MC

Module-1

PART-A

1.) Explain decimal number system and how to convert decimal numbers to binary, octal and hexadecimal numbers with examples.

Sol:

PART-A

① The decimal number system is the standard system for denoting integer and non-integers numbers. It is also called the base-10 system because it is based on 10 digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

CONVERT DECIMAL to BINARY

TO CONVERT a decimal number (Base-2) you repeatedly divide the number by 2 and record the remainder. The BINARY is the sequence of remainders read from bottom to top

Eg:- ① $25 \div 2 = 12$ $r = 1$
② $12 \div 2 = 6$ $r = 0$
③ $6 \div 2 = r = 0$
④ $3 \div 2 = 1$ $r = 1$
⑤ $1 \div 2 = 0$ $r = 1$

∴ The remainders from to top, 25 binary is 11001

Converting Decimal to octal

To convert a decimal number to octal (base-8) you repeatedly divide the number by 8 and record the remainder. The octal number is the sequence of remainders read from bottom to

ex:- convert to octal

① $25 \div 8 = 3, r = 1$

② $3 \div 8 = 0 \quad r = 3$

CONVERTING DECIMAL TO HEXADECIMAL

To convert a decimal number to hexadecimal (base-16), you repeatedly divide the number by 16 and record the remainder. The hexadecimal number is the sequence of remainders read from bottom to top. Hexadecimal digits include 0-9 and A-f (where A=10, B=11, .., f=15).

ex:- convert 25 to HEXADECIMAL

① $25 \div 16 = 1 \quad r = 9$

② $1 \div 16 = 0 \quad r = 1$

∴ the remainders from bottom to top, 25 is hexadecimal is 19.

2.) Explain binary number system and how to convert binary numbers to decimal, octal and hexadecimal numbers with examples.

Sol:

The binary number system is a base-2 numeral system that uses only two digits: 0 and 1, each digit in a binary number is called a bit. Binary numbers are commonly used in computer science and digital eletronics because they are easy to implement with digital circuitry.

Converting Binary to Decimal

To convert a binary number to a decimal number, you multiply each bit by 2 raised to the power of its position, counting from ~~left~~ right to left starting at 0.

Ex:- Convert 1010 (binary) to decimal

① 1010

② multiply each bit by 2 raised to its position:
- (1 \times 2^3 = 8)
- (0 \times 2^2 = 0)
- (1 \times 2^1 = 2)
- (0 \times 2^0 = 0)

③ Add results: (8+0+2+0=10)
So, 1010 in binary is 10 in decimal

converting Binary to octal

To convert a binary number to an octal number, group the binary digits into sets of three starting from the eight. Add leading zeros if necessary.

ex: convert 1010 (binary) to octal
① 001 010
② convert each group to its octal equival
- 001 = 1
- 010 = 2

③ results: 12
So, 1010 in binary is 12 octal.

Converting Binary to Hexadecimal

To convert a Binary number to a Hexadecimal number, group the binary digits into sets of four, starting from the right. Add leading zeroes if necessary

ex: convert 1010 (binary) to Hexadecimal.

① 1010

② convert each group to its hexadecimal equivalent:

0 1 0 1 0 = A

③ results : A

So, 1010 in binary is A in hexadecimal.

3) Explain octal number system and how to convert octal numbers to binary, decimal and hexadecimal numbers with examples

Sol:

③ sol The octal number system is a base-8 system, which means it uses eight digits: 0, 1, 2, 3, 4, 5, 6 & 7. Each digit in an octal number represents a power of 8.

Converting Octal to BINARY

To convert an octal number to binary, repla each octal digit with its 3-bit binary equivale

Ex:- convert 57_8 to binary

$0\,5_8 = 101_2$

$0\,7_8 = 111_2$

$\therefore 57_8 = 101111_2$

Converting Octal to Decimal

To convert an octal number to decimal, multiplx each digit by 8 raised to the power of its position (starting from 0) and sum of the results

esc:- Convert 57$_8$ to decimal

① $5 \times 8^1 = 40$
$7 \times 8^0 = 7$

② Sum of the values: $57_8 = 47_{10}$

Converting Octal to Hexadecimal

To convert an octal number to hexadecimal, first convert it to binary, then group the binary digits into sets of (starting from the right), and convert each group to its hexadecimal equivalent.

ex: Convert 57$_8$ to hexadecimal

① convert to binary: $57_8 = 101111_2$

② convert into sets of four: 1011 11 (add leading zeroes if necessary: 0010 1111)

③ convert each group to hexadecimal
$0010 = 2$
$1111 = f$

④ $57_8 = 2f_{16}$

5) Explain gray code and how to convert binary number to gray code and vice versa with neat examples.

Sol:

(5) Gray code also known as refleted binary code, is a binary numeral system where two successive values differ in only one bit. This Property makes Gray code usefal in error correction, digital communications and Kaurnaugh maps.

Converting Binary to Gray code

To convert a binary number to Gray code follow these steps

(1) The most Significant Bit (MSB) of the Gray code is the same as the MSB of the binary number.

(2) For the remaining bits, each bit of the Gray code is obtained by XORing the corresponding binary bit with the Previous bit.

ex: convert binar 100110 → (BC)

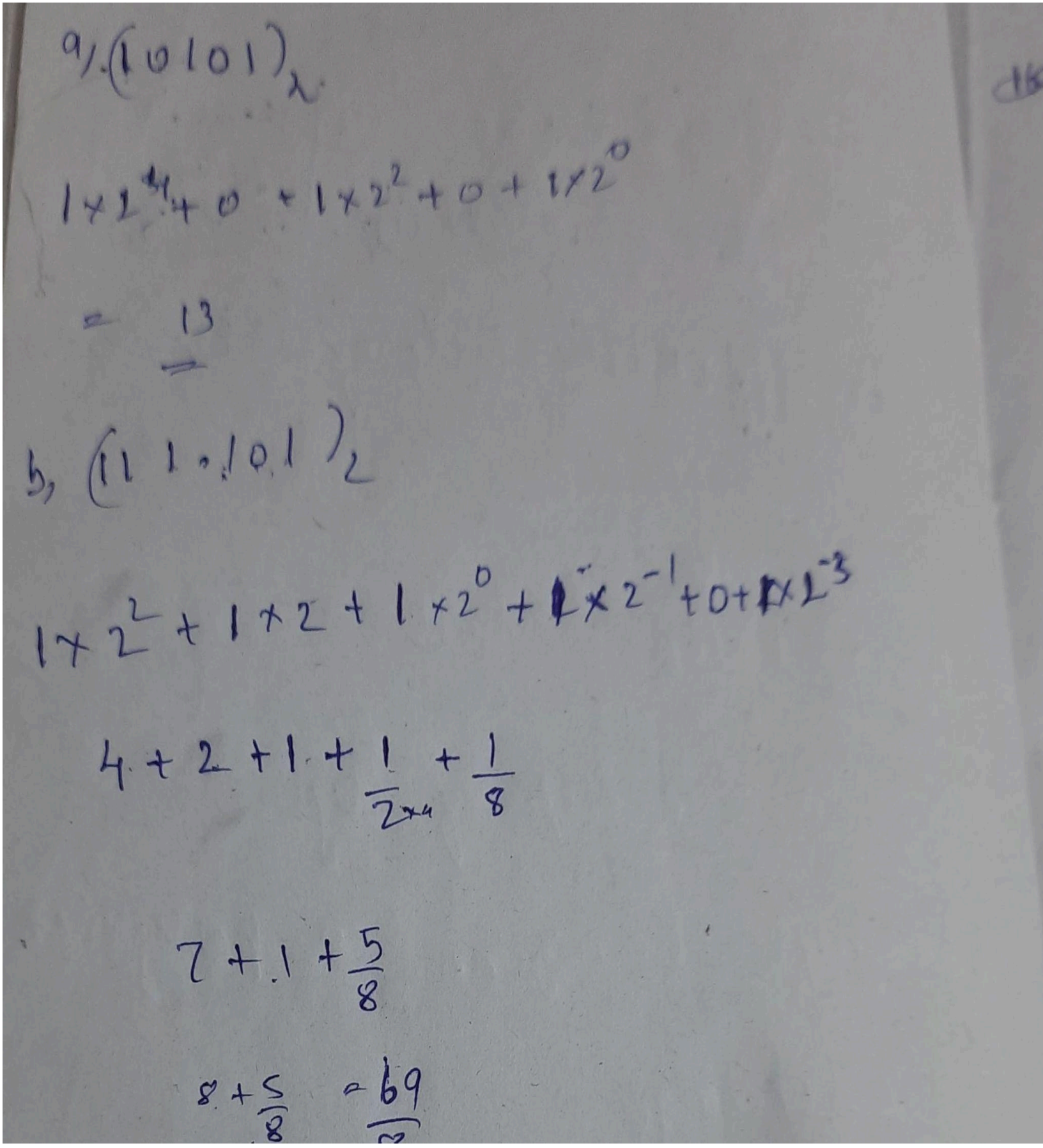
1 0 0 1 1 0
↓ ↓ ↓ ↓ ↓ ↓
1 1 0 1 0 1

Gray to Binary

1 1 0 1 0 1
↓ ↓ ↓ ↓ ↓ ↓
1 1 0 1 1 0

6) Explain decimal number system and convert following numbers to decimal a) (10101)2 b) (111.101)2 c) (4057.06) 8 d) (A0F9.0EB)16

Sol:



