10.4.3.1.3

EE24BTECH11051 - Prajwal

1) Find the roots of the following quadratic equations by completing the squares.

$$4x^2 + 4\sqrt{3}x + 3 = 0 \tag{1.1}$$

Theoritical Solution-
Checking roots of equation exist or not,

$$b^2 - 4ac \geq 0 \tag{1.2}$$
$$= 48 - 4(4)(3) \tag{1.3}$$
$$= 0 \tag{1.4}$$

This means roots of equation exist and are coincident.
And its root is given by

$$4x^2 + 4\sqrt{3}x + 3 = 0 \tag{1.5}$$
$$(2x - \sqrt{3})^2 = 0 \tag{1.6}$$
$$x = -\frac{\sqrt{3}}{2} = -0.866025 \tag{1.7}$$

CODING LOGIC:-
Eigen value method

a) Quadratic Equation

$$p(x) = ax^2 + bx + c \tag{1.8}$$

where $a \neq 0$

b) Divide quadratic equation by a

$$p(x) = ax^2 + bx + c \tag{1.9}$$
$$p(x) = x^2 + \frac{b}{a}x + \frac{c}{a} \tag{1.10}$$

c) Companion Matrix:
Let

$$p = -\frac{b}{a} \tag{1.11}$$
$$q = -\frac{c}{a} \tag{1.12}$$
$$\begin{pmatrix} 0 & q \\ 1 & p \end{pmatrix} \tag{1.13}$$

d) Finding the eigen values of the matrix (1.13) we will get the roots of the given quadratic equation