Module 10: Assignment : Primitive Simulink Block

Problem Statement:

As part of your internship at a research institute, you have been assigned a project to explore the use of Simulink in modeling and simulating various mathematical functions and signals. Your task is to design a comprehensive Simulink model that incorporates different primitive Simulink blocks to simulate the behavior of a complex mathematical system.

Task to be Performed:

Design a Simulink model to simulate the behavior of a dynamic system described by the following mathematical functions and signals:

- Create a Simulink model incorporating a step block to generate a step function signal. Configure the step block with a step time of 2 secs, an initial value of 0 V, and a final value of 5 V. Utilize a scope block to visualize the output signal of the step block during simulation.
- Construct a Simulink model featuring a ramp block to generate a signal representing a linearly increasing function. Set the parameters of the Ramp block as follows: Slope = 0.2, start time = 0 seconds, initial output = 0. Utilize a scope block to visualize the output signal of the ramp block during simulation.
- Create a Simulink model where a ramp block generates a signal representing (ωt), with parameters set to slope = 0.5, start time = 0, and initial output = 0. Implement a trigonometric function block to compute the cosine of the Ramp block's output. Visualize the output signal of a trigonometric function block using scope block during simulation.
- Design a Simulink model featuring a chirp signal block to generate a sine wave with increasing frequency. Configure the chirp signal block with an initial frequency of 10 Hz, a target time of 5 seconds, and the frequency at a target time of 50 Hz. Use a scope block to visualize the output signal block during simulation.
- Create a Simulink model where the MATLAB function takes a single input 'input' and computes the output using the equation

  output = input2 + 3 * input +5

  Integrate this MATLAB function block into a Simulink model and visualize the

output signal using a scope block during simulation.

- Create a simulation model for the algebraic equation

$$y(x,t) = \frac{4}{6}x^{-t} + 6x^{2} - 7x + 12$$

And visualize to show the results produced.

- Create a simulation model to generate a periodic triangular waveform that goes from 0 to 15 in 3 seconds and comes back to zero in the next 3 seconds, and the cycle continues.