5) $(4^{3}\,0^{2}\,5^{1}\,7^{0}.0\,6^{-2})_8 \rightarrow (\quad)_{10}$

$4\times 8^3 + 0 + 5\times 8^1 + 7 + 0 + 6\times 8^{-2}$

$2048 + 40 + 7 + \frac{6}{64}$

$\frac{6}{64} \rightarrow 32$

$= \frac{67043}{32} = (2095.09375)_{10}$

$(A^{3}\,0^{2}\,F^{1}\,9^{0}.0^{-1}\,E\,B^{-2})_{16} \rightarrow (\quad)_{10}$

$10\times 16^3 + 0 + 15\times 16 + 9 + 0 + 14\times 16^{-2} + 11\times 16^{-3}$

$40960 +$

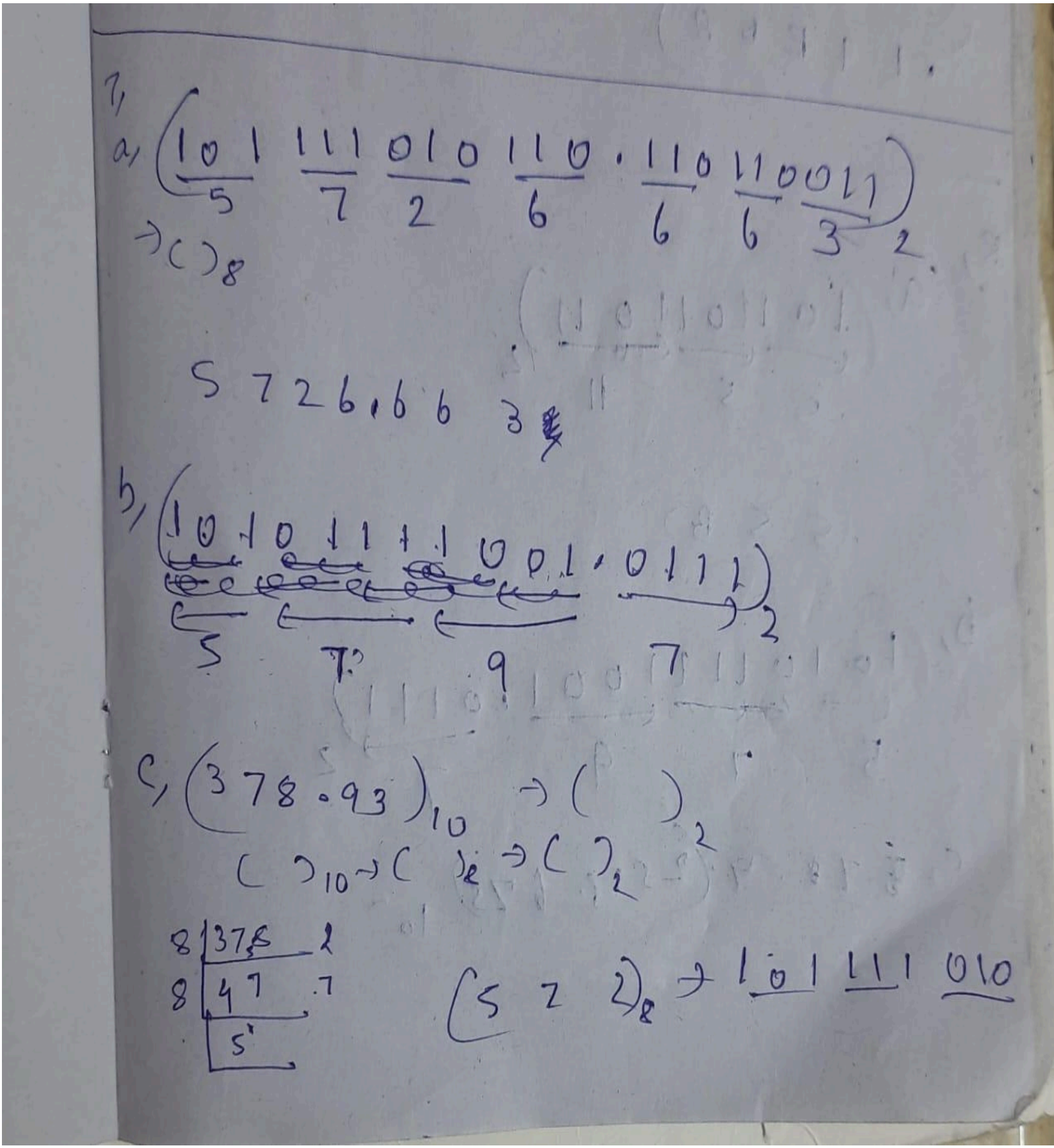
$65776 + 9 + \frac{14}{16^2} + \frac{11}{16^3}$

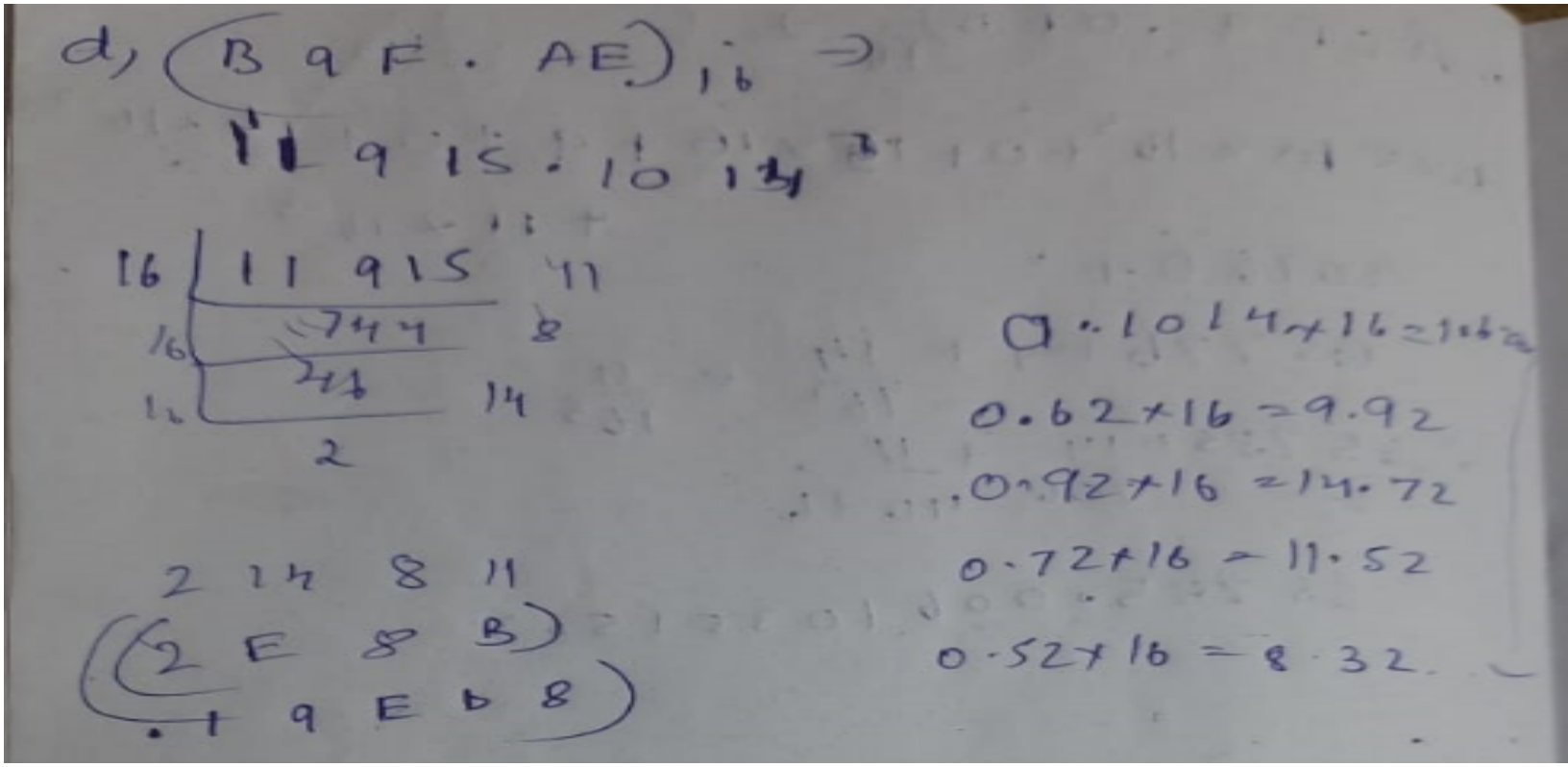
$16^3 \times \frac{65785}{16^3} + \frac{14}{256} + \frac{11}{4096}$

$= 65785.0061035156 3$

7) Explain octal number system and convert following numbers to octal a) (101111010110.110110011)2 b) (10101111001.0111)2 c) (378.93)10 d) (B9F.AE)16

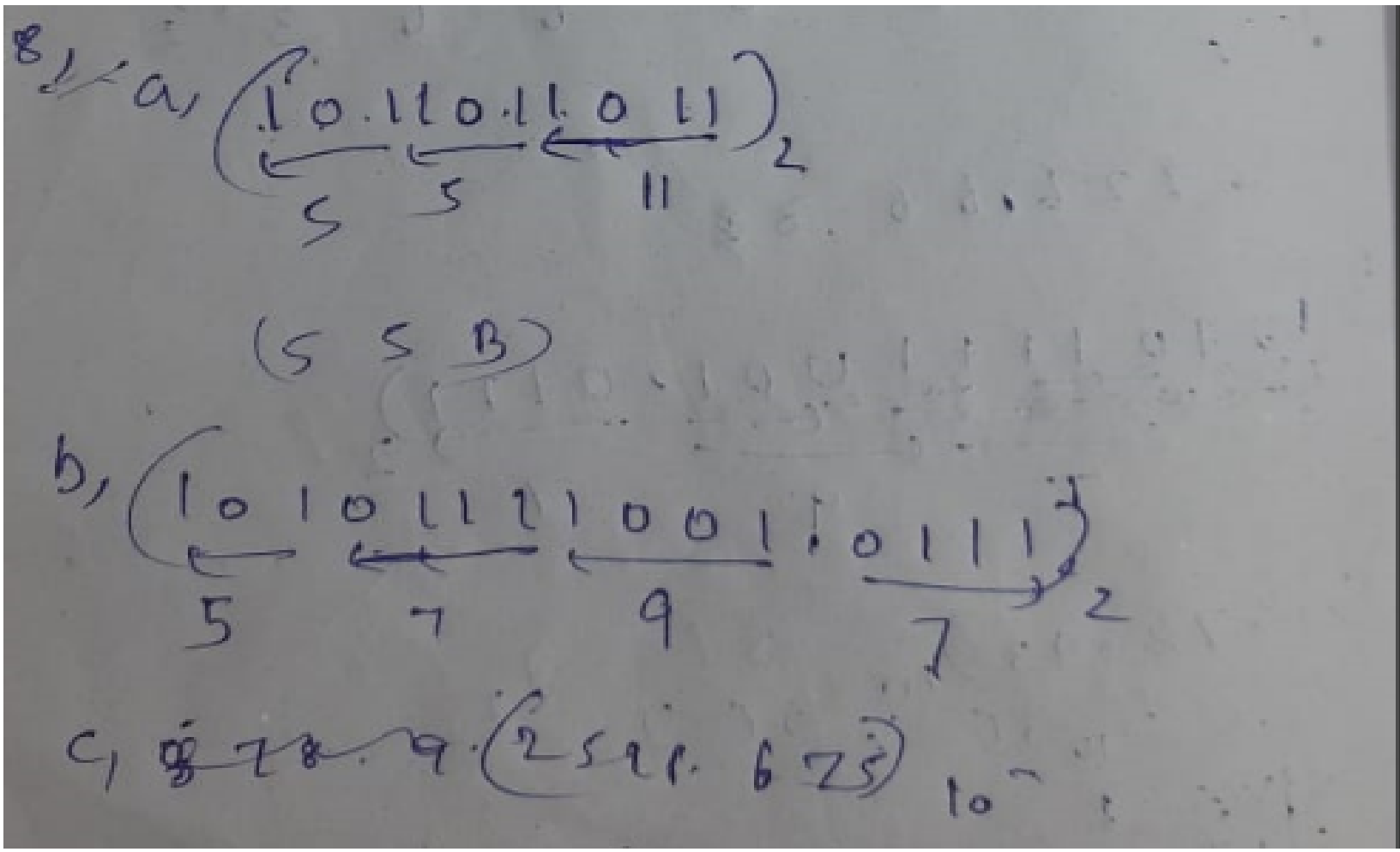
Sol:





