

Please carefully read the following instructions before attempting the assignment.

RULES FOR MARKING

It should be clear that your assignment would not get any credit if:

- The assignment is submitted after the due date.
- The submitted assignment does not open or the file is corrupt.
- Strict action will be taken if the submitted solution is copied from any other student or the internet.

You should consult the recommended books to clarify your concepts as handouts are not sufficient.

You are supposed to submit your assignment in **Doc or Docx** format.

Any other formats like scan images, PDF, ZIP, RAR, PPT, and BMP, etc. will not be accepted.

Topic Covered:

- Number Systems
- Logic Gates
- Boolean Algebra

Lecture # 01 till Lecture # 09

NOTE

No assignment will be accepted **after the due date via email in any case** (whether it is the case of load shedding or internet malfunctioning etc.). Hence refrain from uploading assignments in the last hour of the deadline. It is recommended to upload the solution file at least two days before its closing date.

If you people find any mistake or confusion in the assignment (Question statement), please consult with your instructor before the deadline. After the deadline, no queries will be entertained in this regard.

For any query, feel free to email at:

cs302@vu.edu.pk

QuestionNo 01**Marks (10)**

You are required to perform stated operations. You must consider the stated bases or number system for your final answer. You can use indirect conversion or repeated division methods only. Your solution must list down all the steps of calculations and conversions involved. In the case of direct results, major marks will be deducted.

$$(2F1AD)_{16} + (103589)_{10} + (767657)_8 - (110010101010101011111)_2 = ()_8 = ()_{16} = ()_{10}$$

Solution:

Conversion of $(2F1AD)_{16}$ to octal:

$$\begin{aligned} & \left[(2 \times 16^4) + (F \times 16^3) + (1 \times 16^2) + (A \times 16^1) + (D \times 16^0) \right] \\ &= \left[(2 \times 65536) + (15 \times 4096) + (1 \times 256) + (10 \times 16) + (13 \times 1) \right] \\ &= 131072 + 61440 + 256 + 160 + 13 \\ &= (192941)_{10} \end{aligned}$$

192941/8	24117 – 5
24117/8	3014 – 5
3014/8	376 – 6
376/8	47 – 0
47/8	5 – 7

$$(2F1AD)_{16} = (570655)_8$$

Conversion of $(103589)_{10}$ to octal:

103589/8	12948 – 5
12948/8	1618 – 4
1618/8	202 – 2
202/8	25 – 2
25/8	3 – 1

$$(103589)_{10} = (312245)_8$$

Conversion of $(110010101010101011111)_2$ to octal:

$$\begin{aligned}
& (110010101010101011111)_2 \\
&= (110 \ 010 \ 101 \ 010 \ 101 \ 011 \ 111)_2 \\
&= \left[(1 \times 2^2) + (1 \times 2^1) + (0 \times 2^0) \right] \left[(0 \times 2^2) + (1 \times 2^1) + (0 \times 2^0) \right] \left[(1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0) \right] \\
&\quad \left[(0 \times 2^2) + (1 \times 2^1) + (0 \times 2^0) \right] \left[(1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0) \right] \left[(0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0) \right] \left[(1 \times 2^2) + (1 \times 2^1) + (1 \times 2^0) \right] \\
&= (4 + 2 + 0)(0 + 2 + 0)(4 + 0 + 1)(0 + 2 + 0)(4 + 0 + 1)(0 + 2 + 1)(4 + 2 + 1) \\
&= (6252537)_8
\end{aligned}$$

$$(2F1AD)_{16} + (103589)_{10} + (767657)_8 - (11001010101010101111)_2 = ()_8 = ()_{16} = ()_{10}$$

First add the values of $(2F1AD)_{16} + (103589)_{10}$

	5	7	0	6	5	5
+	3	1	2	2	4	5
1	1	0	3	1	2	2

Now add this value in $(767657)_8$

	1	1	0	3	1	2	2
+		7	6	7	6	5	7
	2	0	7	3	0	0	1

Now do subtraction:

	6	2	5	2	5	3	7
-	2	0	7	3	0	0	1
-	4	1	5	7	5	3	6

So the answer is: $(-4157536)_8$

Converting this octal number to decimal:

$$\begin{aligned} & - \left[(4 \times 8^6) + (1 \times 8^5) + (5 \times 8^4) + (7 \times 8^3) + (5 \times 8^2) + (3 \times 8^1) + (6 \times 8^0) \right] \\ & = - \left[(4 \times 262144) + (1 \times 32768) + (5 \times 4096) + (7 \times 512) + (5 \times 64) + (3 \times 8) + (6 \times 1) \right] \\ & = - \left[(1048576) + (32768) + (20480) + (3584) + (320) + (24) + (6) \right] \\ & = (-1105758)_{10} \end{aligned}$$

Converting this into hexadecimal:

1105758/16	69109 – 14
69109/16	4319 – 5
4319/16	269 – 15
269/16	16 – 13
16/16	1 – 0

$$(-10DF5E)_{16}$$

So finally

$$(2F1AD)_{16} + (103589)_{10} + (767657)_8 - (11001010101010101111)_2 = (-4157536)_8 = (-10DF5E)_{16}$$

Question No 02**Marks (10)**

Simplify the stated Boolean Expression using Boolean Algebra Laws. You must state the properties of each simplification step.

$$(\overline{A}\overline{B} + C) * \overline{D} + (AC + \overline{A}\overline{D}) * E + (\overline{B}\overline{C} + D) * E + AB\overline{D} + B\overline{C}\overline{E} + D$$

Solution: