Total No. of Questions : 8]

SEAT No. :

P9088

[Total No. of Pages : 5

[6179]-213

S.E. (Electrical Engineering)
NETWORK ANALYSIS
(2019 Pattern) (Semester - IV) (203147)

Time : 2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7or Q.8.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable additional data, if necessary.*
5) *Use of non-programmable calculator is allowed.*

Q1) a) Derive the expressions for voltage across resistance and voltage across inductor in series RL circuit connected to a d.c. voltage V for t > 0. Assume that initial current through inductor is zero. **[5]**

b) In the network shown in Fig. 1, switch is closed at t = 0. Before closing the switch capacitor was in uncharged state. Find the values of

$i(0^+), \dfrac{di(0^+)}{dt}, \dfrac{d^2i(0^+)}{dt}$. **[6]**

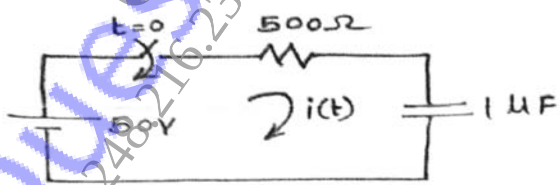

Fig. 1

c) For the network shown in Fig. 2, steady state is reached with switch closed. The switch is opened at t = 0. Obtain expressions for $i_L(t)$ for t>0. **[6]**

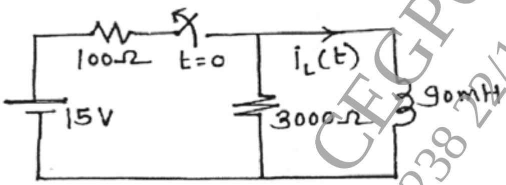

Fig. 2

OR

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Q2) a) Derive the expressions for voltage across resistance and voltage across capacitor in series RC circuit connected to a d.c. voltage V for t > 0. Assume that initial voltage across capacitor is zero. **[5]**

b) In the network shown in Fig. 3. switch is closed at t=0. Assume initial current of inductor to be zero. Find the values of **[6]**

$$i(0^+), \frac{di(0^+)}{dt}, \frac{d^2i(0^+)}{dt}.$$

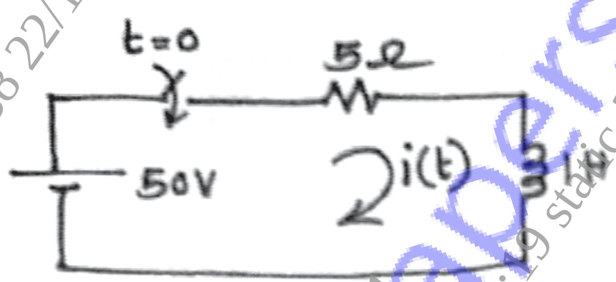

Fig.3

c) The switch in the circuit shown in Fig. 4 is moved from position 1 to 2 at t = 0. Find expression for $V_c(t)$ for t > 0. **[6]**

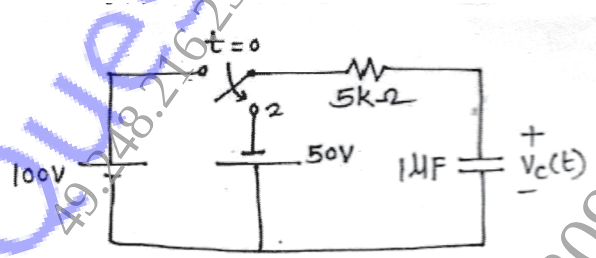

Fig. 4

Q3) a) Express following functions mathematically along with waveforms: **[6]**

i) Step function. Unit Step function. Delayed Unit Step function

ii) Ramp function. Unit Ramp function. Delayed Unit Ramp function

b) In the network shown in Fig. 5, switch is moved from position a to b at t = 0. Just before this switching the initial conditions were $i(0^-) = 2$ A and $V_c(0^-) = 2$ V. Find the expression for current i(t) using Laplace Transform method. Assume $R = 3\,\Omega, L = 1\,H, C = 0.5\,\mu F, V_1 = 5\,V$. **[6]**

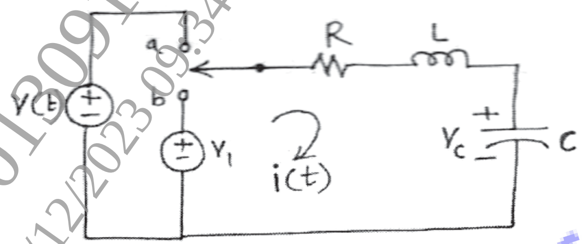

Fig. 5

c) In the network shown in Fig. 6, switch is moved from position 1 to 2 at t = 0. Find $i(t), \frac{di(t)}{dt}, \frac{d^2i(t)}{dt^2}$ at t = 0^+ by Laplace Transform approach. **[6]**