8) Explain hexadecimal number system and convert following numbers to hexadecimal a) (1011011011)2 b) (01011111011.011111)2 c) (2598.675)10 d) (756.603)8

Sol:



9) Explain binary number system and convert following numbers to binary a) (52)10 b) (105.15) c) (367.52)8 d) (3A9E.B0D)16

Sol:

(9) So a.) Decimal to Binary: $(52)_{10}$

$52 \div 2 = 26 \quad r = 0$
$26 \div 2 = 13 \quad r = 0$
$13 \div 2 = 6 \quad r = 1$
$6 \div 2 = 3 \quad r = 0$
$3 \div 2 = 1 \quad r = 1$
$1 \div 2 \quad r = 1$

$\therefore (52)_{10} = (110100)_2$.

b.) Decimal to binary: $(105.15)_{10}$

$105 \div 2 = 52 \quad r = 1$
$52 \div 2 = 26 \quad r = 0$
$26 \div 2 = 13 \quad r = 0$
$13 \div 2 = 6 \quad r = 1$
$6 \div 2 = 3 \quad r = 0$
$3 \div 2 = 1 \quad r = 1$
$1 \div 2 = 0 \quad r = 1$

$\therefore (105)_{10} = (1101001)_2$.

(c) Octal to Binary : $(367.52)_8$

- 3 = 011
- 6 = 110
- 7 = 111
- 5 = 101
- 2 = 010

$\therefore (367.52)_8 = (011\,110\,111.\,101010)_2$

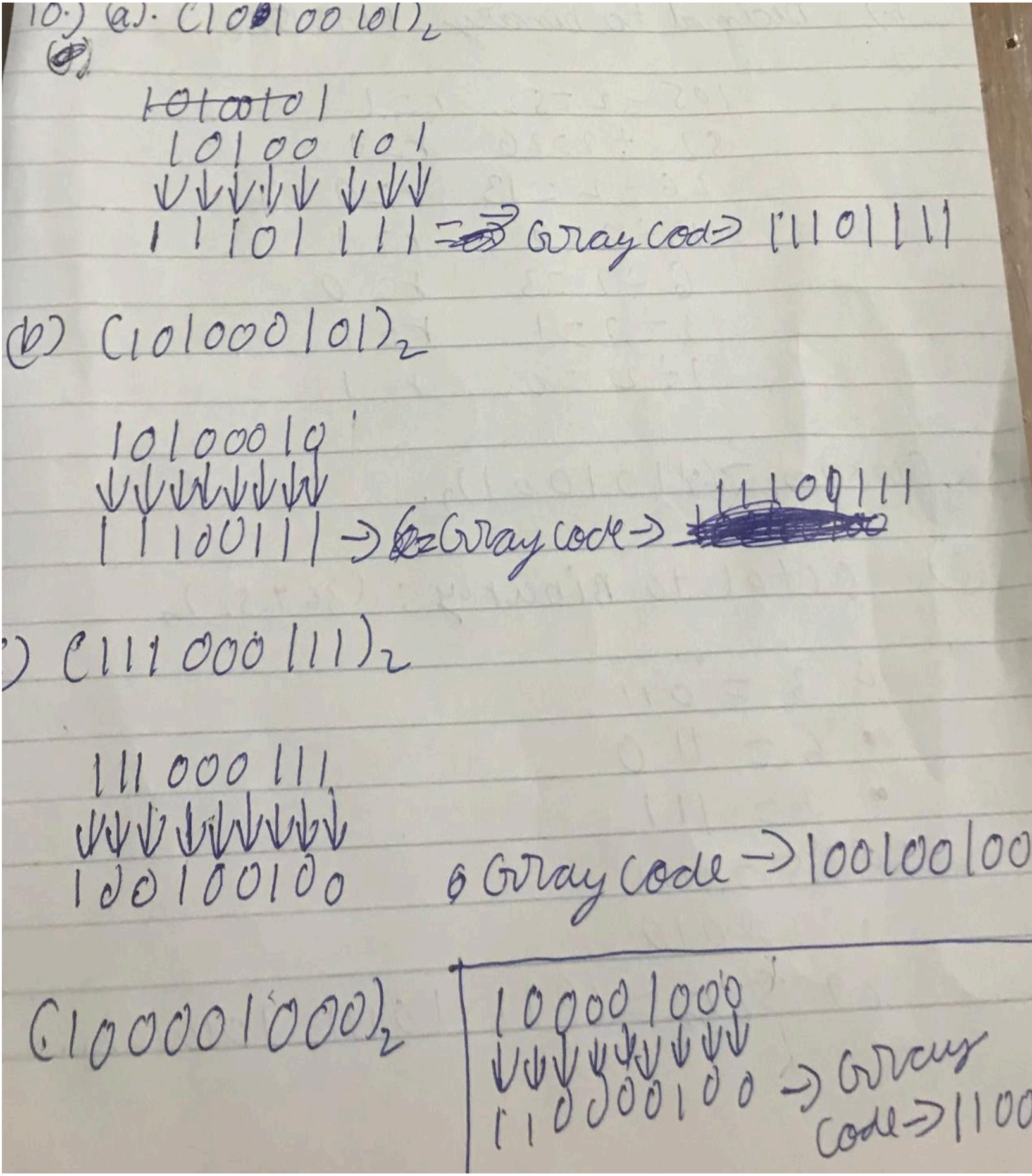
a:) $(3ae.0bod)_{16}$

- 3 = 0011
- a = 1010
- e = 1001
- e = 1110
- b = 1011
- 0 = 0000
- d = 1101

$\therefore (3ae.0bod)_{16} = (001111010010111.\,1011000011101)_2$

10) Explain gray code representation and convert following binary to gray code a) (10100101)2 b) (101000101)2 c) (111000111)2 d) (100001000)2

Sol:



PART -B

1) Convert the following binary numbers to decimal numbers. a) 10011 b) 101010 c) 1011011 d) 010001

Sol:

PART – B

① a.) 10011

Sol $1\times2^4+0\times2^3+0\times2^2+1\times2^1+1\times2^0$

$= 16+0+0+2+1=19$

Decimal: 19

b.) 101010

$1\times2^5+0\times2^4+1\times2^3+0\times2^2+1\times2^1+0\times2^0$

$=32+0+8+0+2+0=42$

Decimal: 42

c.) 1011011

$1\times2^6+0\times2^5+1\times2^4+1\times2^3+0\times2^2+1\times2^1+$

$= 64+0+16+8+2+1=91$

Decimal: 91

d.) 010001

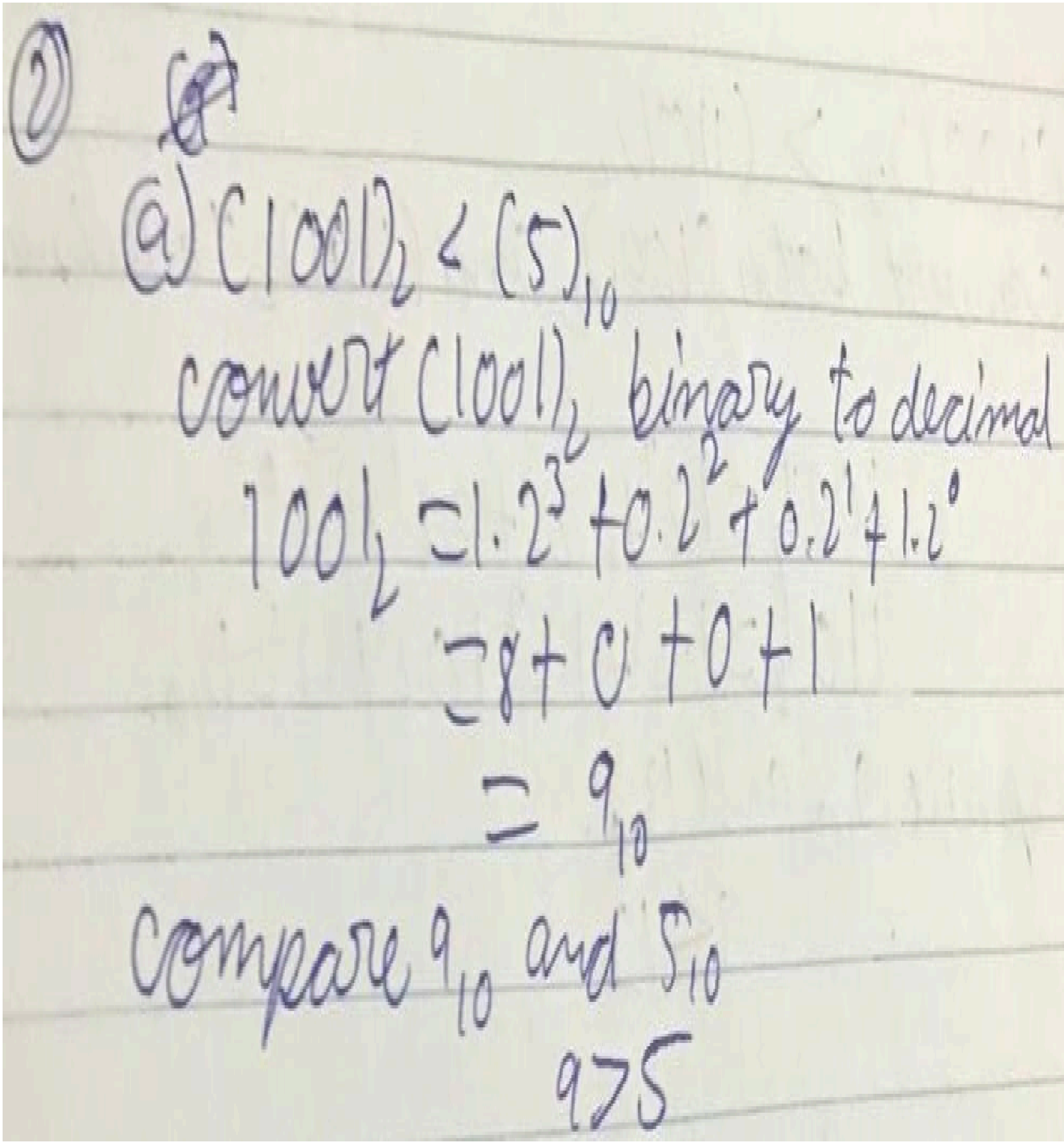
$0\times2^5+1\times2^4+0\times2^3+0\times2^2+0\times2^1+1\times2^0$

$= 0+16+0+0+0+1=17$

Decimal: 17

2) Determine whether the following statements are true or false. Show work that supports your answer. a) (1001)2 < (5)10b)(0111)2 = (111)10c)(0011)2 > 2(10)d)(1001)2 > (1101)2

Sol:



(b) $(0111)_2 = (111)_{10}$

Convert $(0111)_2$ (binary) to decimal:

$$0111_2 = 0 \cdot 2^3 + 1 \cdot 2^2 + 1 \cdot 2^0 = 0 + 4 + 2 + 1$$
$$= 7_{10}$$

Compare 7_{10} with 111_{10}:

$$7 \neq 111$$

So, $(0111)_2 = (111)_{10}$ is false.

