

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2289464

Roll No.

B. TECH

Regular Theory Examination (Odd Sem-III), 2016-17

NETWORK ANALYSIS & SYNTHESIS

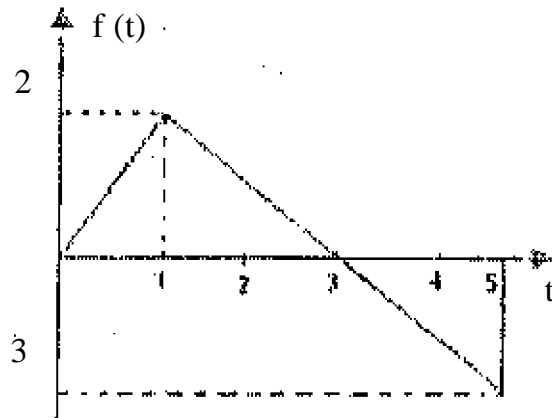
Time : 3 Hours

Max. Marks : 100

SECTION - A

1. Attempt all parts. All parts carry equal marks. Write answer of each part in short questions. (2×10=20)

- a) Express the given waveform as shown in figure in terms of ramp function.



- b) What Are active and Passive Elements.
- c) Write the Hybrid parameters in terms of Z parameters.
- d) Write the application of Superposition theorem with its statement.
- e) Describe the condition of symmetry in terms of Z and Y parameters.
- f) Differentiate network analysis and Network synthesis and also explain zeroes of transmission.
- g) Draw Pole-Zero diagram for following impedance function.

$$Z(s) = \frac{(s+1)}{(s^2 + 2s + 2)}$$

- h) Explain cascaded connection of two port network in brief.
- i) Determine the initial value $f(0^+)$, if

$$F(s) = \frac{2(s+1)}{s^2 + 2s + 5}$$

- j) Describe active band stop filter and draw its frequency response.

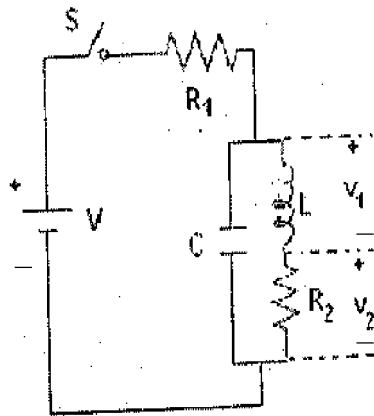
SECTION - B

Note: Attempt any five questions from this section

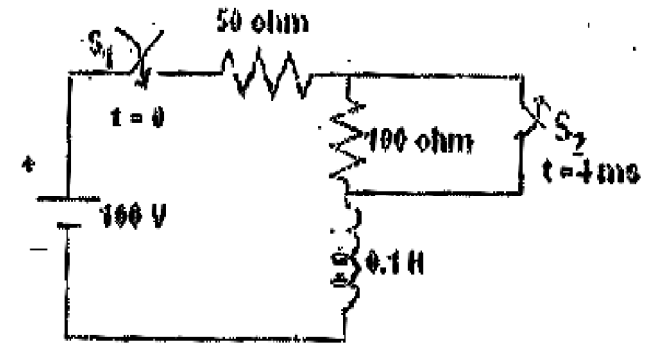
(5×10=50)

2. a) In the circuit shown in figure given below, the switch S is closed at t=0 with zero capacitor voltage and zero inductor current, solve for

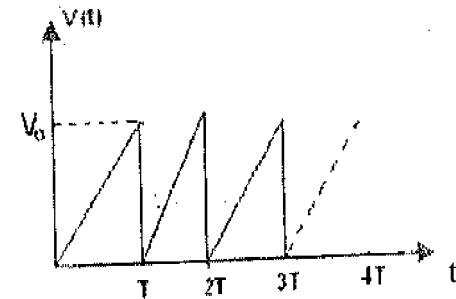
- i) v_1 and v_2 at $t = 0^+$,
- ii) v_1 and v_2 at $t = \infty$,
- iii) v_1 and v_2 at $t = 0^+$
- iv) v_2'' at $t = 0^+$ (v_1 and v_2 are time derivatives of v_1 and v_2)



b) In the circuit shown in figure below. S_1 is closed at $t = 0$ and S_2 is opened at $t = 4\text{ms}$. Determine $i(t)$ for $t > 0$.



c) Find the Laplace Transform of the waveform shown in figure below :



d) Find Cauer-I and II form of $Z(s)$ given below.

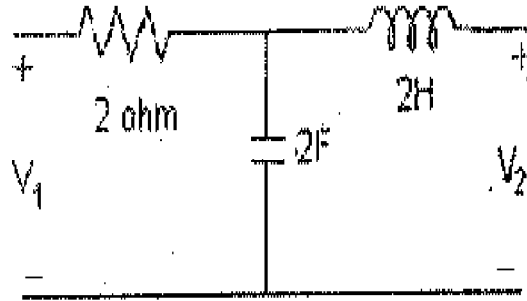
$$Z(s) = \frac{(s+4)(s+6)}{(s+3)(s+5)}$$

e) Obtain the Z parameters of the network in terms of h parameters and T-parameters.

- f) Synthesize the given admittance function with a 1 ohm termination

$$Z_{21}^1(s) = \frac{(s^2 + 2)}{s^3 + 3s^2 + 3s + 2}$$

- g) Determine transmission parameters of a T-network shown in figure below, considering three sections as shown in the figure assuming connected in cascaded manner. Also find corresponding Z and Y-parameters.



- h) The Transform current in a network is given below. Plot the poles and zeros in the s-plane and hence obtain the time domain response.

$$I(s) = \frac{3s(s+2)}{(s+1)(s+4)}$$

SECTION - C

Note: Attempt any two Questions from this section.
(15×2=30)

3. a) Differentiate Active filters and passive filters. Draw the frequency response of band reject and band pass filter.
- b) What do you mean by impedance scaling and frequency scaling. Explain the importance of these techniques in Active filter synthesis.
4. a) Enlist the properties of RL impedance function.
- b) Find the range of values of a so that following function is a Hurwitz $P(s) = s^4 + s^3 + as^2 + 2s + 3$
5. a) Explain Convolution integral and convolution theorem.

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- b) Determine the inverse Laplace Transform of the following function using convolution integral :

$$F(s) = \frac{s(s^2 + 4)}{s + 1}$$

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