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Total No. of Questions : 09] [Total No. of Pages :03

Paper ID [EE201]

MAY 2008

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 3rd)

NETWORK ANALYSIS & SYNTHESIS (EE - 201)

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 × 2 = 20)*

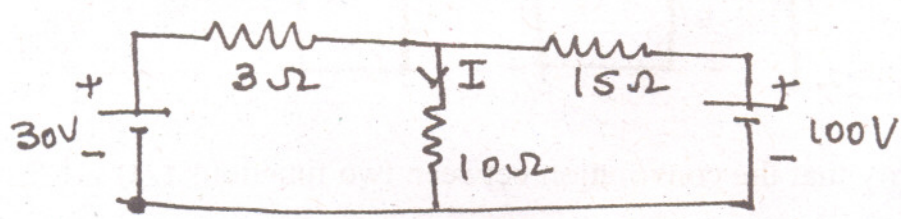
a) Sketch the waveform from the expression
$i(t) = 1.5\ (1 - e^{-4t})\ u(t) - 1.5\ [1 - e^{-4(t-0.1)}]\ u(t - 0.1)$
$u\ (t)$ and $u(t - 0.1)$ are unit step functions.

b) State the reciprocity theorem. Show that integration in the S domain corresponds to division by 't' in the time domain. i.e.

$$L\left[\frac{f(t)}{t}\right] = \int_s^\infty F(s) \cdot ds.$$

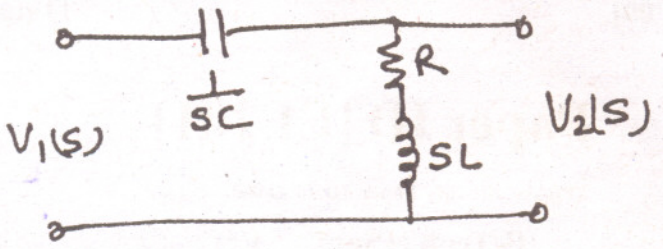
c) Determine Laplace transform of Sinh α t.

d) Using Thevenin's theorem determine current I through the 10 ohm resistance.



e) List the properties of a R-L admittance function.

f) Determine the voltage transfer function of the network



g) How are filters classified.

h) List the demerits of a m derived filter.

i) Design a high pass π section filter to work into impedance of 500 ohm and have a cut off frequency of 1kHz. What will be the attenuation at frequency of 0.9 kHz for the filter.

j) Define parabolic and impulse signals.

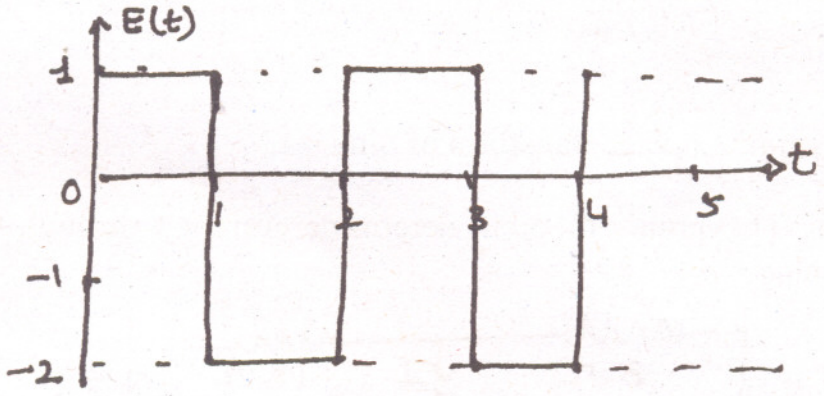
Section - B

(4 × 5 = 20)

Q2) (a) Compare the Loop equations with the node equations.
(b) State the Millman's theorem as applicable to number of voltage sources operating in parallel.

Q3) With the help of suitable example and Tellegen's theorem show that sum of instantaneous power delivered to all branches of a circuit is zero.

Q4) Obtain the Laplace transform of the periodic function shown.



Q5) Verify that the convolution between two functions $f_1(t) = e^{-\alpha t}$ and $f_2(t) = t$ is $\frac{1}{\alpha^2}(\alpha t - 1 + e^{-\alpha t})$.

Q6) Give the general configuration of a constant k high pass T and π filter network. Determine attenuation constant, phase constant and characteristic impedance.

Section - C

(2 × 10 = 20)

Q7) (a) Design a composite low pass filter using T network which is to be terminated in 500 ohm resistance. It must have a cut off frequency of 1kHz with very high attenuation at 1.065 Hz, 1.250 kHz and at infinity.

(b) Show that the m derived π network can be obtained from the constant k type by modifying its series and shunt arm.

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Q8) (a) An impedance function is given by $Z(s)=\frac{s(s+2)(s+5)}{(s+1)(s+4)}$ find the R-L representation of Cauer I and II forms.

(b) Show that the inverse Laplace transform of $F(s)=\frac{1}{(s^2+a^2)^2}$ by convolution integral is $\frac{1}{2a^3}$ (Sin *at* - *at* Cos *at*).

Q9) (a) $V(s)=\frac{4(s+1)}{(s+2)(s+3)}$

Draw the poles and zero of the function and determine V(t) using the diagram.

(b) Check whether the given function $P(s)=s^4+s^3+2s^2+4s+1$ is Hurwitz.

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