(c) $(0011)_2 > 2(10)$

Convert $(0011)_2$ (binary) to decimal:

$$0011_2 = 0 \cdot 2^3 + 0 \cdot 2^2 + 1 \cdot 2^1 + 1 \cdot 2^0$$
$$= 0 + 0 + 2 + 1$$
$$= 3_{10}$$

$$2(10) = 2 \times 10 = 20$$

Compare 3_{10} with 20:

$$3 < 20$$

So, $(0011)_2 > 2(10)$ is false.

(d) $(1001)_2 > (1101)_2$

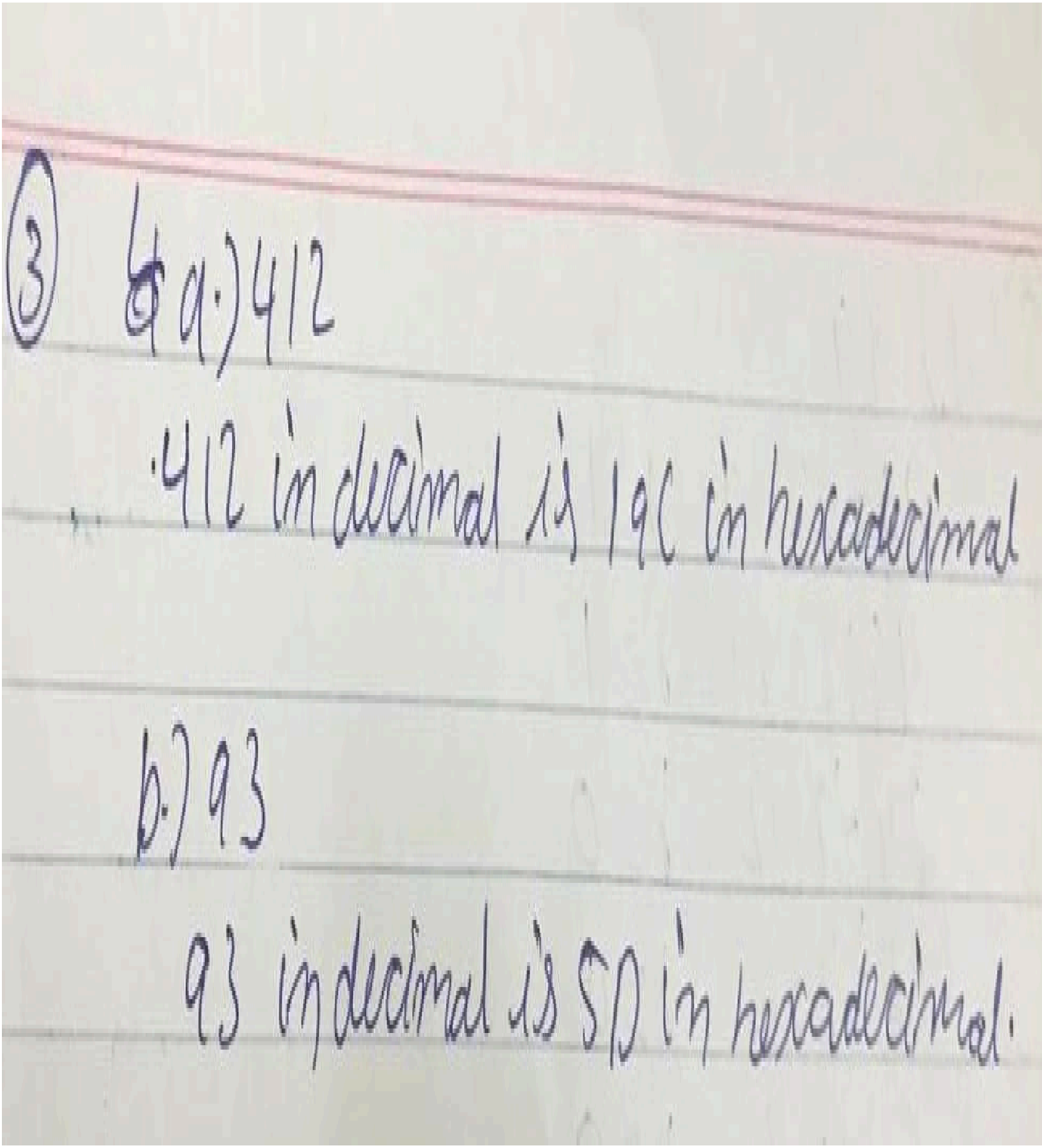
Convert both $(1001)_2$ and $(1101)_2$ to decimal

$$1001_2 = 1 \cdot 2^3 + 0 \cdot 2^3 + 0 \cdot 2^1 + 1 \cdot 2^0 = 9_{10}$$
$$1101_2 = 1 \cdot 2^3 + 1 \cdot 2^2 + 0 \cdot 2^1 + 1 \cdot 2^0 = 13_{10}$$

Compare 9_{10} and 13_{10}:

$$9 < 13$$

3) Convert the following decimal numbers to hexadecimal numbers. a. 412 b. 93
Sol:



4) Convert the following hexadecimal numbers to decimal numbers. a. 7116 b. DE016 c. ABC16 d. 100116

Sol:

(4) a.) 71_{16}

$7 \times 16^1 + 1 \times 16^0 = 7 \times 16 + 1 = 112 + 1$

$= 113_{10}$

b.) $DE0_{16}$

$D \times 16^2 + E \times 16^1 + 0 \times 16^0$

In hexadecimal D = 13 & E = 14

$13 \times 16^2 + 14 \times 16^1 + 0 \times 16^0 = 13 \times 256 + 14 \times 16$

$= 3328 + 224 = 3552_{10}$

C.) ABC_{16}

$A \times 16^2 + B \times 16^1 + C \times 16^0$

In hexadecimal A = 10, B = 11, C = 12

$10 \times 16^2 + 11 \times 16^1 + 12 \times 16^0 = 10 \times 256 + 11 \times 16 + 12$

$= 2560 + 176 + 12$

$= 2748_{10}$

d.) 100_{16}

$1 \times 16^3 + 0 \times 16^2 + 0 \times 16^1 + 1 \times 16^0$

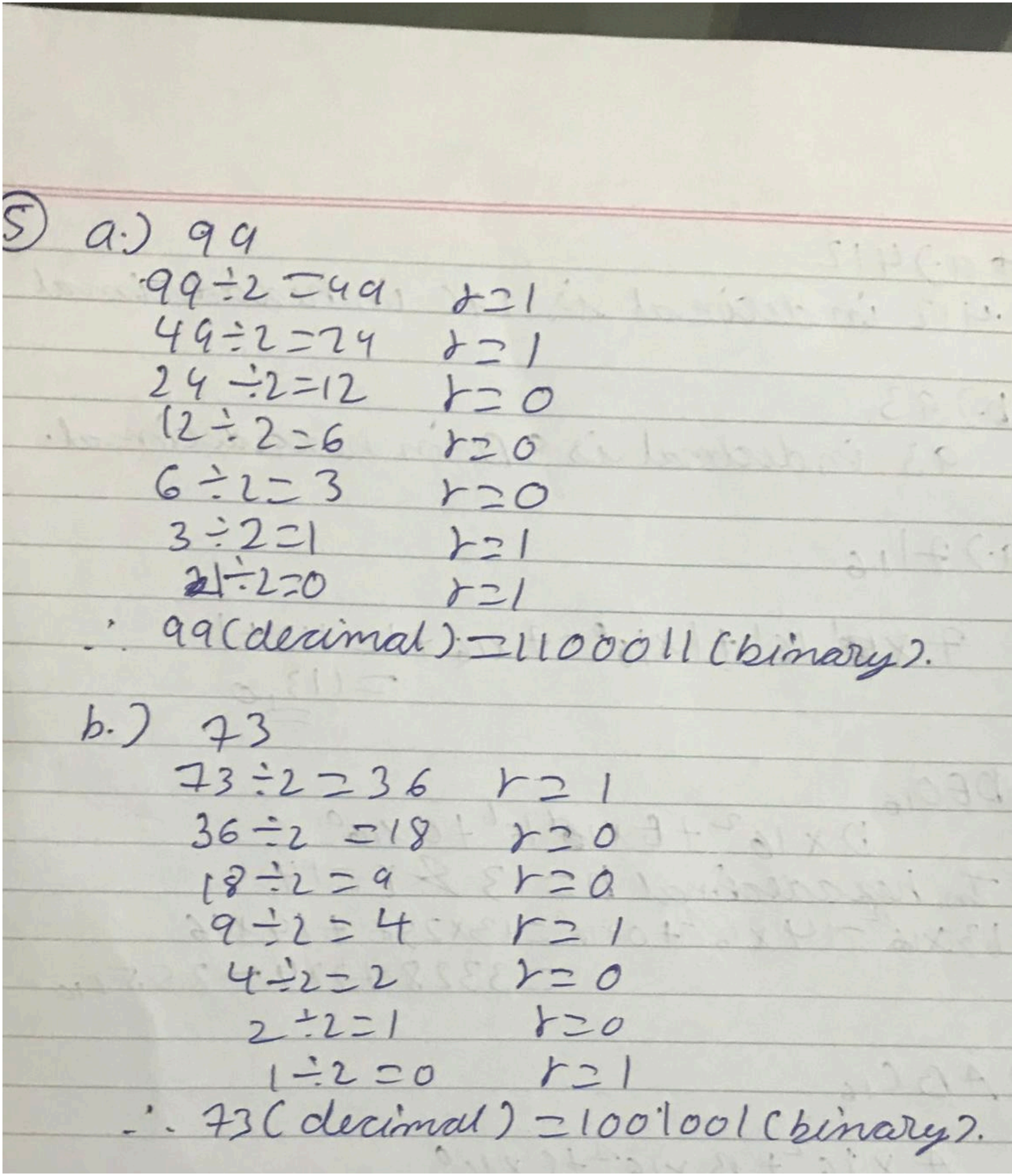
$= 1 \times 4096 + 0 \times 256 + 0 \times 16 + 1$

