N.B.: (1) Question No. 1 is Compulsory
(2) Attempt any three questions from the remaining
(3) Figures to the right indicate full marks.
(4) Assume suitable data if required
(5) Use Smith Chart For transmission line problem.

1. (a) Test for following polynomial using continued fraction expansion only
\[ P(s) = s^6 + 2s^5 + 3s^4 + 4s^3 + 3s^2 + 2s + 1 \]
(b) Obtain s-domain equivalent model at inductor and capacitor with non-zero initial condition.
(c) The paramelex of a transmission line are \( G = 2.25 \, \text{m} \Omega /\text{km}, \)
\( R = 65 \, \Omega /\text{km}, \)
\( L = 1.6 \, \text{mH} /\text{km}, \)
\( C = 0.1 \, \mu \text{F}/\text{km} \)
find characteristic impedance and the propagation constant of the line at a frequency of 1 KHz.
(d) The pole-zero diagram of driving point impedance function is shown At d.c. the input impedance is resistive and equal to 2 \( \Omega \) Determine value of \( R, L, \) and \( C. \)

2. (a) Determine voltage \( V_x \) by Source shifting and Source transformation.

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(b) Find $i_1(t), i_2(t)$ and $i_3(t)$ at $t=0^+$.

(c) Compare Foster form I and Foster Form II of an LC N/W:

$$Z(s) = \frac{6s(s^2 + 4)}{(s^2 + 1)(s^2 + 64)}.$$

3. (a) Design a short circuit shunt stub match for $Z_o = 150-200j$ (Ω) for a line of $Z_o = 100\Omega$ and frequency at $f = 20$ MHz use Smith chart.
(b) Obtain Power associated with dependent voltage source by using Nodal analysis.

(c) Explain various types of filter's

GN-Con.: 10234-14.
4. (a) Obtain hybrid parameter of the interconnected network.

(b) Obtain \( v(t) \) for \( t \geq 0 \). Use Laplace Transform method.

5. (a) Check for p.r.f.

\[
F(s) = \frac{2s^2 + 2s + 1}{s^3 + 2s^2 + s + 2}
\]

\[
F(s) = \frac{s^2 + 2s + 1}{s^3 + 2s^2 + 2s + 3}
\]

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5. (b) Find current flowing in both coils. If applied input voltage is $v(t) = 230 \sqrt{2} \sin (5000 t - 30^\circ)$

5. (C) Obtain pole-zero plot for $\frac{I_2}{I_1}$

6. (a) For the network shown below determine $R_L$ for maximum power transfer and also determine $P_L$.
6. (b) Find \( i_1(t) \), \( i_2(t) \), \( \frac{di_1(t)}{dt} \), \( \frac{di_2(t)}{dt} \) and \( \frac{di_3(t)}{dt} \) at \( t=0^+ \) if switch \( k \) is opened at \( t=0 \).

6. (c) Compare Cauer form I and Cauer form II for RC N/W

\[
Z(s) = \frac{4(s+1)(s+3)}{s(s+2)}
\]