Class test 1

Section A

Perform bit conversions on the following numbers to binary:

a) 45 (2)

45 ÷ 2 = 22 remainder 1

22 ÷ 2 = 11 remainder 0

11 ÷ 2 = 5 remainder 1

5 ÷ 2 = 2 remainder 1

2 ÷ 2 = 1 remainder 0

1 ÷ 2 = 0 remainder 1

101101

b) 156 (2)

156 ÷ 2 = 78 remainder 0

78 ÷ 2 = 39 remainder 0

39 ÷ 2 = 19 remainder 1

19 ÷ 2 = 9 remainder 1

9 ÷ 2 = 4 remainder 1

4 ÷ 2 = 2 remainder 0

2 ÷ 2 = 1 remainder 0

1 ÷ 2 = 0 remainder 1

10011100

c) 247 (2)

247 ÷ 2 = 123 remainder 1

123 ÷ 2 = 61 remainder 1

61 ÷ 2 = 30 remainder 1

30 ÷ 2 = 15 remainder 0

15 ÷ 2 = 7 remainder 1

7 ÷ 2 = 3 remainder 1

3 ÷ 2 = 1 remainder 1

1 ÷ 2 = 0 remainder 1

11110111

Section B

Perform bit conversions on the following binary numbers to decimal:

a) 101110 (2)

$$(1 \times 2^5) + (0 \times 2^4) + (1 \times 2^3) + (1 \times 2^2) + (1 \times 2^1) + (0 \times 2^0)$$

$$= 32 + 0 + 8 + 4 + 2 + 0 = 46$$

b) 1101011 (2)

$$(1 \times 2^6) + (1 \times 2^5) + (0 \times 2^4) + (1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0)$$

$$= 64 + 32 + 0 + 8 + 0 + 2 + 1 = 107$$

c) 10011011 (2)

$$(1 \times 2^7) + (0 \times 2^6) + (0 \times 2^5) + (1 \times 2^4) + (1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0)$$

$$= 128 + 0 + 0 + 16 + 8 + 0 + 2 + 1 = 155$$

Section C

Perform binary addition:

a) 1101 + 1011 (2)

Answer: 11000

b) 101010 + 110110 (2)

Answer: 1100000

c) 1110110 + 1011011 (2)

Answer: 11000101

Perform binary addition in an 8-bit register (Indicate an overflow):

d) 11011101 + 10101111 (4)

Answer: 110010100