$= 4096 + 1$

$= 4097_{10}$

5) Convert the following decimal numbers into positive binary numbers. a. 99 b. 73 c. 213 d. 128

Sol:



(5) a.) 99

99 ÷ 2 = 49 r = 1
49 ÷ 2 = 24 r = 1
24 ÷ 2 = 12 r = 0
12 ÷ 2 = 6 r = 0
6 ÷ 2 = 3 r = 0
3 ÷ 2 = 1 r = 1
1 ÷ 2 = 0 r = 1

∴ 99 (decimal) = 1100011 (binary).

b.) 73

73 ÷ 2 = 36 r = 1
36 ÷ 2 = 18 r = 0
18 ÷ 2 = 9 r = 0
9 ÷ 2 = 4 r = 1
4 ÷ 2 = 2 r = 0
2 ÷ 2 = 1 r = 0
1 ÷ 2 = 0 r = 1

∴ 73 (decimal) = 1001001 (binary).

c) 213

213 ÷ 2 = 106 r = 1

106 ÷ 2 = 53 r = 0

53 ÷ 2 = 26 r = 1

26 ÷ 2 = 13 r = 0

13 ÷ 2 = 6 r = 1

6 ÷ 2 = 3 r = 0

3 ÷ 2 = 1 r = 1

1 ÷ 2 = 0 r = 1

13 (decimal) = 1101101

= 1101101 (binary)

(a) 128

128 ÷ 2 = 64 r = 0

64 ÷ 2 = 32 r = 0

32 ÷ 2 = 16 r = 0

16 ÷ 2 = 8 r = 0

8 ÷ 2 = 4 r = 0

4 ÷ 2 = 2 r = 0

2 ÷ 2 = 1 r = 0

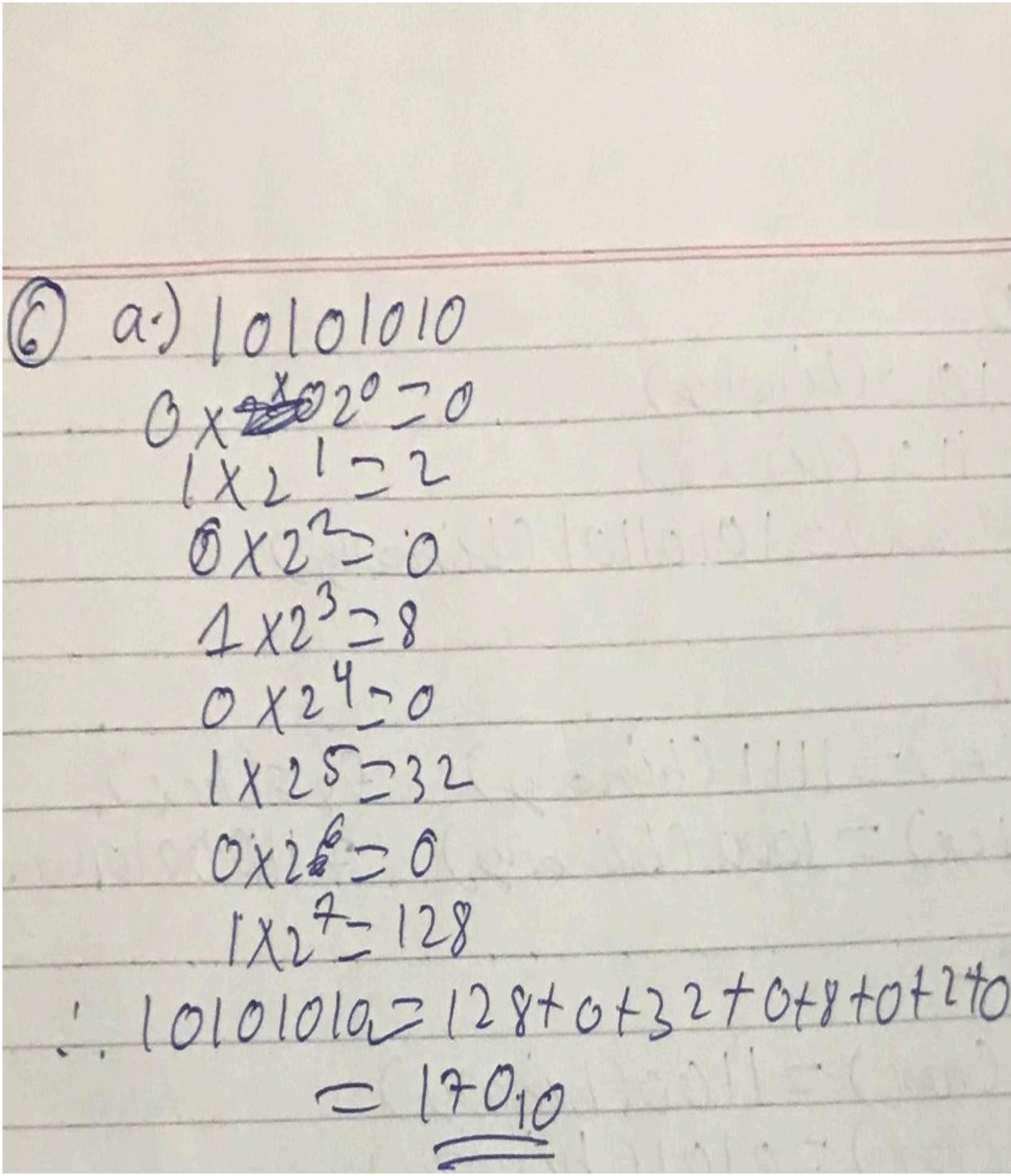
1 ÷ 2 = 0 r = 1

128 (decimal)

= 10000000 (binary).

6) Convert the following binary numbers into decimal numbers. a. 10101010 b. 11001100 c. 11110000 d. 11111111

Sol:



b.) 11001100

$0 \times 0^0 = 0$

$0 \times 0^1 = 0$

$1 \times 2^2 = 4$

$1 \times 2^3 = 8$

$0 \times 2^4 = 0$

$0 \times 2^5 = 0$

$1 \times 2^6 = 63$

$1 \times 2^7 = 128$

$11001100_2 = 128 + 64 + 0 + 0 + 8 + 4 + 0 + 0$

$= 204_{10}$

c.) 11110000

$1 \times 0^0 = 0$

$1 \times 2^2 = 4$

$1 \times 2^3 = 8$

$1 \times 2^4 = 16$

$0 \times 2^5 = 0$

$0 \times 2^6 = 0$

$0 \times 2^7 = 0$

$0 \times 2^8 = 0$

111000

$= 0 + 4 + 8 + 16 + 0 + 0 + 0 + 0$

$= 240_{10}$

d.) 11111111

$11111111_2 = 258_{10}$

7) Convert the following hexadecimal numbers into binary numbers. a. AD b. F8 c. C5 d. B9

Sol:

(7) a.) AD

$A_{(hex)} = 1010$ (binary)

$D = 1101$ (binary)

$\therefore AD_{(hex)} = 10101101$ (binary)

b.) f8

$f_{(hex)} = 1111$ (binary)

$8_{(hex)} = 1000$ (binary)

$f8_{(hex)} = 11111000$ (binary)

c.) C5

- $C_{(hex)} = 1100$ (binary)
- $5_{(hex)} = 0101$ (binary)

$C5_{(hex)} = 11000101$ (binary)

d.) B9

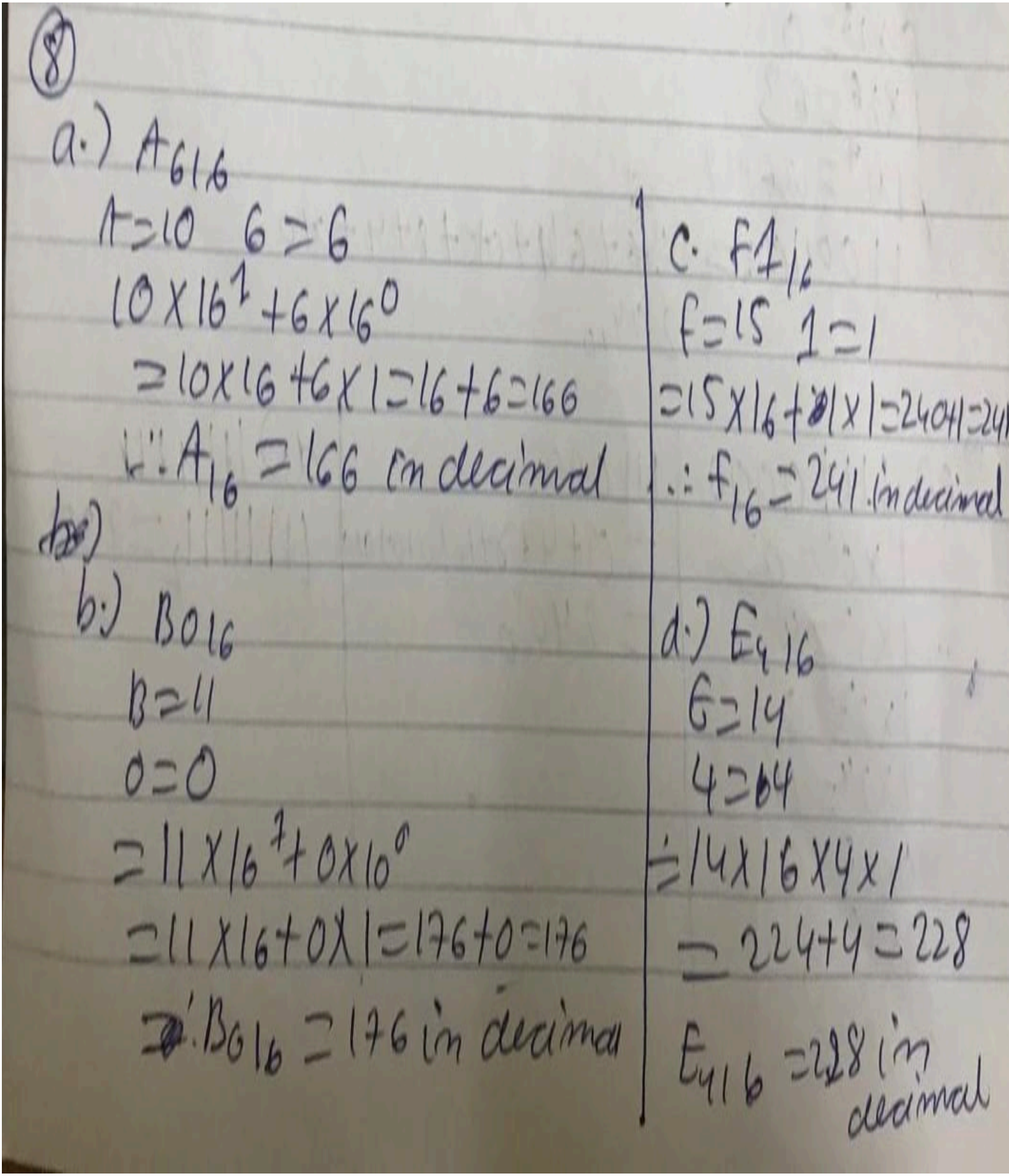
$B_{(hex)} = 1011$ (binary)

