

COMPETITOR'S INSTRUCTION:-

**Attempt all questions: Where applicable circle the letter that indicates the correct answer.
Otherwise answer questions as instructed**

D1.1 Embedded code is used widely in modern electronics. Name 5 things that may typically have embedded code in the average household.

(1.0)
(0.2 each)

D1.2 Embedded code often runs on microcontrollers. What function below would you not typically find on a microcontroller.

- a) RAM
- b) USB
- c) Serial Communications
- d) HDMI
- e) ROM
- f) Analogue to Digital Conversion

(0.5)

D1.3 High level 'C' or 'C++' is often used for programming, what is the low level programming language called.

- a) Hex
- b) Assembly
- c) Bin
- d) Op-code

(0.5)

D1.4 Which of these is not a good reason for using high level 'C' programming.

- a) Smaller code size.
- b) Code can be compiled onto different processors
- c) Easier to program and debug.
- d) Use library functions

(0.5)

The following questions are simple 'C' expressions where a, b and c are all unsigned chars (0-255)
Answers in hex, decimal or binary, but please specify which is used.

D1.5 b = 100;
 a = b & 1;

What is the value of a?

(0.5)

D1.6 b = 1;
 a = b << 5;

What is the value of a?

(0.5)

D1.7 b = 2; c=3;
 a = (b | 1) * (c & 2);

What is the value of a?

(1.0)

D1.8 b = 128;
 a = ~b; //(hint ~ is same as bit wise NOT)

What is the value of a?

(1.0)

For the following 'for' loop examples, a and b are all unsigned chars (0-255)

D1.9

```
a = 0;
for ( b=0;b<13;b++)
{
    a = a + 1;
}
```

What is the value of a at the end of the loop?

(1.0)

D1.10

```
a = 0;
for ( b=1;b<=10;b+=2)
{
    a++;
}
```

What is the value of a at the end of the loop?

(1.5)

For the following 'do while' loop examples where a and b are all unsigned chars (0-255)

D1.11

```
a = b = 0;
do {
    a += b*3;
    b++;
} while ( b <= 5 );
```

What is the value of a at the end of the loop?

(1.5)

D1.12

```
a = b = 0;
do {
    a += b;
    b++;
} while ( b++ <= 10 );
```

What is the value of a at the end of the loop?

(1.5)

The Following source code has 6 'C' syntax errors, in any order, identify the error and specify the correct syntax.

```
BYTE test;
BYTE c;
BYTE b;
WORD CRC,seed;
BYTE data() = { 0x01,0x04,0xfG,0x56,0x78,0x78,0x55,0x7A };

void main(void)
{

    seed = 0x1021;
    CRC = 07fff;
    for (c==0;c<8;c++)
    {
        test = data[c];
        for ( b=0;b<8;b++)
        {
            if ( ( CRC & 1) == ( test & 1 ) )
            {
                CRC >>= 1
            }
            else
            {
                CRC ^= seed;
            }
            test >>= 1;
        }
    }
}
```

D1.13

Syntax error 1 and correct syntax

(1.0)

D1.14

Syntax error 2 and correct syntax

(1.0)

D1.15

Syntax error 3 and correct syntax

(1.0)

D1.16

Syntax error 4 and correct syntax

(1.0)

D1.17

Syntax error 5 and correct syntax

(1.0)

D1.18

Syntax error 6 and correct syntax

(1.0)

D1.19

The line 'CRC ^= seed' does what?

- a) Puts an NOT version of seed into CRC
- b) Test to see if CRC does not equal seed
- c) Puts seed into CRC if seed > 0
- d) Puts the result of an exclusive OR of CRC and seed into CRC

(0.5)

D1.20

The line 'test >>= 1' does what?

- a) Puts 1 into test
- b) Doubles the value of test
- c) Does a single right shift of test
- d) Test whether test is equal to 1

(0.5)

D1.21 if a variable 'b' is assigned as 'signed char b'
What is the largest positive number b can be?

(1.0)

D1.22 if a variable 'b' is assigned as 'signed char b'
What is the largest negative number b can be?

(1.0)

D1.23 if a variable 'b' is assigned as 'signed char b' and is the largest positive value it can be and is then incremented, what value in decimal and hex will be 'b' become?

(1.0)

D1.24 if a variable is assigned as 'unsigned char *b' 'b' is called a?

- a) union
- b) pointer
- c) structure
- d) function
- e) constant

(1.0)

D1.25 which of these is NOT the reason you use function call in programming?

- a) Increase speed of code
- b) Reduce code size
- c) Make code more readable
- d) Reduce errors

(1.0)

D1.26 the line 'unsigned char mydata[] = { 0x36,0x78,0xfc,0x55,0xEA };' defines a variable type called mydata. What sort of type is mydata?

- a) Union
- b) Array
- c) Structure
- d) Enum

(1.0)

D1.27 in B1.26 data is being initialised with 7 bytes of unsigned hex data. What are the decimal values of the 7 bytes (Do not use a calculator please)

(2.0)

(0.4 each)
