Victoria University of Bangladesh
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① ~~a~~ Digital logic design:-

Digital logic design in a system in electrical and computer engineering that uses simple numbers values to produce input and output operations.

Fields of DLD:-

④ Universal Representation:-

~~For any type~~ Digital logic encodes data in binary form, enabling uniform handling and seamless integration of diverse data representations like images, texts, videos and audio.

④ Error reduction and correction:-

Digital logic, with its limited error proneness and redundancy check mechanisms, ensures reliable and accurate data processing by detecting and ~~rect~~ rectifying errors during transmission.

(iv) Scalability and Modularity:-

Digital logic offers a cost effective, scalable framework for ~~do~~ developing complex systems ~~to~~ using basic logic gates.

(v) Noise immunity:-

Digital logic, due to its discrete nature, offers more robust communication and data processing by filtering noise and mitigating errors compared to analog signals.

b) Advantages of DLD:-

(i) It is cheaper and easier to design.

(ii) Easier to store, transmit and manipulate information.

(iii) Devices becomes smaller and faster.

② a) $(275.125)_{10} = 8$

$$\Rightarrow \begin{array}{r|l} 8 & 275 \\ \hline 8 & 34 \;-\; 3 \\ \hline 8 & 4 \;-\; 2 \\ \hline & 0 \;-\; 4 \end{array}$$

$(423)_8$

$(.125)$

$.125 \times 8 = 1.0$

$\therefore (275.125)_{10} = (423.1)_8$ Ans.

b) $(AC07.12ECF)_{16} = (?)_{10}$

$\Rightarrow A\times16^3 + C\times16^2 + 0\times16^1 + 7\times16^0 + 1\times16^{-1} + 2\times16^{-2}$
$+ E\times16^{-3} + C\times16^{-4} + F\times16^{-5}$

$\Rightarrow 10\times16^3 + 12\times16^2 + 0\times16^1 + 7\times16^0 + 1\times16^{-1} + 2\times16^{-2} + 14\times16^{-3}$
$+ 12\times16^{-4} + 15\times16^{-5}$

$\Rightarrow (44039.07392787933)_{10}$

(c) $(100111.1011)_2 = (?)_{10}$

$1\times2^5+0\times2^4+0\times2^3+1\times2^2+1\times2^1+1\times2^0+1\times2^{-1}+0\times2^{-2}$
$+1\times2^{-3}+1\times2^{-4}$

$\Rightarrow 1\times32+0\times16+0\times8+1\times4+1\times2+1\times1+1\times1/2+0\times1/4$
$+1\times\frac{1}{8}+1\times1/16$

$\Rightarrow 32+0+0+4+2+1+1+1/2+0+\frac{1}{8}+1/16$

$\Rightarrow 32+4+2+1+1/2+1/8+1/16$

$\Rightarrow (39.5625)_{10}$ Ans.

d) $(15435.063)_8 = (?)_{10}$

$\Rightarrow 1\times8^4+5\times8^3+4\times8^2+3\times8^1+5\times8^0+0\times8^{-1}+6\times8^{-2}+3\times8^{-3}$

$\Rightarrow 1\times4096+5\times512+4\times64+3\times8+5\times1+0\times1/8+6\times1/64+3\times1/512$

$\Rightarrow 4096+2560+256+24+5+0.09375+0.005859375$

$\Rightarrow (6941.099609375)_{10}$ Ans.

③ a) Define the example of LSB and MSB:-

The MSB and LSB gives more resolution when controlling the parameters. MSB stands for most significant bit while LSB stands for least significant bit. In binary terms, the MSB is the bit that has the greatest effect on number and it is the left most bit.

For example, for a binary number 0011 0101, the most significant 4 bits would be 0011. The least significant 4 bits would be 0101.

The left-most bit is the most significant because for the binary 00110101, the value is 53. If you flip the left most bit from 0 to 1, you have 10110101, which gives you 181. Flipping the LSB on the right will give you 00110100, which is 52. Hence the name MSB and LSB.

~~iii) $(10354.2762)_8 = (?)_{16}$~~

~~Octal~~

3) i) $(33.12)_{10} = (?)_{16}$

$$\Rightarrow \begin{array}{r|l} 16 & 33 \\ \hline 16 & 2 - 1 \\ \hline & 0 - 2 \end{array}$$

$(21)_{16}$

$0.12 \times 16 = 1.92) — 1$

$.92 \times 16 = x$

$\therefore (33.12)_{10} = (21.1)_{16}$ (Ans.

ii) $(54.22)_{16} = (?)_{10}$

$5 \times 16^1 + 4 \times 16^0 + 2 \times 16^{-1} + 2 \times 16^{-2}$

$\Rightarrow 5 \times 16 + 4 + 0.125 + 0.0078125$

$\Rightarrow (84.1328125)_{10}$ Ans.

iii) $(10354.2762)_8 = (?)_{16}$

Converting the numbers octal to binary:-

1 - 001 2 - 010

0 - 000 7 - 111

3 - 011 6 - 110

5 - 101 2 - 010

4 - 100

Intiger part

$(001000011101100)_2$

$\Rightarrow (0010110100100)_2$

0010 → 2

1101 → D

0100 → 4

Fractional part

$(010111110010)_2$

$\Rightarrow (0101111110110010)_2$

0101 → 5

1111 → F

1011 → 13

0010 → 2

$\therefore (204.5F132)_{16}$

Ans.

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iv) $(AB C0D.89FF)_{16} = (?)_8$

Integer part

$(101010111100110100000)_2$

101 → 5

010 → 2

111 → 7

100 → 4

011 – 3

000 – 0

Fractional part

$(1000100111101111)_2$

100 → 4

010 → 2

011 → 3

111 → 7

So the octal equivalent of $(AB C0D.89EF)_{16} =$

$(527430.4237)_8$ Ans.

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