$9_{(hex)} = 1001$ (binary)

$B9_{(hex)} = 10111001$ (binary)

8) Convert the following hexadecimal numbers into decimal numbers. a. A6 b. B0 c. F1 d. E4

Sol:



9) Convert each of the following binary numbers to octal, decimal, and hexadecimal formats. a. (111011101)2 b. (10101010111)2 c. (111100000)2

Sol:

(9) a.) $(111011101)_2$

① octal

$111_2 = 7_8$

$011_2 = 3_8$

$101_2 = 5_8$

$\therefore (111011101)_2 = (735)_8$

② Decimal

$(111011101)_2 = 1\times2^8 + 1\times2^7 + 1\times2^6 + 0\times2^5 + 1\times2^4 + 1\times2^3 + 1\times2^2 + 0\times2^1 + 1\times2^0$

$= 256 + 128 + 64 + 16 + 8 + 4 + 1 = 477_{10}$

③ Hexadecimal

$0111_2 = 7_{16}$

$0111_2 = 7_{16}$

$01_2 = 1_{16}$

$\therefore (111011101)_2 = (1DD)_{16}$

b.) $(1010101011)_2$

Octal

$001_2 = 1_8$

$010_2 = 2_8$

$101_2 = 5_8$

$011_2 = 3_8$

$\therefore (1010101011)_2 = (1253)_8$

Decimal

$(1010101011)_2 = 1\times2^{10} + 0\times2^9 + 1\times2^8 + 0\times2^7 + 1\times2^6$
$+ 0\times2^5 + 1\times2^4 + 0\times2^3 + 1\times2^2 + 1\times2^1$
$+ 1\times2^0$

$= 1024 + 256 + 64 + 16 + 4 + 2 + 1$

$= 1367_{10}$

③ Hexadecimal

a) $1010_2 = A_{16}$
$0001_2 = 1_{16}$
$0101_2 = 5_{16}$
$0101_2 = 5_{16}$
$111_2 = 3_{16}$
$\therefore (1010101010111)_2 = (1557)_{16}$

c) $(11110000)_2$
$111 = 7_8$
$100 = 4_8$
$000 = 0_8$
$\therefore (11110000)_2 = (740)_8$

Decimal
$(11110000)_2 = 1\times2^9 + 1\times2^8 + 1\times2^6 + 1\times2^5 + 0\times2^4 + 0\times2^3 + 0\times2^2 + 0\times2^1 + 0\times2^0$
$= 256 + 128 + 64 + 32$
$= 480_{10}$

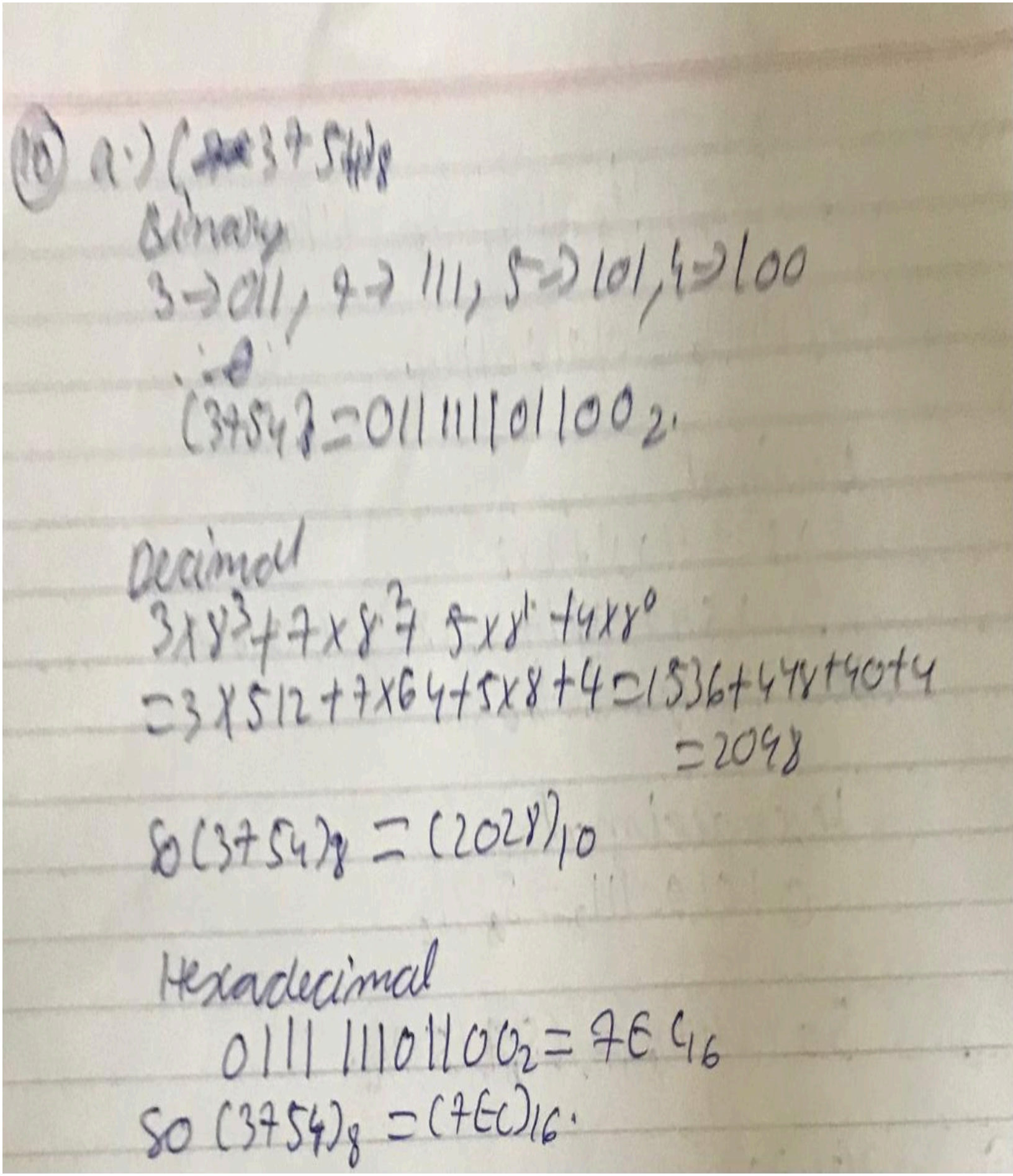
③ Hexadecimal

$1111_2 = F_{16}$
$0000_2 = 0_{16}$

$\therefore (11110000) = (F0)_{16}$

10) Convert each of the following octal numbers to binary, decimal, and hexadecimal formats. a. (3754)8 b. (7777)8 c. (247)8

Sol:



b) $(7777)_8$

Binary

$7_8 = 111_2$, $7_8 = 111_2$, $7_8 = 111_2$, $7_8 = 111_2$

So $(7777)_8 = 111\ 111\ 111\ 111_2$

Decimal

$7 \times 8^3 + 7 \times 8^2 + 7 \times 8^0$

$= 7 \times 512 + 7 \times 64 + 7 \times 8 + 7 = 3584 + 448 + 56 + 7$

$= 4095$

So $(7777)_8 = (4095)_{10}$.

Hexadecimal

$111\ 111\ 111\ 111_2 = fff_{16}$

$(7777)_8 = (fff)_{16}$

c.) $(247)_8$

$2_8 = 010_2$, $4_8 = 100_2$, $7_8 = 111_2$

So $(247)_8 = 010100111_2$.

