H006
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Signal Processing Lab

Subject- Virtual Instrumentation

EXPERIMENT NO. 5

Aim:
5a – Create a 7 segment display
5b – Create a 7 segment display using for loop
5c – Build a VI to compute following expression to get the waveform
a = tanh(x) + cos(x)
y = a^3 + a
where, x varies from 0 to 20 in steps of 0.1

Software Used : PC with software (NI LabVIEW)

Theory :
A seven segment display is a common electronic display component that can display decimal digits and some characters using a combination of seven rectangular segments arranged in the shape of the number "8". Each segment of the display can be illuminated or not illuminated, which makes it possible to display different numbers and characters.

The seven segments in a typical seven segment display are labeled A through G, with each segment being a separate LED or LCD element. The segments are arranged in a specific pattern, with each segment representing a specific part of a digit or character. The arrangement is such that, with proper illumination of the segments, it is possible to display any decimal digit from 0 to 9, as well as some alphabetical characters such as A, B, C, D, E, F, and G.

To display a particular digit or character, the corresponding segments are illuminated, while the others are left unilluminated. For example, to display the digit 8, all seven segments are illuminated, while to display the digit 0, only segments A, B, C, D, E, and F are illuminated.

Seven segment displays are widely used in digital electronics for displaying numerical and some alphabetical characters. They are commonly used in calculators, digital clocks, measurement devices, and other applications that require a simple and cost-effective method for displaying numerical and some alphabetical characters.

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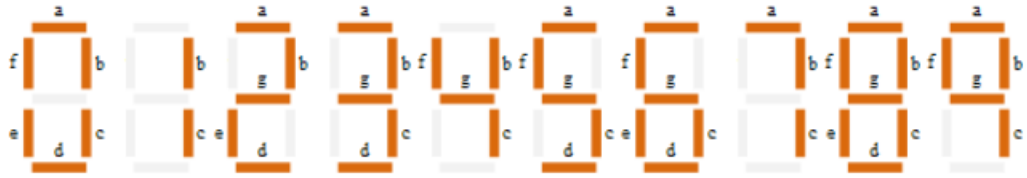
Decimal Digit	Individual Segments Illuminated						
	a	b	c	d	e	f	g
0	×	×	×	×	×	×	
1		×	×				
2	×	×		×	×		×
3	×	×	×	×			×
4		×	×			×	×
5	×		×	×		×	×
6	×		×	×	×	×	×
7	×	×	×				
8	×	×	×	×	×	×	×
9	×	×	×			×	×



In LabVIEW, the Formula Node is a programming construct that allows you to create complex mathematical expressions using a familiar syntax similar to that used in many programming languages. It is a graphical programming element that allows you to enter equations and mathematical expressions directly into a node, making it easier to understand and maintain complex calculations.

The Formula Node works by allowing you to enter an equation or expression using standard mathematical operators such as +, -, /, *, ^ (for exponents), and other functions like sin, cos, and log. You can also use variables and constants in the expression, and connect them to other nodes or inputs/outputs within the program. The Formula Node then evaluates the expression based on the input values and produces an output.

The Formula Node can be used in various applications, such as signal processing, control systems, and scientific computations. It is particularly useful when you need to perform complex mathematical calculations that cannot be easily achieved with built-in LabVIEW functions or standard programming constructs.

To use the Formula Node in LabVIEW, you simply drag and drop the Formula Node from the Functions Palette onto the block diagram. You then double-click on the node to open its configuration window, where you can enter the mathematical expression. Once you have entered the expression, you can connect input values to the node, and the output of the node can be connected to other nodes or output devices.

In summary, the Formula Node in LabVIEW is a graphical programming construct that allows you to enter complex mathematical expressions using standard operators and functions. It is a useful tool for performing complex mathematical calculations and can be used in a variety of applications

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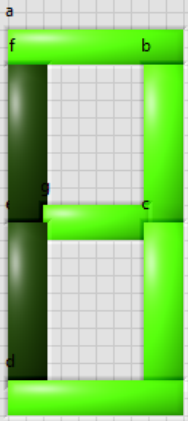
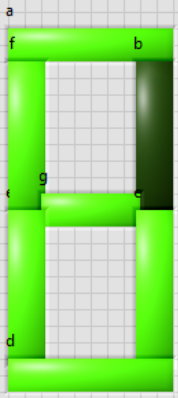
Front Panel:

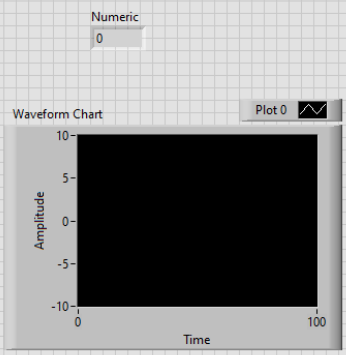
EXP 5a: Create a 7 segment decoder



EXP 5b: Create a 7 segment decoder using for loop



EXP 5c: Build a VI to compute following expression to get the waveform
a = tanh(x) + cos(x)
y = a^3 + a
where, x varies from 0 to 20 in steps of 0.1



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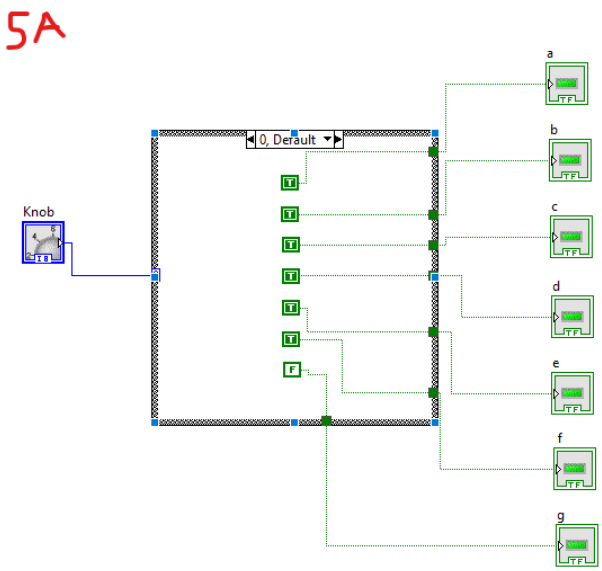
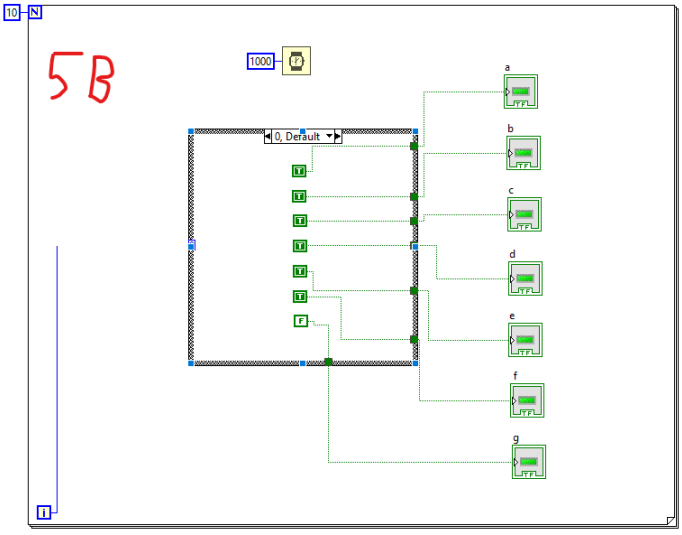
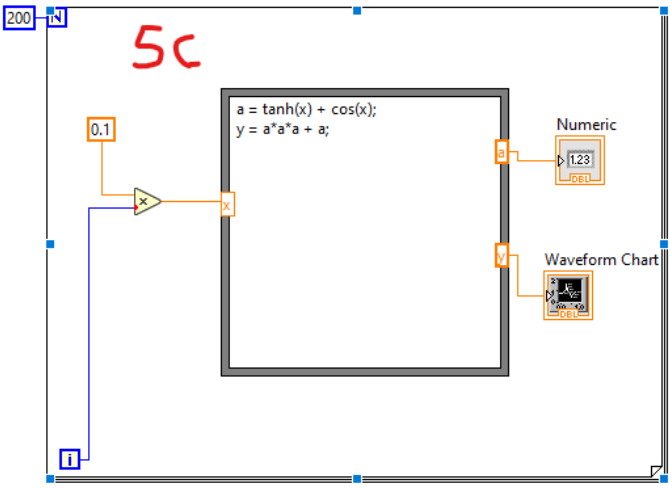
Block Diagram:







