# Motilal Nehru National Institute of Technology Allahabad
## Class: B. Tech. (EE), 4th Semester
### Subject: Networks and Systems (EE-1301)
### Session: Odd Semester (2015-16), Examination: End-Sem. Exam

Max. Time: 3 Hours                                                     Max. Marks: 60 marks

Note: Attempt _ALL_ questions. Marks are indicated next to them. Q7 is compulsory.

1. Attempt _Any Two_ of the following:
   (a) Find the value of the current '_I_' _flowing through_ 50Ω Resistor in the bridge network shown in  [05]
   Figure 1(a).
   (b) What is the power loss in the 10Ω resistor of the circuit in _Figure 1(b)_?  [05]
   (c) If $V_L$ represents the drop across $R_L$ in _Figure 1(c)_, find the current across $R_L$ utilizing Thevenin's  [05]
   theorem. Assume $R_L =10Ω$ and a factor in the dependent current source as 0.5.
   (d) Find Thevenin's equivalent circuit for the network shown in _Figure 1(d)_ at the left of terminals  [05]
   x-y.

2. (a) Derive the mathematical expression of cascade parameters in terms of h-parameters for a 2-port  [05]
   network.
   (b) In the circuit shown in _Figure 2(b)_, find the h-parameter.  [05]
   (c) The Z-parameters of a two-port network are  [05]
   $Z_{11}=10Ω$, $Z_{22}=20Ω$, $Z_{12}=Z_{21}=5Ω$.
   (i)    Find the ABCD parameters of this two-port network.
   (ii)    Find its equivalent T-network.

3. Attempt _Any Three_ of the following:
   (a) In a series RC circuit, the resistance is of 2Ω while the capacitor is of ¼ F. Find the transfer  [05]
   function of voltage and the drop across the capacitor assuming the supply voltage to be $V_0(t)=t$
   u(t).
   (b) A RL series circuit is energized by a voltage $V_0 (t) =3t$ u (t). Find i (t). Assume R=2Ω, L=1H.  [05]
   (c) Find $V_c$ (t) and $I_L$ (t) in the circuit of _Figure 3(c)_ assuming zero initial conditions.  [05]
   (d) A triangular pulse waveform is shown in _Figure 3(d)_ by waveform analysis, draw the component  [05]
   functions.

4. (a) Write pole zero concept in context of stability of a system.  [02]
   (b) Check whether following is Hurwitz or not!  [06]
   (i)    $s^5 + s^3 + s$
   (ii)    $s^5 + 3s^4 + 3s^3 + 4s^2 + s + 1$
   (c) Check whether following is PRF or not!  [04]
   $$Z(s) = \frac{s^3 + 5s^2 + 9s + 3}{s^3 + 4s^2 + 7s + 9}$$
   (d) Realize following network in _Caurer_ and _Foster_ network forms:  [08]
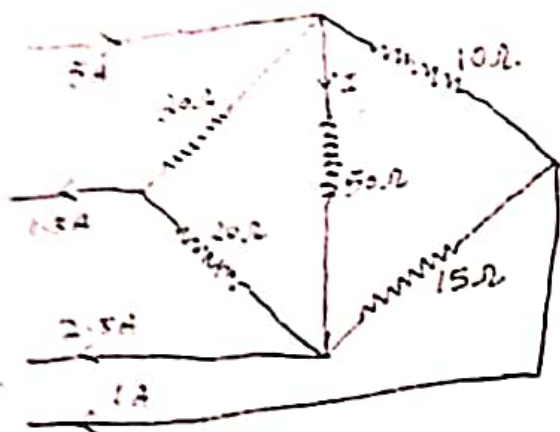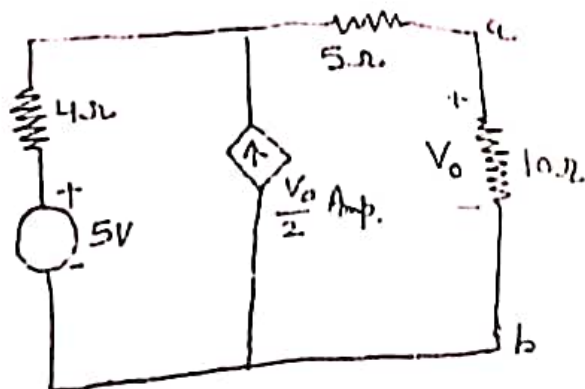   $$Z(s) = \frac{6s^3 + 5s^2 + 6s + 4}{2s^3 + 2s}$$
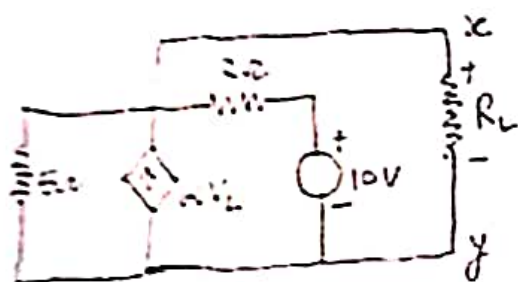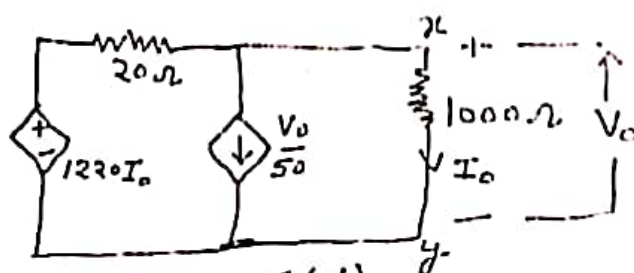
Figure 1(a)


Figure 1(b)


Figure 1(c)


Figure 1(d)


Figure 2(b)

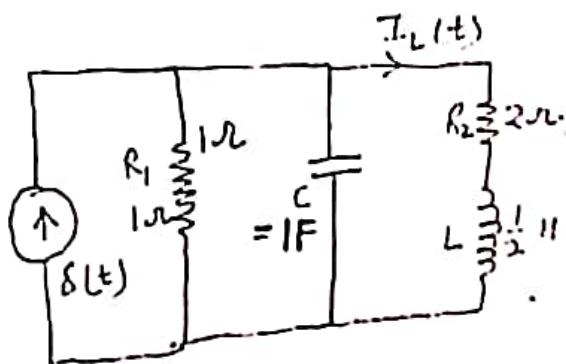
Figure 3(b)
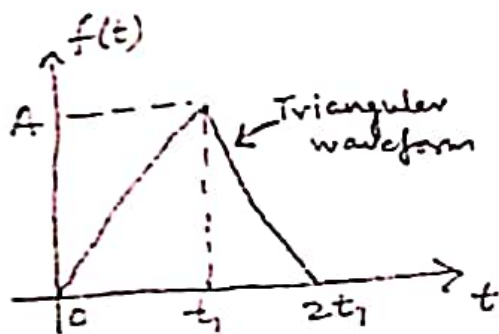

Figure 3(d)