

Name:

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## COE 306, Term 171

### Introduction to Embedded Systems

#### Quiz# 2 Solution

Date: Tuesday, Oct. 24, 2017

Q1. Consider the C code given below:

```
volatile static int Array[10] = {75,20,50,40,55,60,10,85,100,90};
int Max=Array[0];
int Min=Array[0];

for (int i=1; i<10; i++)
    if (Array[i]<Min)
        Min = Array[i];
    else if (Array[i] > Max)
        Max = Array[i];
```

Implement the given C code using minimum number of ARM assembly instructions.

```
                                adr        r0, Array
                                ldr        r1, [r0]    ; min
                                ldr        r2, [r0]    ; max
                                mov        r3, #1      ; i=1
ForLoop
                                ldr        r4, [r0, r3, lsl #2]    ; get Array[i]
                                cmp        r4, r1        ; if (Array[i]<Min)
                                movlt     r1, r4        ; Min = Array[i]
                                blt        Skip
                                cmp        r4, r2        ; if (Array[i]>Max)
                                movgt     r2, r4        ; Max = Array[i];
Skip
                                add        r3, r3, #1    ; i++
                                cmp        r3, #9      ; i<10
                                bne        ForLoop
Array DCD        75,20,50,40,55,60,10,85,100,90
```

**Q2.** Determine the content of register 0x27 after executing the following PIC16F assembly code:

```
    MOVLW 0xA7
    MOVWF 0x25
    MOVLW 4
    MOVWF 0x26
    CLRF 0x27
NEXT MOVF 0x25, w
    ANDLW 3
    ADDWF 0x27, f
    RRF 0x25, f
    RRF 0x25, f
    DECFSZ 0x26
    GOTO NEXT
```

This code scans the content of register 0x25 as a group of 2-bits and adds them up and stores the sum in register 0x27. So, the content of register 0x27 is  $3+1+2+2=8$ .