Question

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What is $(1111)_2 + (1001)_2 - (1010)_2$ equal to?

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1. $(111)_2$
2. $(1100)_2$
3. $(1110)_2$
4. $(1010)_2$
5. None of these

Answer (Detailed Solution Below)

Option 3 : $(1110)_2$

Detailed Solution

Concept:

Covert Binary to Decimal:

For binary number with n digits;

D_{n-1} .... $D_3D_2D_1D_0$

The decimal number is equal to the sum of binary digits (D_n) times their power of 2 (2^n)

Decimal = $D_0 \times 2^0 + D_1 \times 2^1 + D_2 \times 2^2 + ...$

Decimal to binary:

- Take decimal number as dividend.
- Divide the number by 2.
- Get the integer quotient for the next iteration.
- Get the remainder (it will be either 0 or 1 because of divisor 2).
- Repeat the steps until the quotient is equal to 0
- Write the remainders in reverse order (which will be equivalent binary number of given decimal number).

Calculation:

To find: $(1111)_2 + (1001)_2 - (1010)_2 = ?$

$(1111)_2 = 1 \times 2^0 + 1 \times 2^1 + 1 \times 2^2 + 1 \times 2^3 = 15$

$(1001)_2 = 1 \times 2^0 + 0 \times 2^1 + 0 \times 2^2 + 1 \times 2^3 = 9$

$(1010)_2 = 0 \times 2^0 + 1 \times 2^1 + 0 \times 2^2 + 1 \times 2^3 = 10$

$(1111)_2 + (1001)_2 - (1010)_2 = 15 + 9 - 10 = 14$

Now, in binary 14 can be written as,

Division	Remainder (R)
14 / 2 = 7	0
7 / 2 = 3	1
3 / 2 = 1	1
1 / 2 = 0	1

$(14)_{10} = (1110)_2$

Hence, option (3) is correct.