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

(An Autonomous Institution affiliated to VTU, Belagavi)

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

Semester End Examination; June - 2017

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 do you mean by initial conditions in electrical networks and what is the purpose of determining them? 6

b. In the given network of Fig.1, the switch is closed at $t = 0$, with zero current in inductor. Find;

i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0+$. 6

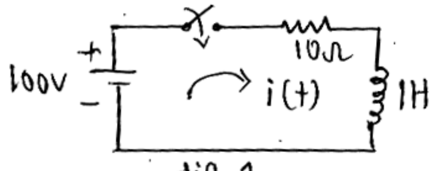


fig. 1

c. In the network shown in Fig.2 the switch is closed. Assuming all initial conditions are zero.

Find $i, \frac{di}{dt}, \frac{d^2i}{dt^2}$ at $t = 0+$. 8

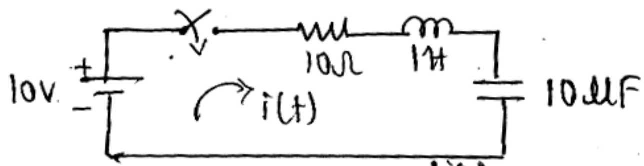


fig.2

2 a. In the network shown in Fig. 3, at $t = 0$, the switch is opened. Calculate v, dv/dt, d^2v/dt^2 at $t = 0+$. 10

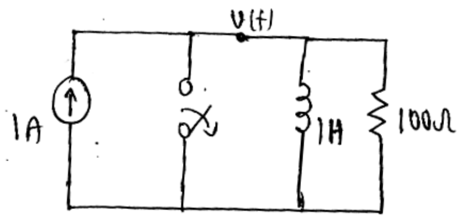


Fig.3

b. In the network shown in Fig 4. a steady state is reached with the switch 'k' open. At $t = 0$, the switch is closed. For the elemental values given, determine the value of $V_a(0-)$ and $V_a(0+)$ and $V_b(0+)$. 10

Contd...2

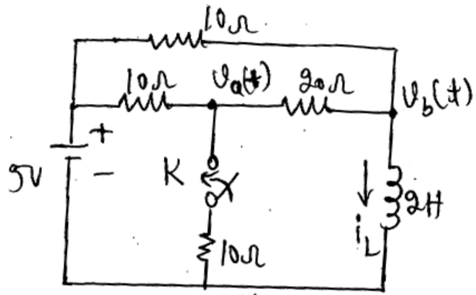


Fig.4

UNIT - II

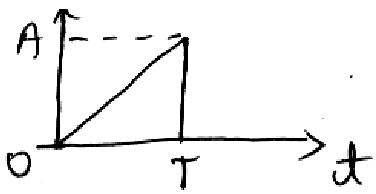
3 a. Clearly discuss the following functions : 6

(i) Step function (ii) Ramp function (iii) Gate function.

b. Sketch the waveforms for the given functions : 6

(i) t u(t-T) (ii) (t-T) u(t) (iii) Sin (ωt-T/4) u(t-T/4).

c. Obtain the Laplace transform of saw tooth waveform shown in Fig. (5) 8



fig(5)

4 a. Show that the Laplace transform of a train of periodic waveforms with a period 'T' is given by $\frac{F_1(S)}{1-e^{-TS}} = F(S)$ where $F_1(S) = \mathrm{L}\{f_1(t)\}$. 10

b. Find the Laplace transform of a pair of rectangular pulses each of duration 'T' Sec shown in Fig. (6). 10

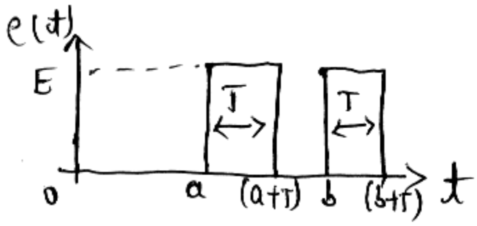


fig.(6)

UNIT - III

5 a. At t = 0, unit pulse voltage of unit width is applied to series RL circuit as shown in Fig. (7), obtain an expression for *i(t), v(t) = u(t) – u(t-1).* 10

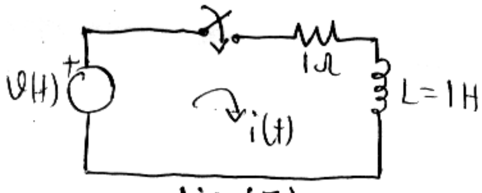
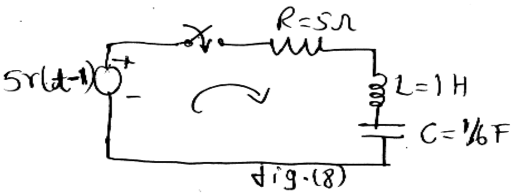


fig.(7).

b. For the network shown in Fig. (8). Find *i(t)* when the switch is closed at *t* = 0 with zero initial conditions. 10



6. a State and prove Convolution theorem. 10

b. Calculate the initial value of the current using the initial value theorem given that the Laplace transformation of current is $I(S)=\dfrac{2S+5}{(S+1)(S+2)}$,find *i(0+)*. Also verify *i(0+)* from time response. Also calculate *i(t)* at *t* = 2 sec. 10

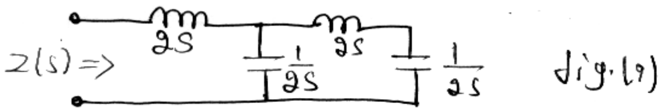
UNIT - IV

7 a. Determine the driving point impedance function of the network shown in Fig. (9) 6

b. Obtain the pole-zero plot of the following functions : 6

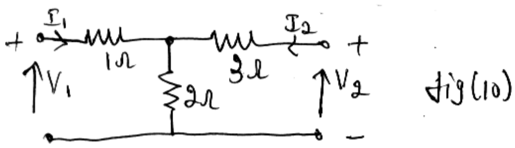
(i) $F(S)=\dfrac{S(S+2)}{S^2+2S+2}$ (ii) $F(S)=\dfrac{S(S+2)}{(S+1)(S+3)}$

c. Plot the following on the pole-zero plot and determine the time response of each of the individual poles, assuming the response is current (i) $S_1 = 0$ (ii) $S_2 = -1$ (iii) $S_3 = -2$. 8



8 a. Obtain the expression of Z parameters in terms of ABCD parameters. 10

b. Find the Y-parameters for the network shown in Fig. (10) 10



UNIT - V

9 a. Test whether the polynomial $P(S) = 2S^4+5S^3+6S^2+3S+1$ is Hurwitz or not. 10

b. Just whether the function $F(S)=\dfrac{S(S+3)(S+5)}{(S+1)(S+4)}$ is PR function or not. 10

10 a. Realize the Foster I & II form of the following impedance function : $F(S)=\dfrac{4(S^2+1)(S^2+9)}{S(S^2+4)}$ 10

b. Realize the caver II and I form of the following Impedance function : $Z(S)=\dfrac{10s^4+12s^2+1}{2s^3+2s}$ 10

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