Digital Assignment-1 Solution (Set-1)

1. **Convert 101010101 to decimal; the radix may not be always indicated.**

   $N = d \times r^8 + d \times r^7 + d \times r^6 + d \times r^5 + d \times r^4 + d \times r^3 + d \times r^2 + d \times r^1 + d \times r^0$

   $= 1x2^8 + 0x2^7 + 1x2^6 + 0x2^5 + 1x2^4 + 0x2^3 + 1 \times 2^2 + 0x2^1 + 1x2^0$

   $= 256 + 0 + 64 + 0 + 16 + 0 + 4 + 0 + 1$

   $= 34110$

2. **Convert 6910 to binary.**

   ans:

   100001012

3. **Convert 69 to binary.**

   2) 69
   2) 34 " 1
   2) 17 " 0
   2 8 ") 1
   2 4 ") 0
   2 2 ") 0
   1 " 0

   Read the remainders from bottom to top.

   6910 = 10001012.

4. **Add 1011112 and 101112.**

   Number 1 1 0 1 1 1 1

   Number 2 1 0 1 1 1

   $1\,0\,0\,0\,1\,1\,0_2$

   During the addition, 1 + 1 = 10 and 1 + 1 + carry(1) = 11, and so o

5. Add 1111 and 1111.

Number 1:	1 1 1 1
Number 2:	1 1 1 1
Carry:	1 1 1
	$1\ 1\ 1\ 1\ 0_2$

Binary subtraction is performed in a manner similar to that in decimal subtraction. Because there are only two digits in binary, its subtraction often requires more borrowing operation than decimal numbers.

6. Subtract 1110 from 1000.

10000
1110
00010_2

We find that in the second column 1 cannot be subtracted from 0. So a 1 must be borrowed the from third column but it is a 0. In this example, 1 is available at the fifth column. So borrow this 1, leaving behind a 0. Then 1 is (1 + 1) in the fourth column. We borrow 1 leaving behind 1 in the fourth column. Finally, successive borrowing makes (1 + 1) in the second column from which we subtract 1, yielding 1 as answer in the second column. At this stage, we have the answers for zeroth and first column. The third, fourth and fifth columns are

Column 5	4	3
0	1	1
	1	1
0	0	0

Thus, the complete answer is

000102 = 210

7. Subtract 10101 from 101010.

101010
10101
10101_2

8. Convert 10101110111101012 to hexadecimal.

1010	1110	1111	0101	Group in four = from LSB
A	E	F	5	Convert each number

9. Convert $FA876_{16}$.

F	A	8	7	6
111	1010	1000	0111	011
1				0

Thus, the solution is 1111, 1010, 1000, 0111, 0110_2.

10. Convert $FA27D_{16}$.

$F * 16^4 + A * 16^3 + 2 * 16^2 + 7 * 16^1 + D * 16^0$

$= 15 * 65536 + 10 * 4096 + 2 * 356 + 7 * 16 + 13$

$= 10,24,637$

11. Convert 57345.

16) 57345 ↑
16) 3584 – 1
16) 224 – 0
14 – 0

14 00 1 ⟶ Convert decimal to hexadecimal notation.
↓
$E\,0\,0\,1_{16}$

The result is $E001_{16}$.

12. Convert 1111101011012 to octal.

Split the number into group of three	110	101	10 1
111			
7	6	5	5

The result is 7655_8

13. Convert 67548 to binary.

6	7	5	4
110	111	101	10
			0

The result is 110111101100_2.

14. Convert 86710 to octal number. It is simply a successive division by 8.

8) 867
8) 108 – 3
8) 13 – 4
1 – 5

The result is $(1543)_8$

15. Given m = 11010110, n = 01000101
Determine (a) (m - n) and (b) (n - m)

(a) 2's complement of n
01000101
1's complement 10111010
+1
2's complement 10111011
Add in 11010110
Delete carry →1 10010001
(m − n)10010001

(b) 2's complement of m
11010110
1's complement 00101001
+1
2's complement 00101010
Add n 01000101
No carry 01101111
1's complement 10010000
+1 2's complement (n – m) –10010001

16. Convert the given decimal numbers to binary:
(i) (258)10
(ii) (137)10
(iii) (11.6875)10

ans: i). 100000010
ii). 10001001
iii). 1011.1011

17. Convert the hexadecimal (8F6)16 to a decimal number.

ans: 2294

18.How can you convert octal numbers to binary and vice versa

ans: Convert each octal number into its 3 bit binary representation.
Group 3 bits from lsb and convert it into equivalent ocatal notation.

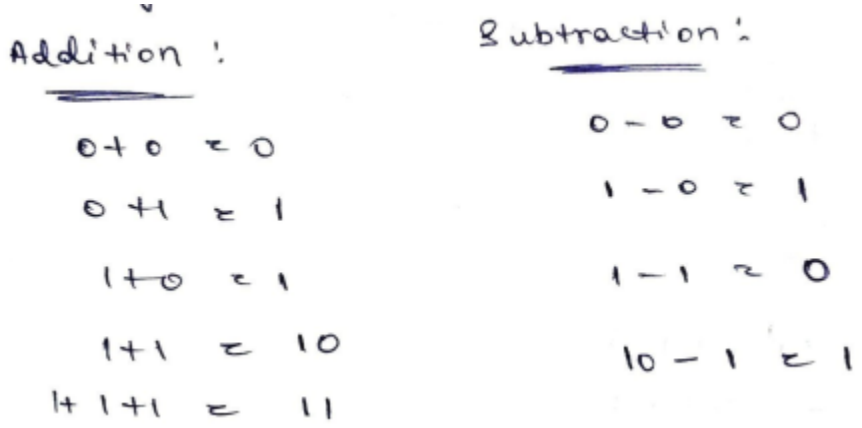
19. How can you convert hexadecimal to binary and vice versa?

ans: Convert each hexadecimal number into its 4 bit binary representation.

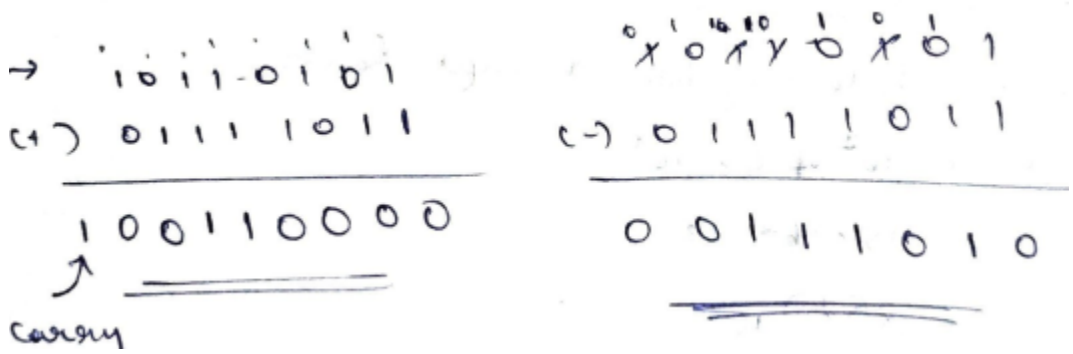
Group 4 bits from lsb and convert it into equivalent hexadecimal notation.

20. Write the basic rules for addition and subtraction of binary numbers.

ans:



21. Take any two 8-bit binary numbers. Illustrate how to add and subtract the two.



22. Find the decimal equivalents of the following binary numbers.

(a) 1111111

(b) 11001.0101

ans:

a). 127

b). 25.3125

23. Subtract in binary form:

(47)10 – (23)10

ans: 11000

24. Decode the following into decimal form (H stands for Hexadecimal):

(a) FCH (b) 9AH

ans:

a). 252
b). 154

25. Perform the following conversions:

(a) 279 from decimal to octal number.
(b) 125 from decimal to octal number.
(c) 11000111.1101 from binary to octal number.

ans:

a). 427
b). 175
c). 307.64

26. Perform the indicated operations in binary:
(a) (32)8 + (73)8
(b) (175)8 – (114)8
(c) (7E)16 + (AD)16
(d) (BC)16 – (F4)11

ans:

a). 1010101
b). 0110001
c). 100101011
d). 11001000

27. Convert 1100 0111, 1101 to octal number.

ans:

307.64

28. Convert the decimal number 25.375 to its binary equivalent.

ans:

11001.011

29. Convert (294.6875)10 into octal.

ans:

446.54

30. Convert the following numbers to their hexadecimal equivalents.

(a) (49.5)10

(b) (972.625)10

ans:

a). 31.8

b). 3CC.A

31. Convert 11OOO111.11O1 to octal number.

ans:

307.64