Write an assembly language program to toggle LED's with period of 0.5 seconds using interrupts generated by timer – A in up mode.	9	L4	CO5	PO3
UNIT - IV		18	L2	CO2	PO1
5 a.	With a block diagram and its control register, explain function of basic timer 1.	9	L2	CO2	PO2
b.	Explain watchdog timer with its control register WDTCTL.	9	L2	CO2	PO2
c.	Explain capture / compare control register TACCTLn of TIMER-A in MSP430 microcontroller.	9	L2	CO2	PO2
UNIT - V		18			
6 a.	Write the architecture of comparator $_A^+$. Explain each of its bits that control its operation.	9	L2	CO2	PO2
b.	With diagram, explain 4-bit switched capacitor SAR ADC, indicate switch position for an input of $V_{in} = 0.4 V_{FS}$ and binary output 0110.	9	L2	CO2	PO2
c.	With neat block diagram, explain sigma-delta ADC.	9	L2	CO2	PO2

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