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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fourth Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; June/July - 2015

Network Analysis - II

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each **Unit**.*

UNIT - I

1. a What are initial and final conditions in networks? Why is it necessary to study these conditions in networks? Explain with a practical example. 6

b. In the circuit shown in Fig. 1b switch K is closed at t = 0. Find the expressions for i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ all at t = 0+ 4

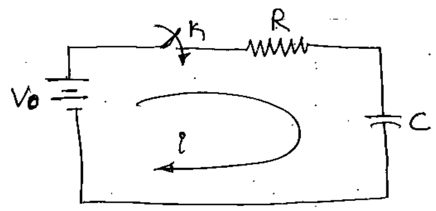

Fig 1b

c. In the circuit shown in Fig. 1c, capacitor C is charged to 100 V in the polarity shown. Switch K is closed at t = 0. Find the values of i_1, i_2, $\frac{di_1}{dt}$, $\frac{di_2}{dt}$, $\frac{d^2i_1}{dt^2}$, $\frac{d^2i_2}{dt^2}$ all at t = 0+.

Given; $C_1 = C_2 = 1\mu F$. $R_1 = R_2 = 10\ k\Omega$. 10

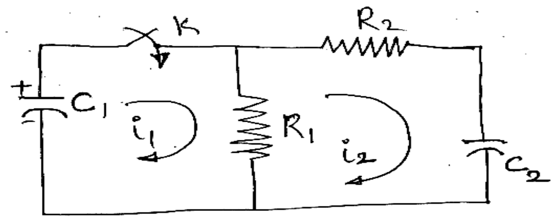

Fig 1C

2 a. Find $i_L(0+); v_c(0+); \frac{dv_c(0+)}{dt}$ & $\frac{di_L(0+)}{dt}$ for the circuit shown in Fig. 2a. 10

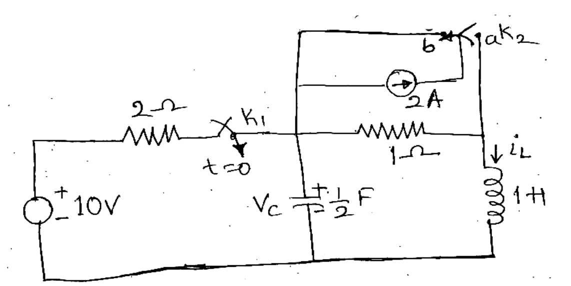

Fig2a

b. In the given ckt shown in Fig. 2b steady state is reached with switch K open. Switch K is closed at t = 0. Find the voltage V_c across the capacitor and current i_2 through inductor at t = 0-. Also find the values of $i_1, i_2, \frac{di_1}{dt}$ and $\frac{di_2}{dt}$ at $t = 0+$. 10

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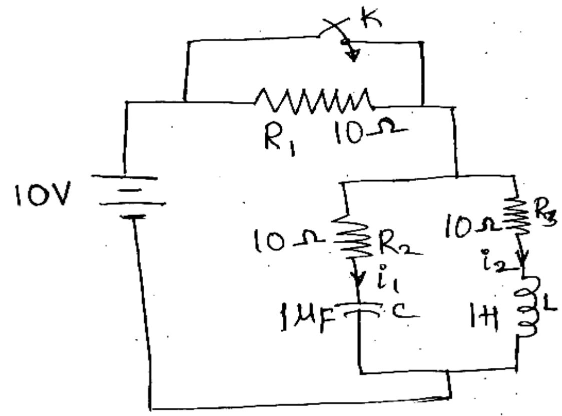


UNIT-II

3 a. Find the inverse Laplace transform of the following functions; 10

i) $F(s)=\dfrac{1}{s\left(s^2-\theta^2\right)}$ ii) $F(s)=\dfrac{250}{(s+2)\left(s^2+625\right)}$

b. Find the Laplace transform of the periodic waveform shown in Fig. 3b. 10

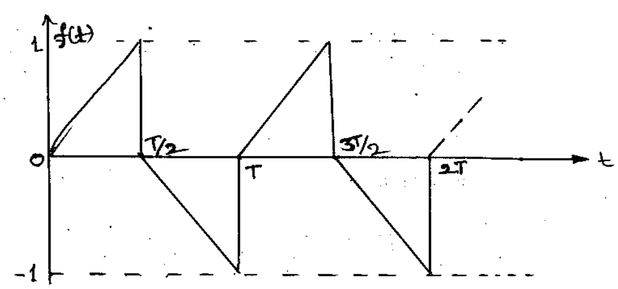


Fig 3b

4 a. In a series RLC circuit the following equation for the current is obtained. Use Laplace transform to solve the equation and find an expression for current i(t). 10

$\dfrac{di(t)}{dt}+3i(t)+2\int_0^t i(t)dt+8\delta(t)=2e^{-3t}$ with i(0-) = 4 and 2q(0-) = 8.

b. Find the Laplace transform of the periodic waveform shown in Fig. 4b using waveform synthesis. 10

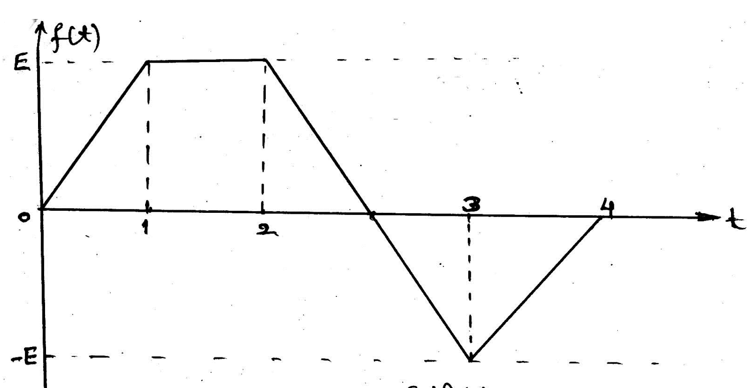
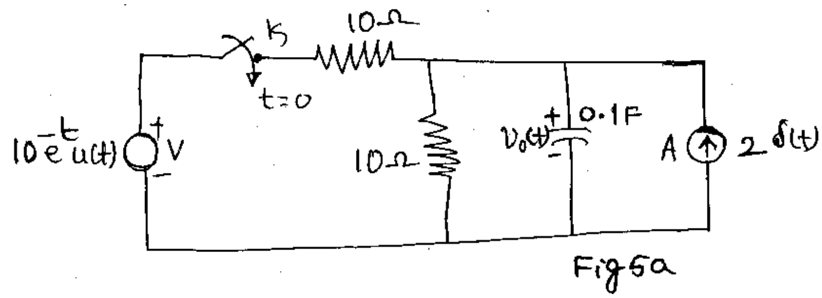


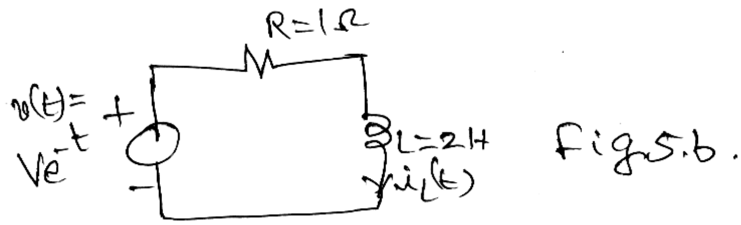
Fig 4b

UNIT- III

5 a. For the circuit shown in Fig. 5a, switch K is closed at t = 0. Find $V_o(t)$ using Laplace transform. Assume $V_o(0\text{-}) = 5$ volts. 10

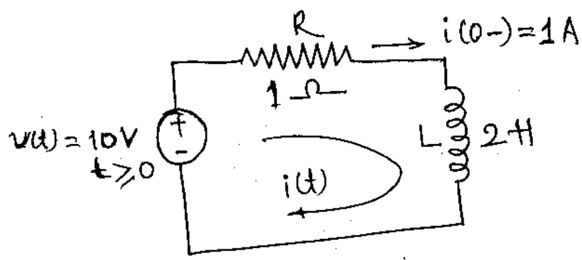


b. Determine the current in the inductive branch, shown in Fig. 5b, using impulse response. 10



6. a In a series RC circuit with R = 10 Ω and C = 50 μF, switch K is closed at t = 0 connecting a DC voltage source of 100 V to the circuit. The capacitor has an initial charge of 2 nC. Use Laplace transform to find current *i*(t) through the circuit at t = 0+. 5

b. For the circuit shown in Fig. 6b determine an expression for current *i*(t) by Laplace transform considering initial conditions given, by writing equations in time domain. 5

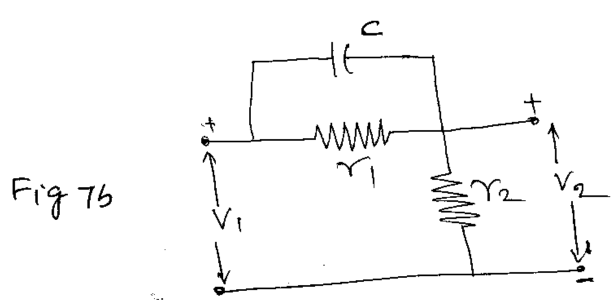


c. If impulse response $h(t)=2e^{-3t}u(t)$ and input $x(t)=u(t)-\delta(t)$ determine output r(t) using convolution theorem and verify the same by finding inverse Laplace transform. 10

UNIT - IV

7 a. List the restrictions on locations of poles and zeros in driving point functions. 4

b. For the circuit shown in Fig. 7b find Z_{in} and voltage ratio transfer function. 6



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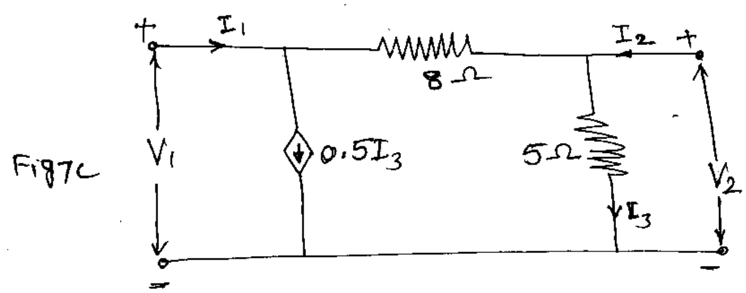
c. Obtain the z parameters for the π network shown in Fig. 7C. 10



8 a. Obtain the pole – zero diagram of the given function and obtain the time domain response. 10

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

b. Determine Y parameter and hence Z parameters of the circuit shown in Fig. 8b. 10

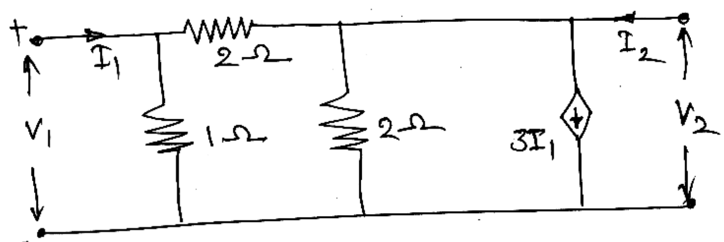


Fig 8b

UNIT - V

9 a. Explain the properties of Hurwitz polynomial. 8

b. Check whether the following functions are Hurwitz polynomial. 12

i) $F(s)=s^7+3s^5+s^3+2s$ ii) $F(s)=s^4+s^3+3s^2+2s+2$

10 a. The driving point impedance of a one port LC network is given by 10

$Z(s)=\dfrac{(s^2+1)(s^2+3)}{s(s^2+2)(s^2+4)}$ obtain the first and second form of Foster network.

b. A driving point function is give by $F(s)=\dfrac{s^2+6s+8}{s^2+4s+3}$. Show that the function can be realized in both cauer RC and RL forms. 10

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