5.2 a) **Find the 16-bit 2’s complementary binary representation for the decimal number 1987.**

*Solution:*

1987 = 2^10 + 2^9 + 2^8 + 2^7 + 2^6 + 2^1 + 2^0

1987 base ten = 0000 0111 1100 0011 base two  
For 2’s complement of 1987 we will first do 1’s complement on the binary

0000 0111 1100 0011 1’s complement is 1111 1000 0011 1100.

Adding one for the 2’s complement  
Answer = 1111 1000 0011 1101

5.2 b) **Find the 16-bit 2’s complementary binary representation for the decimal number −1987.**

*Solution:*

-1987= - [2^10 + 2^9 + 2^8 + 2^7 + 2^6 + 2^1 + 2^0]

-1987 base ten = - [0000 0111 1100 0011]

= 1111 1000 0011 1101

For 2’s complement we will first do 1’s complement on the binary

1111 1000 0011 1101 1’s complement is 0000 0111 1100 0010

Adding one for the 2’s complement

Answer = 0000 0111 1100 0011

5.2 c) **From your answer in (b), find the six-digit 16’s complement hexadecimal representation for the decimal number −1987.**

*Solution:*

0000 0111 1100 0011 = -1987

Therefore,

-1987 = 7\*16^2 + 12\*16^0 + 3\*16^0

= 7C3 hex

Answer = 0007C3 hex

P.T.O

5.5 What are the 16-bit 1’s and 2’s complements of the following binary numbers?

a) 10000

1’s complement of 10000 is **01111.**

For 2’s complement we will add 1 to 1’s complement,

Answer = **10000**

b) 100111100001001

1’s complement of 100111100001001 is **011000011110110**

For 2’s complement we will add 1 to 1’s complement,

Answer = **011000011110111**

c) 0100111000100100

1’s complement of 0100111000100100 is **1011000111011011.**

For 2’s complement we will add 1 to 1’s complement,

Answer = **1011000111011111.**