Decimal

$2 \times 8^2 + 4 \times 8^1 + 7 \times 8^0$

$= 2 \times 64 + 4 \times 8 + 7 = 128 + 32 + 7 = 167$

So $(247)_8 = (167)_{10}$

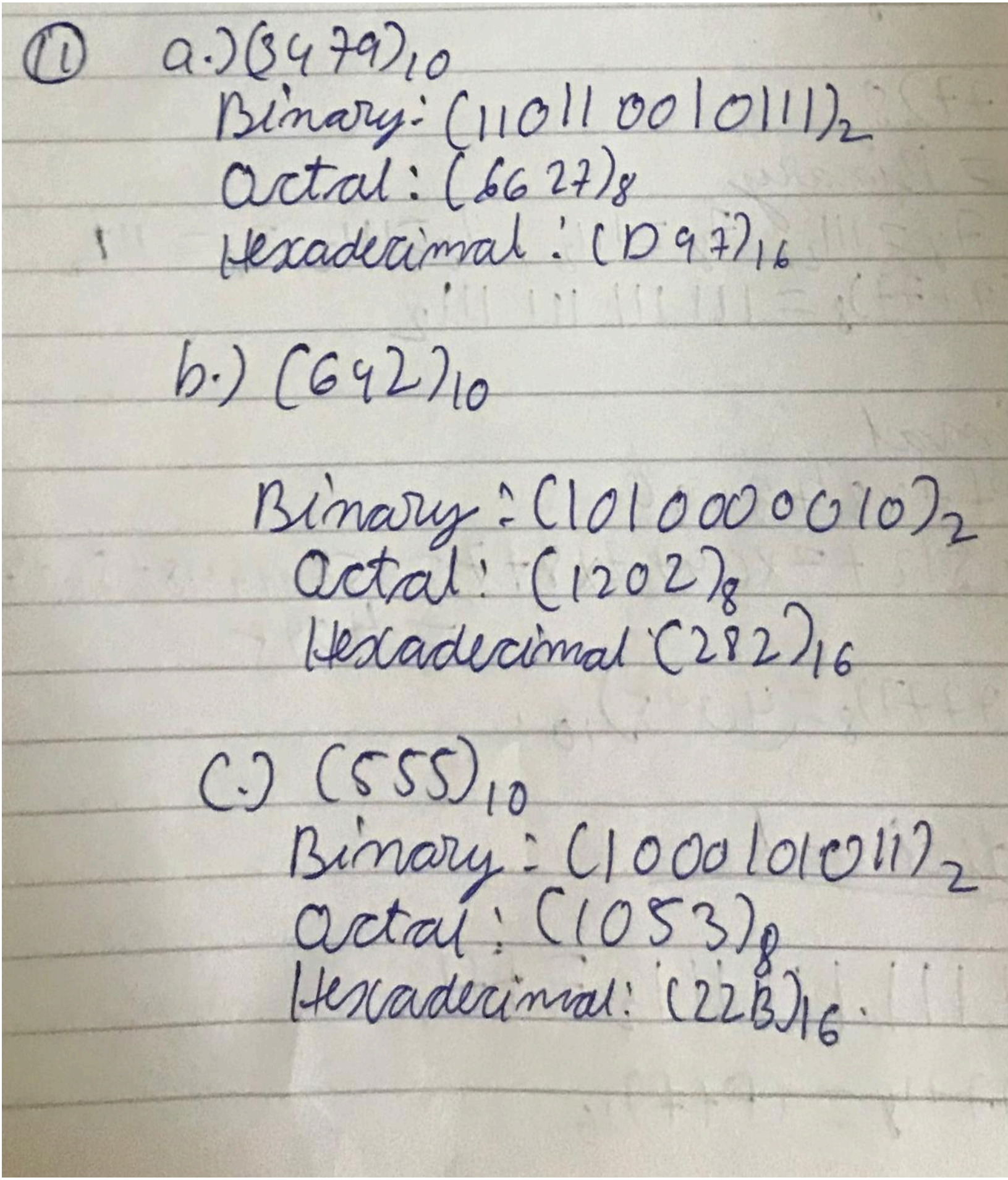
Hexadecimal

$010100111_2 = S_8 3_{16}$

So $(247)_8 = (S8)(53)_{16}$.

11) Convert each of the following decimal numbers to binary, octal, and hexadecimal formats. a. (3479)10 b. (642)10 c. (555)10

Sol:



12) Convert each of the following hexadecimal numbers to binary, octal, and decimal formats. a. (4FB2)16 b. (88BAE)16 c. (DC4)16

Sol:

(12) a.) $(4FB2)_{16}$

Binary: 100111110110010_2

Octal: 47662_8

Decimal: 20402_{10}

b.) $(88BAE)_{16}$

Binary: 10001000101110101110_2

Octal: 2105656_8

Decimal: 560046_{10}

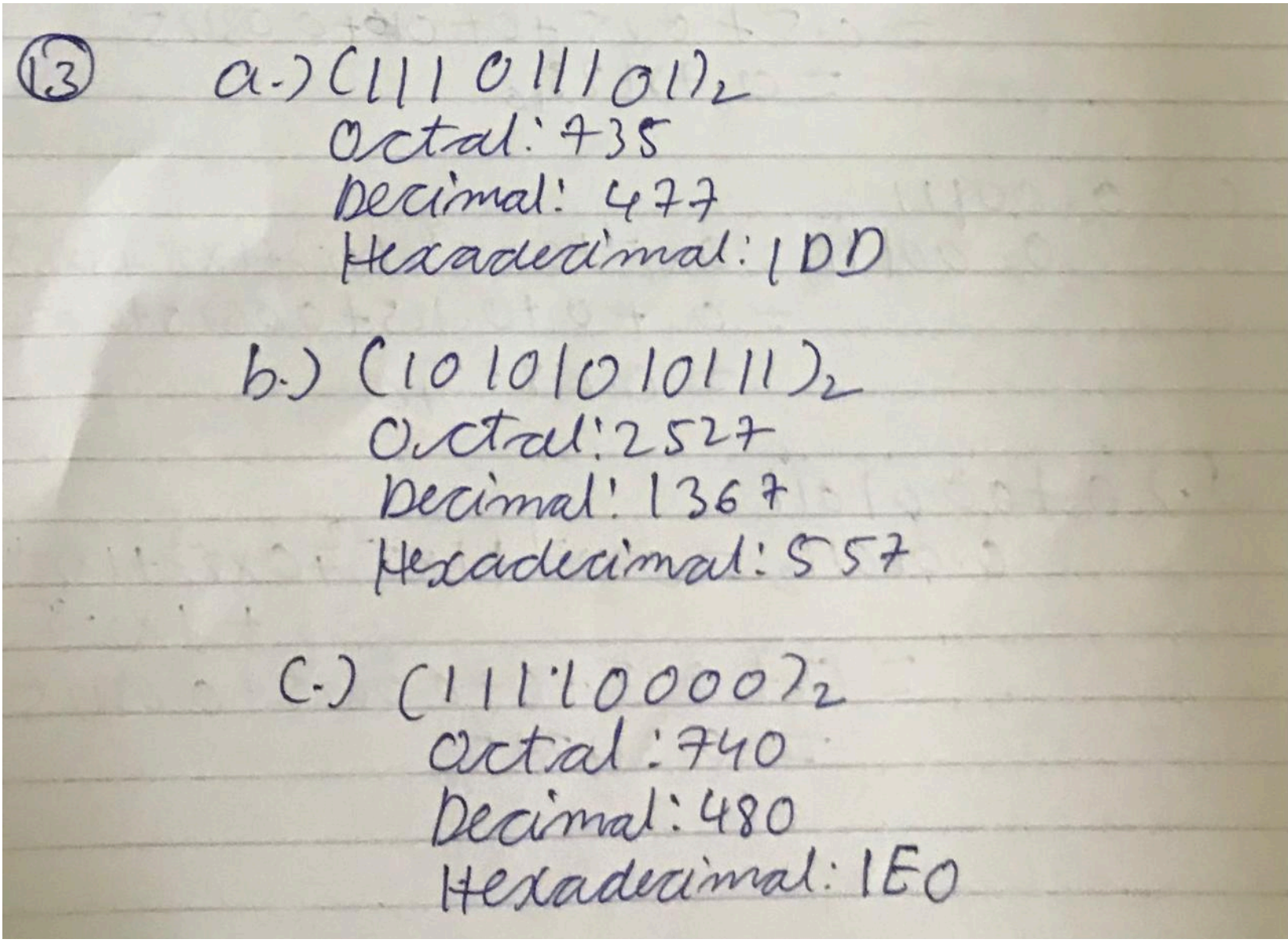
c.) $(DC4)_{16}$

Binary: 110111000100_2

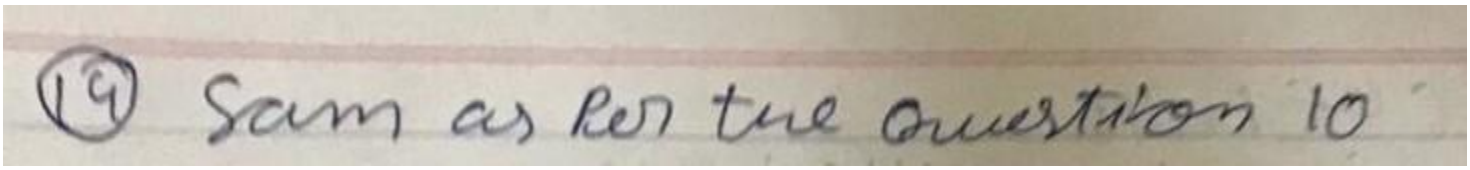
Octal: 6704_8

Decimal: 3524_{10}

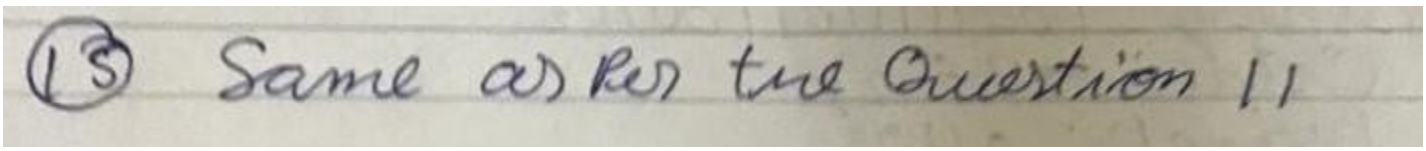
13) Convert each of the following binary numbers to octal, decimal, and hexadecimal formats. a. (111011101)2 b. (10101010111)2 c. (111100000)2
Sol:



14) Convert each of the following octal numbers to binary, decimal, and hexadecimal formats. a. (3754)8 b. (7777)8 c. (247)8
Sol:



15) Convert each of the following decimal numbers to binary, octal, and hexadecimal formats. a. (3479)10 b. (555)10 c. (642)10
Sol:



16) Convert each of the following hexadecimal numbers to binary, octal, and decimal formats. a. (4FB2)16 b. (88BAE)16 c. (DC4)16

Sol:

(16) Same as Per the Question 12

17) Convert the following binary numbers to decimal numbers a. 0.1101 b. 0.11001 c. 0.00111 d. 0.01011

Sol:

(17) a.) $(0.1101)_2$

$0.1101 = 2^{-1} \times 1 + 2^{-2} \times 1 + 2^{-3} \times 0 + 2^{-4} \times 1$

$= (\frac{1}{2}) + (\frac{1}{4}) + 0 (\frac{1}{16})$

$= 0.8125$

b.) 0.11001

$0.11001_2 = 1 \times 2^{-1} + 1 \times 2^{-1} + 0 \times 2^{-4} + 1 \times 2^{-5}$

$= 0.5 + 0.25 + 0 + 0 + 0.03125$

$= 0.78125_{10}$

c.) 0.00111

$0.00111_2 = 0 \times 2^{-1} + 0 \times 2^{-2} + 1 \times 2^{-3} + 1 \times 2^{-4} + 1 \times 2^{-5}$

