

ENGI-1232-WA, Introduction to Microcontrollers, March 4<sup>th</sup>, 2022

Test#2, Total Mark: 18

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1) Answer the following questions: (1 points)

a) True or False. The CPFSLT instruction alters the contents of its operands.

False

b) For the following decimal number, specify the packed BCD in hexadecimal format: 15.

packed BCD format:000100101

2) Write a program that finds the position of the first 1 in an 8-bit data item. The data is scanned from D0 to D7. Write the result into 0x30. For example, if the data is equal to 11110000, then the program should write 0x04 into address 0x30. (6 points)

```
dataitem equ 0x20
```

```
counter equ 0x21
```

```
result equ 0x30
```

```
org 0x00
```

```
goto Start
```

**Start:**

```
movlw 0x00
```

```
movwf result
```

```
movlw 0x08
```

```
movwf counter
```

```
bcf STATUS,C
```

**forloop:**

```
rrcf databyte
```

```
btfsc databyte
```

```
bra ending
```

```
incf result
```

```
decf counter
```

```
bnz forloop
```

clrf result (this is for the case there are no 1s in data item which is not necessary due the info gained during the test)

**ending:**

```
bra $
```

**3)** Use timer0 to generate a pulse with frequency of 2 KHz and duty cycle of 75% on PORTD0.  
Assume that Fosc=4 Mhz. (11 points)

TCON:

T0PS0 = 0

T0PS1 = 0

T0PS2 = 0

PSA = 0

T0SE = 0

T0SC = 0

T08BIT = 0

TMR0ON = 0

TCON = 0x00

TMR0H&TMR0L:

$2\text{kHz}/4 = 500\text{Hz}$

$4\text{Mhz}/4 = 1\text{Mhz}$

$\text{initialvalue} = 1\mu\text{s} \cdot (2^{16}) - (2\text{ms}/4) \cdot 3 = \text{FFFF} - 5\text{DC} = \text{FA23}$

org 0x00

goto start

**delay:**

movlw 0xFA

movwf TMR0H

movlw 0x23

movwf TMR0L

bcf T0CON,TMR0IF

bsf T0CON,TMR0IF

btfss T0CON, TMR0IF

bra check

**return**

**start:**

clrf TRISB

bcf PORTB,0

again:

movlw 0

movwf T0CON

call delay

btg PORTB,0

bra again  
**end**