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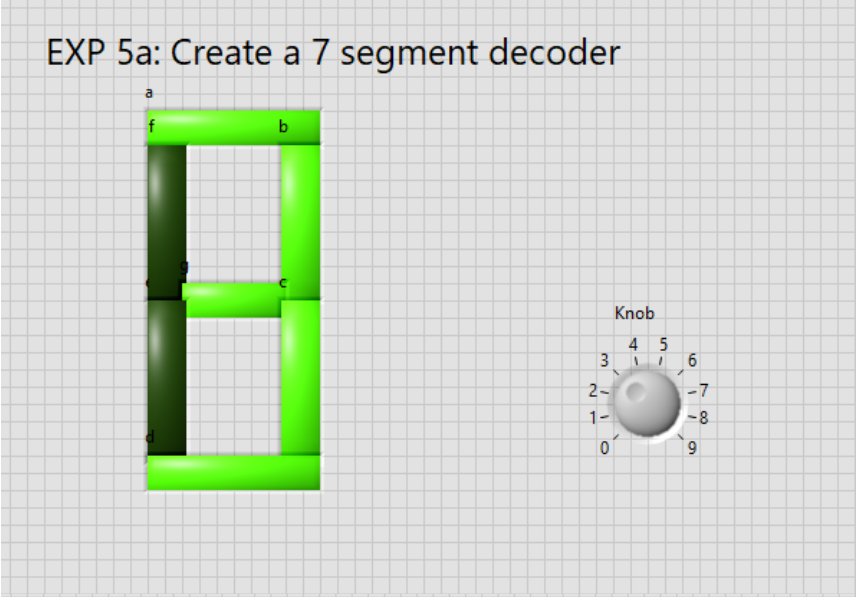
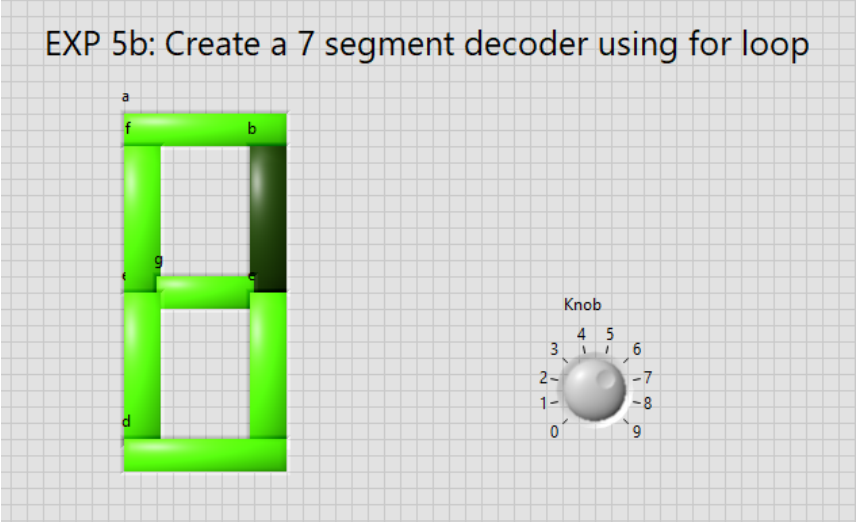
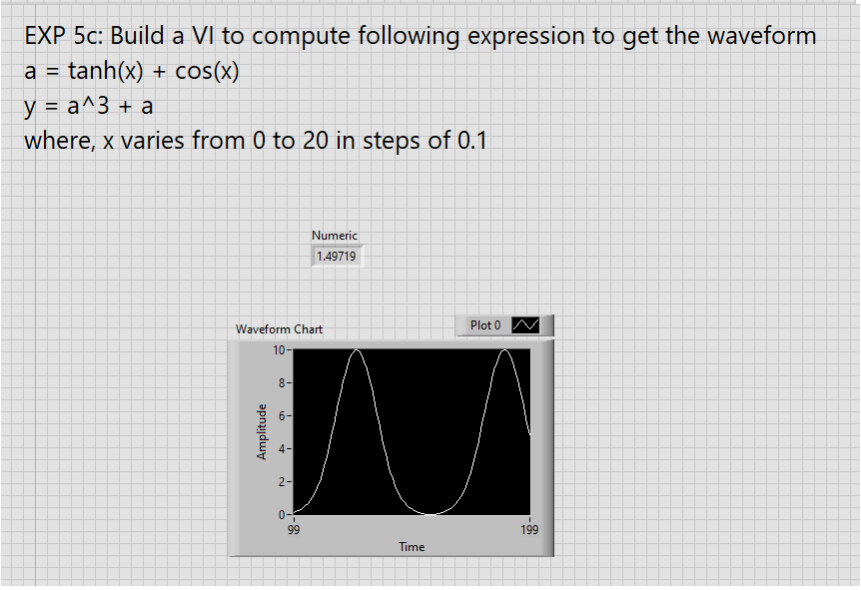
Output :







Conclusion: We successfully carried out the experiment in LabView