Basic Elements of Block diagram:

| Description | Elements of Block diagram. |
|---|---|
| Differentiator | $x(t) \longrightarrow \boxed{\frac{d}{dt}} \longrightarrow \frac{d}{dt} x(t)$ |
| Integrator with Zero initial Condition | $x(t) \longrightarrow \boxed{\int} \longrightarrow \int x(t) dt$ |
| Multiplier | $x(t) \longrightarrow \triangleright a \longrightarrow^{a x(t)}$ |
| Signal Adder | $x_1(t)$  $x_2(t)$  $\longrightarrow^{x_1(t) + x_2(t)}$ |

Construct the block diagram of the system described by the equation.

$$\frac{d^2 y(t)}{dt^2} + 2\frac{dy(t)}{dt} + 3y(t) = 4\frac{dx(t)}{dt} + 5x(t)$$

$$y(t) = -\frac{1}{3}\frac{d^2 y(t)}{dt^2} - \frac{2}{3}\frac{dy(t)}{dt} + \frac{4}{3}\frac{dx(t)}{dt} + \frac{5}{3}x(t)$$
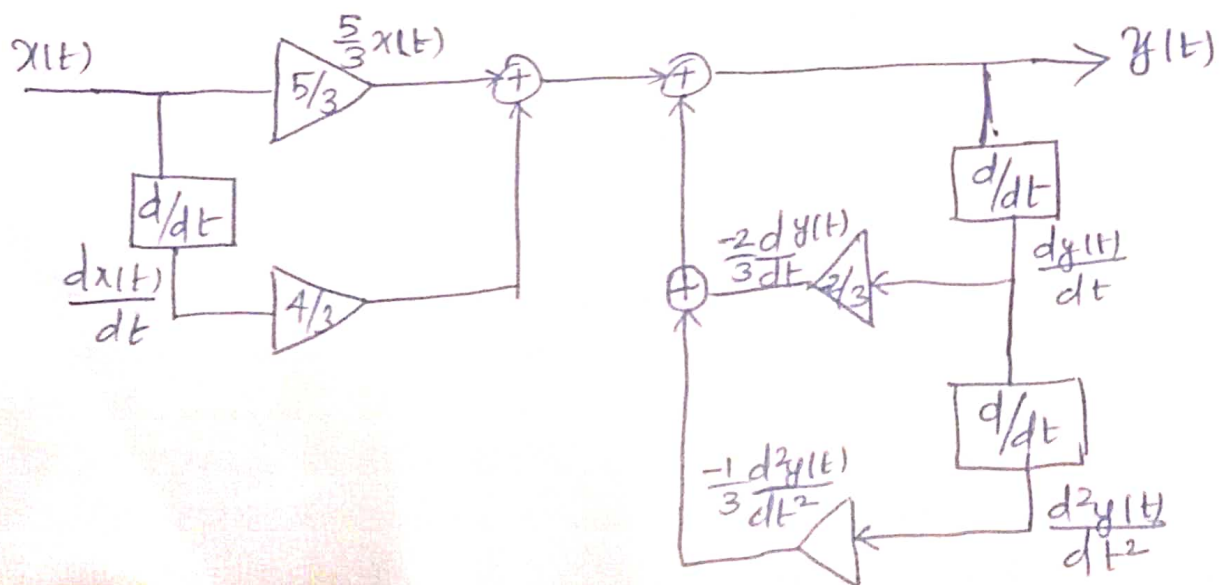
$$\frac{d^2y(t)}{dt^2} + 2\frac{dy(t)}{dt} + 3y(t) = 4\frac{dx(t)}{dt} + 5x(t) \quad \text{Draw the}$$

Block diagram using integrators.

Solution:

Integrate the given equation with zero
initial conditions

$$\frac{dy(t)}{dt} + 2y(t) + 3\int y(t)dt = 4x(t) + 5\int x(t)dt$$

again integrate

$$y(t) + 2\int y(t)dt + 3\iint y(t)dtdt = 4\int x(t)dt + 5\iint x(t)dtdt$$

$$y(t) = -2\int y(t)dt - 3\iint y(t)dtdt + 4\int x(t)dt + 5\iint x(t)dtdt$$