**به نام خدا**

**تمرین 7**

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**سوال دو**

الف) کمترین میزان تغییر رطوبت برابر 0.3150 درصد است.

ب) در حالت تک تبدیل محاسبات مقادیر زیر را نتیجه می دهد:

R2 = 1974 ohm

R3 = 717 ohm

ج) (توابع کار با LCD در قسمت ه موجود است)

; written by amirphl. amirphl@gmail.com github:amirphl instagram:amirphl

.equ LCD\_RS = 1

.equ LCD\_RW = 2

.equ LCD\_E = 3

.def temp = r16

.def argument= r17 ;argument for calling subroutines

.def return = r18 ;return value from subroutines

; Reset Vector

rjmp Start

;====================================================================

; CODE SEGMENT

;====================================================================

;ADC conversion interrupt

.org 0x01C

in r20,ADCL

in r21,ADCH

call LCD\_wait

sbrc r21,1

ldi argument, '1'

sbrs r21,1

ldi argument, '0'

call LCD\_putchar

sbrc r21,0

ldi argument, '1'

sbrs r21,0

ldi argument, '0'

call LCD\_putchar

sbrc r20,7

ldi argument, '1'

sbrs r20,7

ldi argument, '0'

call LCD\_putchar

sbrc r20,6

ldi argument, '1'

sbrs r20,6

ldi argument, '0'

call LCD\_putchar

sbrc r20,5

ldi argument, '1'

sbrs r20,5

ldi argument, '0'

call LCD\_putchar

sbrc r20,4

ldi argument, '1'

sbrs r20,4

ldi argument, '0'

call LCD\_putchar

sbrc r20,3

ldi argument, '1'

sbrs r20,3

ldi argument, '0'

call LCD\_putchar

sbrc r20,2

ldi argument, '1'

sbrs r20,2

ldi argument, '0'

call LCD\_putchar

sbrc r20,1

ldi argument, '1'

sbrs r20,1

ldi argument, '0'

call LCD\_putchar

sbrc r20,0

ldi argument, '1'

sbrs r20,0

ldi argument, '0'

call LCD\_putchar

reti

Start:

sei

;stack pointer setup

ldi r16,high(RAMEND)

out SPH,r16

ldi r16,low(RAMEND)

out SPL,r16

;init LCD

rcall LCD\_init

;MUX = ADC1 , use AREF

in r16,ADMUX

ori r16,0b01000001

andi r16,0b01100001

out ADMUX,r16

;ADIE = 1

in r16,ADCSRA

ori r16,0b00001000

out ADCSRA,r16

;ADEN = 1

in r16,ADCSRA

ori r16,0b10000000

out ADCSRA,r16

;100 clock idle

ldi r16,50

make\_delay:

dec r16

brne make\_delay

;ADSC = 1

in r16,ADCSRA

ori r16,0b01000000

out ADCSRA,r16

;100 clock idle

ldi r16,50

make\_delay\_2:

dec r16

brne make\_delay\_2

Loop:

jmp Loop

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ADC noise reduction

Idle

in r16, MCUCR

ori r16, (1<<SE)| (1<<SM0) | (0<<SM1) | (0<<SM2)

out MCUCR, r16