

## EE1001 Part 2 - Assignment 2

1. Find the 9's, 10's, 1's (8-bit) and 2's (8-bit) complement of decimal numbers: 23 and 91.

Ans.

|    | 9's | 10's | 1's       | 2's       |
|----|-----|------|-----------|-----------|
| 23 | 76  | 77   | 1110 1000 | 1110 1001 |
| 91 | 8   | 9    | 1010 0100 | 1010 0101 |

2. Find the decimal value of the following 8-bit 2's complement numbers:

(a) 10010110, (b) 00101101, (c) 11010010, (e) 01001001

Ans. (a) -106 (b) 45 (c) -46 (d) 73

3. Express the following decimal numbers in 6-bit 2's complement representation:

(a) -18, (b) 11, (c) -11, (d) -23, (e) 27, (f) -37

Ans. (a) 101110 (b) 001011 (c) 110101 (d) 101001 (e) 011011 (f) out range

4. Convert decimal numbers 175 and 83 to 8-bit unsigned binary number and find the sum and check for its correctness.

Ans.  $175_{10} = 10101111$ ,  $83_{10} = 01010011$

Sum = 100000010 (carry – incorrect 8-bit answer)

5. Convert decimal numbers 97 and -53 to 8-bit 2's complement number and find the sum and check for its correctness.

Ans.  $97_{10} = 0110\ 0001$ ,  $-53_{10} = 1100\ 1011$

sum = 0010 1100 (No overflow – correct)

6. Convert the following decimal numbers to 8-bit 2's complement numbers and use addition to perform the following arithmetic operation and check the correctness of the answers:

(a) 23+37, (b) 113+48, (c) -37+83, (d) -23-71, (e) -117-39

Ans. (a) 0011 1100 (b) overflow (c) 0010 1110 (d) 1010 0010 (e) overflow

7. Express two BCD numbers 374 and 258 in binary format and perform binary addition. Find the sum and express the result in BCD format.

Ans.  $632_{BCD} = 0110\ 0011\ 0010$  (add 0110 to digits with sum greater than 9)

8. Express two decimal numbers 12 and 14 in 4-bit unsigned binary number and perform binary multiplication to find the product.

Ans.  $1100 \times 1110 = 1010\ 1000$

9. Find the quotient and remainder for  $101011010 \div 1011$ .

Ans. Quotient = 11111, remainder = 101