EE 200: Quiz 1
Duration 40 Minutes

Use the following format of answering:

Name: **Roll No:**   **Section:**

Email: **WhatsApp no:**

*Write **only** the final answer in each question. All questions carry equal marks. Answer scripts submitted after 40 minutes will be penalized with negative marks. The submission channel will be closed at completion of 60 minutes.*

1. The square roots of the complex number $(a + b\mathbf{i})$(with $b \neq 0$) are $\pm(\gamma + \delta\mathbf{i})$. Find γ and δ in terms of a and b.

2. The relation between the input $x(t)$ and output $y(t)$ of a linear time-invariant system is given by the differential equation:

$$\frac{dy(t)}{dt} + q_0\, y(t) = \frac{dx(t)}{dt} - q_0\, x(t)$$

   where q_0 is a constant. Show an implementation of the analog system by using one integrator and the required numbers of multipliers and adders.

3. A special type of sinusoidal analog signal is the chirp signal whose frequency $f(t)$ increases or decreases with time. This type of signals is used in radar and sonar. The linear chirp

signal is given by

$$x(t) = \sin(\phi(t)) = \sin(at^2 + bt + c)$$

where a, b, and c are constants. The instantaneous frequency of the chirp signal is defined by

$$f(t) = \frac{1}{2\pi} \frac{d\phi(t)}{dt}$$

Given that the instantaneous frequencies are f_0 and f_T at time instants $t = 0$ and $t = T$, respectively, and the signal is x_0 at $t = 0$, find the constants a, b, and c.

4. Consider the following MATLAB code:

```
poly1 = input('Coefficients of first polynomial= ');
poly2 = input('Coefficients of second polynomial= ');
L1 = length(poly1);
L2 = length(poly2);
if L1<=L2
      poly1 = [zeros (1, L2-L1) poly1];
else
      poly2 = [zeros (1, L1-L2) poly2];
end
      result = poly1 -poly2;
disp('Result= ')
disp(result)
```

For the data entered:
  Coefficients of first polynomial $= [3.1\ -5.2\ 4.4\ 0.6]$
  Coefficients of second polynomial $= [3.5\ -2.5\ 1.9]$

Find the display as:
  Result=