Matthew Coscia

To represent numbers using 12-bit registers in 2's complement form, we need to allocate 1 bit for the sign (0 for positive, 1 for negative), and the remaining 11 bits for the magnitude.

Let's calculate the 2's complement binary representation for each of the given numbers:

1. -13:
    a. Convert the magnitude of 13 to binary: 13 in binary is 1101.
    b. Invert the bits: 1101 becomes 0010.
    c. Add 1: 0010 + 1 = 0011.
    d. The 2's complement representation of -13 in 12 bits is 1100 0000 0011.
2. 56:
    a. Convert 56 to binary: 56 in binary is 111000.
    b. Since it is positive, we directly represent it as 12 bits: 0000 1110 0000.
3. -1:
    a. Convert the magnitude of 1 to binary: 1 in binary is 0001.
    b. Invert the bits: 0001 becomes 1110.
    c. Add 1: 1110 + 1 = 1111.
    d. The 2's complement representation of -1 in 12 bits is 1111.
4. -2048:
    a. Convert the magnitude of 2048 to binary: 2048 in binary is 100000000000.
    b. Invert the bits: 100000000000 becomes 011111111111.
    c. Add 1: 011111111111 + 1 = 1000000000000.
    d. The 2's complement representation of -2048 in 12 bits is 1000 0000 0000.
5. 2048:
    a. Since 2048 is outside the range of a 12-bit signed number, it cannot be represented in 2's complement form using 12 bits.

Therefore, the 2's complement binary representations for the given numbers using 12-bit registers are as follows:

-13: 1100 0000 0011

56: 0000 1110 0000

-1: 1111

-2048: 1000 0000 0000

2048: Cannot be represented in 12 bits.