Embedded C Practice: Questions & Solutions (8051, PIC18, ARM7)

1. Blink an LED connected to a specific pin using delay

[8051 Solution:]

```c
#include <reg51.h>
void delay() {
    int i, j;
    for(i=0; i<1000; i++)
        for(j=0; j<1275; j++);
}
void main() {
    while(1) {
        P1 = 0xFF;
        delay();
        P1 = 0x00;
        delay();
    }
}
```

[PIC18 Solution:]

```c
#include <xc.h>
#define _XTAL_FREQ 8000000
void main() {
    TRISB = 0x00;
    while(1) {
        PORTB = 0xFF;
        __delay_ms(500);
        PORTB = 0x00;
        __delay_ms(500);
    }
}
```

[ARM7 Solution:]

```c
#include <LPC214x.h>
void delay() {
    for(int i=0; i<60000; i++);
}
int main() {
    IODIR0 = 0xFFFFFFFF;
```

```
    while(1) {
        IOSET0 = 1<<10;
        delay();
        IOCLR0 = 1<<10;
        delay();
    }
}
```

2. Read a switch input and turn ON LED when pressed

[8051 Solution:]

```
#include <reg51.h>
void main() {
    while(1) {
        if(P2 == 0x00)
            P1 = 0xFF;
        else
            P1 = 0x00;
    }
}
```

[PIC18 Solution:]

```
#include <xc.h>
#define _XTAL_FREQ 8000000
void main() {
    TRISB = 0x01;  // RB0 input (switch)
    TRISD = 0x00;  // RD as output (LED)
    while(1) {
        if(PORTBbits.RB0 == 0)
            LATD = 0xFF;
        else
            LATD = 0x00;
    }
}
```

[ARM7 Solution:]

```
#include <LPC214x.h>
int main() {
```

```
    IODIR0 = (1<<10); // P0.10 output (LED)
    IODIR1 &= ~(1<<15); // P1.15 input (switch)
    while(1) {
        if(!(IOPIN1 & (1<<15)))
            IOSET0 = (1<<10);
        else
            IOCLR0 = (1<<10);
    }
}
```

3. UART Transmit 'Hello' continuously

[8051 Solution:]

```
#include <reg51.h>
void main() {
    SCON = 0x50;
    TMOD = 0x20;
    TH1 = 0xFD;
    TR1 = 1;
    while(1) {
        char *msg = "Hello\r\n";
        while(*msg) {
            SBUF = *msg++;
            while(!TI);
            TI = 0;
        }
    }
}
```

[PIC18 Solution:]

```
#include <xc.h>
#define _XTAL_FREQ 8000000
void uart_init() {
    TXSTAbits.BRGH = 1;
    BAUDCONbits.BRG16 = 1;
    SPBRG = 51;
    RCSTAbits.SPEN = 1;
    TXSTAbits.TXEN = 1;
}
```

```c
void uart_send(char data) {
    while(!TXSTAbits.TRMT);
    TXREG = data;
}
void main() {
    uart_init();
    while(1) {
        char *msg = "Hello\r\n";
        while(*msg) uart_send(*msg++);
        __delay_ms(1000);
    }
}
```

[ARM7 Solution:]

```c
#include <LPC214x.h>
void uart0_init() {
    PINSEL0 = 0x00000005;
    U0LCR = 0x83;
    U0DLL = 97;
    U0LCR = 0x03;
}
void uart0_send(char c) {
    while(!(U0LSR & 0x20));
    U0THR = c;
}
int main() {
    uart0_init();
    while(1) {
        char *msg = "Hello\r\n";
        while(*msg) uart0_send(*msg++);
        for(int i=0;i<60000;i++);
    }
}
```