$= 0 + 0 + 0.125 + 0.0625 + 0.03125$

$= 0.21875_{10}$

d.) ~~0 1 0~~ 0.01011

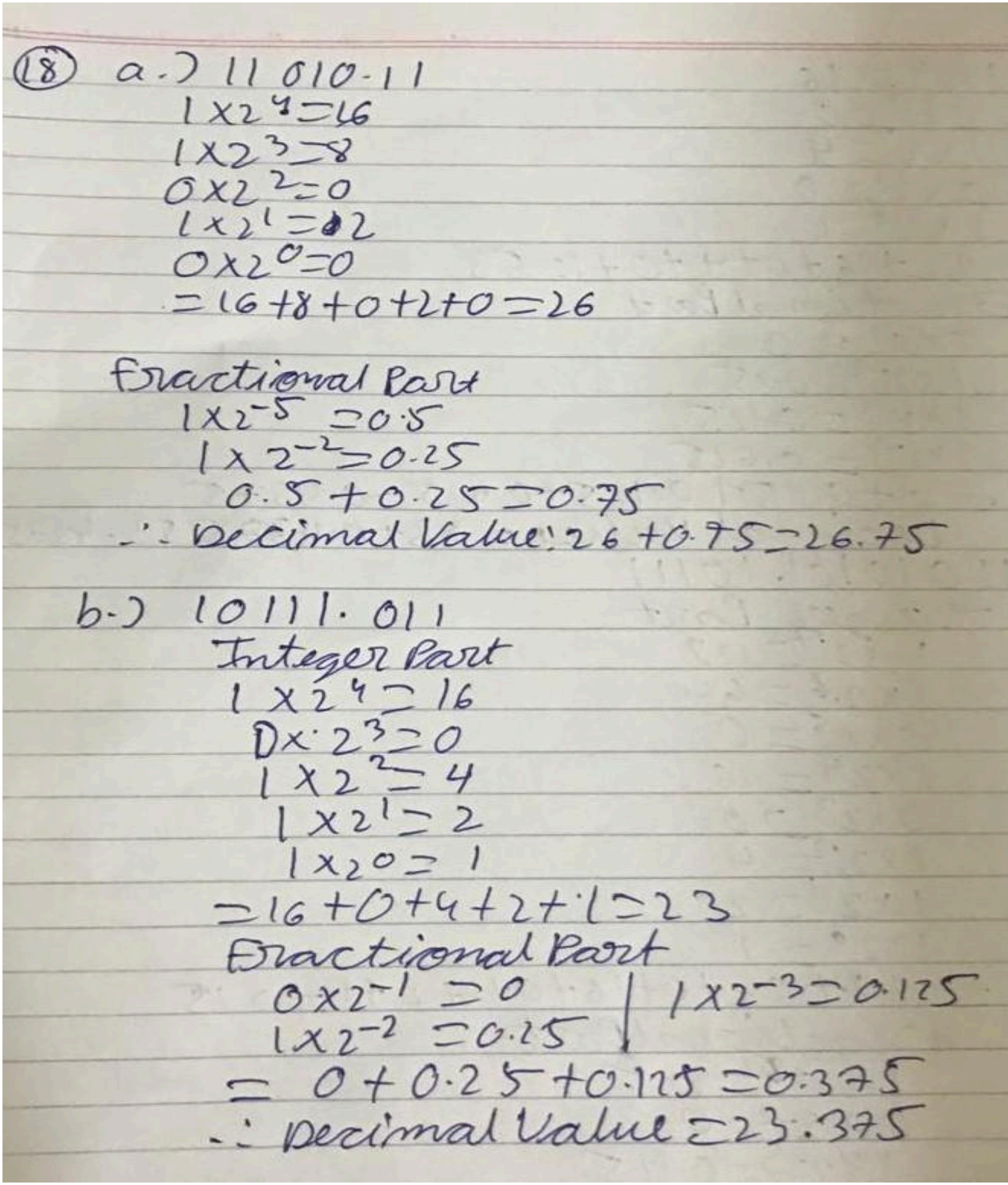
$0.01011_2 = 0 \times 2^{-1} + 1 \times 2^{-2} + 0 \times 2^{-3} + 1 \times 2^{-4} + 1 \times 2^{-5}$

$= 0 + 0.25 + 0 + 0.0625 + 0.03125$

$= 0.34375_{10}$

18) Convert the following binary numbers to decimal numbers: a. 11010.11 b. 10111.011 c. 110101.0111 d. 11010101.10111

Sol:



c.) 110101.0111

Integer Part

$1 \times 2^5 = 32$

$1 \times 2^4 = 16$

$0 \times 2^3 = 0$

$1 \times 2^2 = 4$

$0 \times 2^1 = 0$

$1 \times 2^0 = 1$

$= 32 + 16 + 0 + 4 + 0 + 1 = 53$

Fractional Part

$0 \times 2^{-1} = 0$

$1 \times 2^{-2} = 0.25$

$1 \times 2^{-3} = 0.125$

$1 \times 2^{-4} = 0.625$

$= 0 + 0.25 + 0.125 + 0.625 = 0.4375$

Decimal Value $= 53 + 0.4375 = 53.4375$

a.) 110101 01. 10111

Integer Part

$1 \times 2^7 = 128$

$1 \times 2^6 = 64$

$0 \times 2^5 = 0$

$1 \times 2^4 = 16$

$0 \times 2^3 = 0$

$1 \times 2^2 = 4$

$1 \times 2^1 = 2$

$1 \times 2^0 = 1$

$= 128 + 64 + 0 + 16 + 0 + 4 + 2 + 1 = 215$

Fractional Part

$1 \times 2^{-1} = 0.5$

$0 \times 2^{-2} = 0$

$1 \times 2^{-3} = 0.125$

$1 \times 2^{-4} = 0.0625$

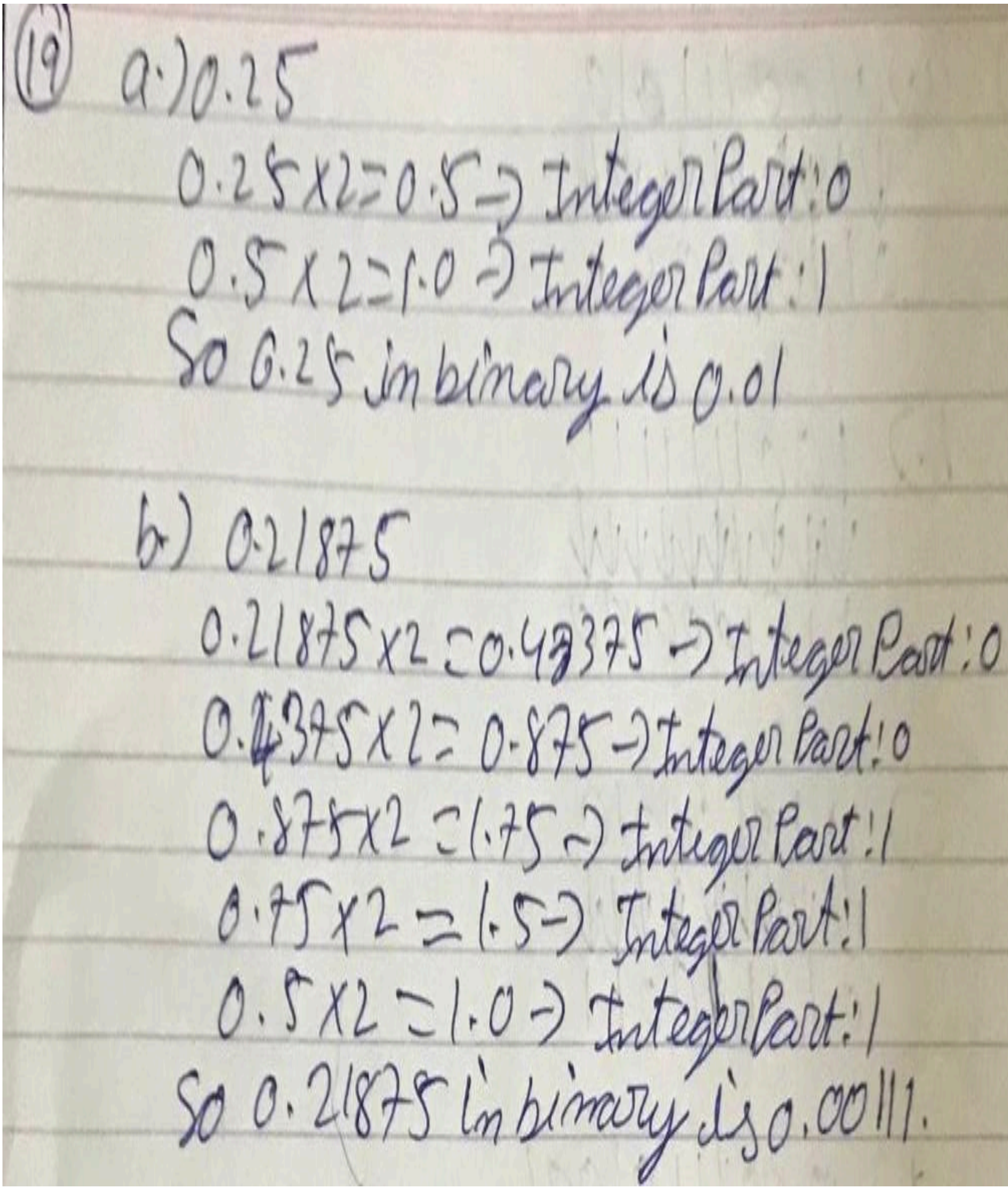
$1 \times 2^{-5} = 0.03125$

$= 0.5 + 0 + 0.125 + 0.0625 + 0.03125 = 0.71875$

Decimal Value $= 215 + 0.71875 = 215.71875$

19) Convert the following decimal numbers to binary numbers: a. 0.25 b. 0.21875 c. 0.28125 d. 0.59375

Sol:



(c) 0.28125

0.28125 × 2 = 0.5625 ⇒ Integer Part: 0

0.5625 × 2 = 1.125 ⇒ Integer Part: 1

0.125 × 2 = 0.25 ⇒ Integer Part: 0

0.25 × 2 = 0.5 ⇒ Integer Part: 1

0.5 × 2 = 1.0 ⇒ Integer Part: 1

~~So 0.5943~~

So 0.28125 in binary is 0.01001.

d.) 0.59375

0.59375 × 2 = 1.875 → Integer Part: 1

0.1875 × 2 = 0.375 ⇒ Integer Part: 0

0.375 × 2 = 0.75 ⇒ Integer Part: 0

0.75 × 2 = 1.5 ⇒ Integer Part: 1

0.5 × 2 = 1.0 ⇒ Integer Part: 1

So, 0.59375 in binary is 0.10011.

20) Convert the following binary number to gray code: a. 0100011110 b. 1001111111 c. 010100010 d. 00011101001

Sol: