

## D1 'C' Programming

The skills program is based around an IR beam detector and counter.

Please read carefully the accompanying notes on the Hardware and Software setup of this test.

D1.1 Ensure that you have both the MPLAB IDE and HIDBootloader (Windows) applications running on your PC.

D1.2 Use the Bootloader to download the "welcome" application in the project folder.  
Demonstrate downloaded program to a Judge. (1 mark)

Running this program on the PIC demo board demonstrates how the completed debugged version of this test should run, it also includes a welcome message.

D1.3 Open the Workspace Project "Skills1". ( File->Open Workspace...) Make the Project, (F10), the compiler will find syntax errors in the source code. Correct all 5 syntax errors as reported and document each error fix below. The compiler only identifies one error at once, so re-make the project (F10) after each fix.

D 1.4 Documented corrected 1<sup>st</sup> syntax error (1 mark)

D 1.5 Documented corrected 2<sup>nd</sup> syntax error (1 mark)

D 1.6 Documented corrected 3<sup>rd</sup> syntax error (1 mark)

D 1.7 Documented corrected 4th syntax error (1 mark)

D 1.8 Documented corrected 5<sup>th</sup> syntax error

(1 mark)

D 1.9 Using the Bootloader, download the compiled "Skills1" file to the PIC demo board.  
Demonstrate compiled program to a Judge.

(1 mark)

D 1.10 The compiled and downloaded program has a problem with displaying numbers correctly on the LED display.

Using the Schematic Diagram for reference, ensure that any errors in the subroutine 'Display7Segment()' are corrected.

D 1.11 Documented corrected 'Display7Segment()' faults.

(2 mark)

D 1.12 Using the Bootloader download the compiled "Skills1" file to the PIC demo board.  
Demonstrate compiled and downloaded program to a Judge.

(1 mark)

D 1.13 The program will still have a problem with displaying certain numbers on the LED display.

Document corrected data errors in the array NumtoSeg[ ]

(2marks)

D 1.14 Using the Bootloader download the compiled "Skills1" file to the PIC demo board.  
Demonstrate compiled and downloaded program to a Judge.

(1 mark)

D 1.15 If we wanted to change the display to count hexadecimal numbers, document below what changes you would make to the NumtoSeg[] array.

(2 marks)

D 1.16 Document any changes from the following code for hexadecimal counting.

```
LEDdigits[0] = IRcounter%10;           // units  
LEDdigits[1] = (IRcounter/10)%10;     // tens  
LEDdigits[2] = IRcounter/100;        // hundreds
```

(2 marks)

D 1.17 Implement the changes D1.16, D1.17 and any other changes you feel should be added to the Project for hexadecimal counting, make and download to the PIC board.

Demonstrate the hexadecimal counting changes to a judge.

(3 marks)