Printed pages: 3 K. N. I. T., SULTANPUR

(Paper code and roll No. to be filled in your answer book)

Paper code: KEC-304 Roll No. 1 5 4 1 2

B.Tech. (Main & COP)
Third Semester Examination, 2016-17
Network Analysis & Synthesis

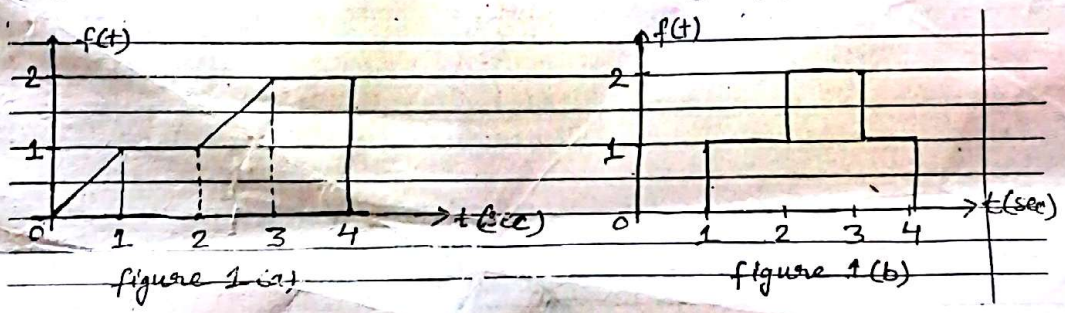
Time: 3 Hours **Total Marks: 100**

Note: Attempt all questions. Assume missing data suitably.

1. Attempt any four parts of the following: **(5x4=20)**

(a) With the help of mathematical expressions and characteristics curve, explain unit step, impulse and ramp signals used to analyse the network.

(b) Synthesize the waveforms shown in fig. 1(a) & 1(b).

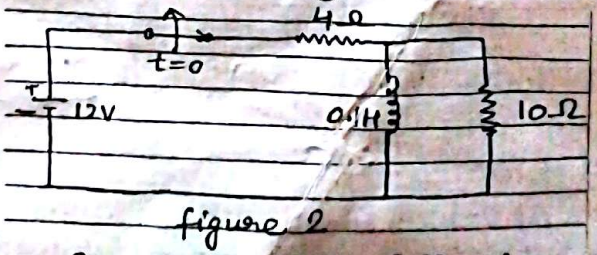


(c) Find the current i(t) in a series R-L-C circuit comprising R = 3 Ω, L = 1 H and C = 0.5 F when ramp voltage 12 volts is applied.

(d) Discuss the concept of initial and final conditions in network analysis with suitable examples.

(e) Find the transient response of a series R-L circuit having sinusoidal excitation.

(f) The 12 V battery in fig. 2 is disconnected (opened) at t = 0. Find the inductor current and voltage as a function of time.



2. Attempt any four parts of the following: **(5x4=20)**

(a) Find the initial and final values, if they exist, of the signals with Laplace transforms given below:

(i) $F(s) = (s+10)/(s^2+3s+2)$ (ii) $F(s) = (s^2+5s+7)/(s^2+3s+2)$

(b) Find the inverse Laplace transform of the given function:
$F(s) = 1/[s^2(s+2)]$

(c) Find i(t), if $I(s) = 1/[s(s+1)^2(s+2)]$

(d) State and prove maximum power transfer theorem.

(e) Explain Reciprocity theorem, with an example.

(f) State Thevenin's and Norton's theorems and also write their limitations.

3. Attempt any two parts of the following: (10x2=20)

(a) For the network shown in fig. 3, calculate Z, T and h-parameters.

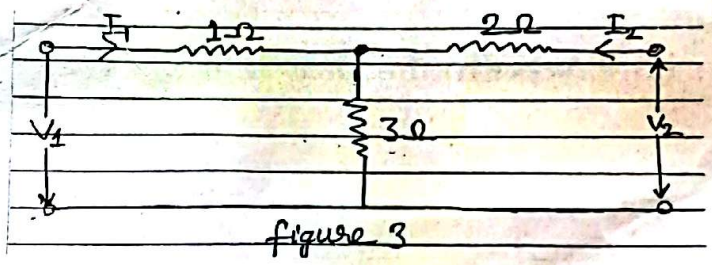


figure 3

(b) For the л-network of fig. 4, obtain the Y-parameters.

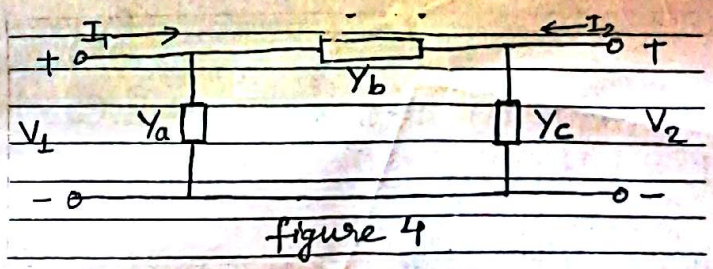


figure 4

(c) What is a positive real function? Also check whether the function $z(s) = [(s^2+1)(s^2+4)]/[s(s^2+2)]$ is R-L network or not.

4. Attempt any two parts of the following: (10x2=20)

(a) Write the properties of L-C immittance functions.
Check whether the function $F(s) = [K(s^2+1)(s^2+9)]/[s(s^2+4)]$ is an L-C immittance function or not.

(b) Synthesize the impedance $z(s) = [2(s^2+1)(s^2+9)]/[s(s^2+4)]$ in Foster-I and II forms.

(c) Find the range of values of 'a' in P(s), so that
$P(s) = 2s^4 + s^3 + a\,s^2 + s + 2$ is Hurwitz.

5. Attempt any two parts of the following: **(10x2=20)**

(a) Explain the term "zeros of transmission". Realize the network function $Y_{21}(s) = [(s+2)(s+4)/(s+1)(s+3)]$ with 1 Ω termination.

(b) Enlist the properties of transfer function of a network. Draw the pole-zero plot of the function.
$F(s) = [10(s+1)(s+3)/s(s+2)(s+4)]$

(c) An admittance function is given as $Y(s) = (4s^2+6s)/(s+1)$. Realise the network using Cauer's first and second forms.