U.S.N

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; June - 2017

Microcontroller

Time: 3 hrs   Max. Marks: 100

*Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a.	List all the register of MPS 430 CPU and describe its speciality and necessity.	10
b.	Differentiate between :	
	(i) Harvard and Von-Neuman architecture (ii) RISC and CISC	10
	(iii) Microprocessor and Microcontroller.	
2 a.	List all six blocks meant for peripheral function and describe their functionalities.	10
b.	Taking a practical control system as an example, explain the role of microcontroller and its various components with a neat diagram. Discuss possible choices for microcontroller in this application substantiating your choice.	10

UNIT - II

3 a. Explain the operation of a stack pointer register given following initial conditions and sequence of instructions. Indicate status of SP and other concerned register after executing each of these instructions.

Initial value of SP : 0240

Push W # 0x3355   10

Push W # 0x2288

Mov W # 0x1122, R_0

Pop W R_0

Pop W R_1

b. Discuss the following with regard to Reset mechanisms in MSP 430 :

   i)   Initialization process before the main activity begins

   ii) Handling Hardware issues   10

   iii) Flags in interrupt flag register IRG1.

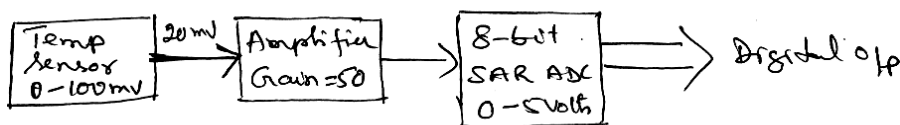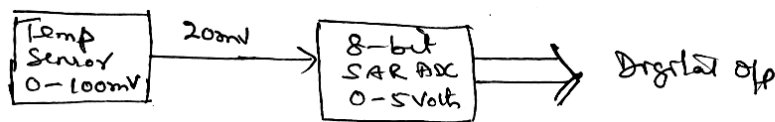|		
4 a.	Enumerate speciality of constant generator and its usefulness.	4
b.	Develop a simple hardware circuit and program to record the most recent eight status of a push bottom.	10
c.	Describe the following instructions with an example :	6
	i) Swpb src ii) dint iii) inv w dst.	

UNIT - III

5 a. Differentiate between subroutines and interrupt service routines.   5

   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.   10

   c. Compare the low-power modes of MSP 430 Active, LPMO, LPM3 and MPM4 for clock settings and current values.   5

6. a Discuss the bit settings of SR register for different low power modes on MPS 430.   6

   b. Write an ISR in C language to toggle LED's with period of 0-5 sec using interrupts from timer-A.   8

   c. Describe the step wise process when an interrupt arises.   6

UNIT - IV

7 a. Draw the simplified block diagram of Basic timer 1 and list its high lighting features. Also, explain different bits of its control register BTCTL.   8

   b. Construct a state machine to set the timer of clock using Timer-A.   12

8 a. Draw the simplified block diagram of Timer-B and describe function of each unit.   10

   b. Discuss the edge-aligned PWM and two main parameters of PWM design for 60% duty cycle and frequency = 100 Hz.   10

UNIT - V

9 a. Show that a comparator acts as 1-bit ADC. Design a comparator based warning circuit which glows a LED when the temperature crosses the set threshold value.   10

   b. Describe the operation of a 4-bit switched capacitor SAR ADC with neat diagram. Indicate switch position for an input of $V_{in} = 0.4$ VFS and binary outputs 0110 and 1000.   10

10 a. Draw the simplified block diagram of ADCIO and explain the sections relating to clock and voltage source options.   10

   b. Explain principle of operation of sigma delta ADC.   5

   c. Determine the digital output corresponding to two situations below and comment on the outputs

(i) Situation -1

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(ii) Situation -2

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