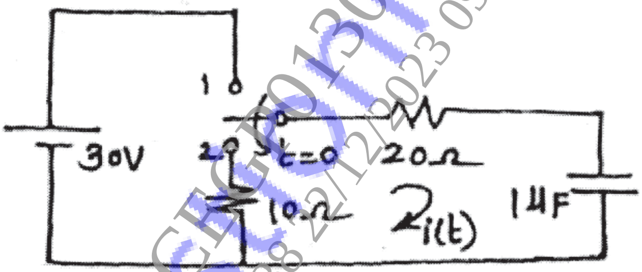

Fig. 6

OR

Q4) a) State any six properties of Laplace Transform. **[6]**

b) In the network shown in Fig. 7, the switch is moved from position a to b at t = 0. Determine expression for i(t) using Laplace Transform approach. **[6]**

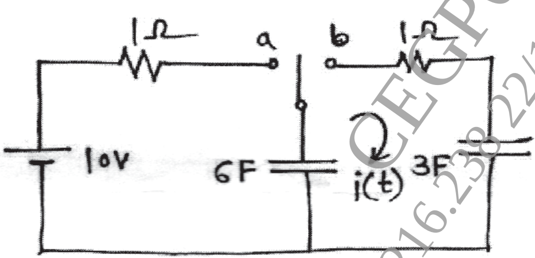

Fig. 7

c) In the network shown in Fig. 8, switch is moved from position 1 to 2 at t = 0. Find expression for i(t) by Laplace Transform approach. **[6]**

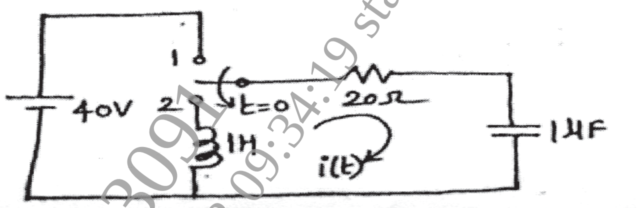

Fig. 8

Q5) a) Design constant K low pass filter having cut-off frequency 1kHz and design impedance 400Ω in both the T and π configurations. **[5]**

b) Find Z parameters of the network shown in Fig.9. **[6]**

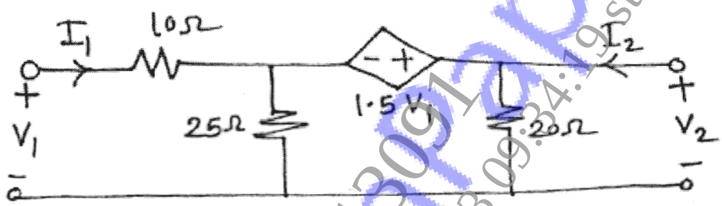

Fig. 9

c) Derive 'h' parameters in terms of 'Z' parameters for a two port network. **[6]**

OR

Q6) a) Design constant k high pass filter having cut-off frequency 1000 Hz and design impedance 1000Ω in both the T and π configurations. **[5]**

b) Find Y parameters of the network shown in Fig. 10. **[6]**

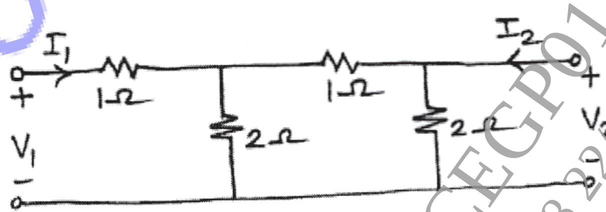

Fig. 10

c) Derive 'Z' parameters in terms of 'Y' parameters for a two port network. **[6]**

Q7) a) Define various network functions of a two port network. **[6]**

b) Determine Driving Point Admittance function $Y_{11}(s)$ for the network in Fig. 11 and hence draw pole zero plot of $Y_{11}(s)$. **[6]**

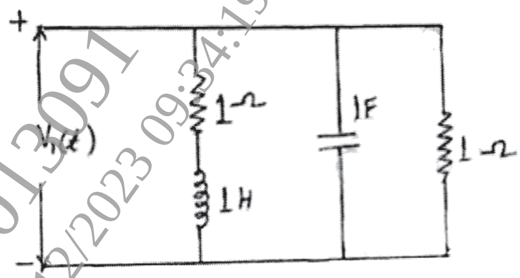

Fig. 11

c) Plot Poles and Zeros for the network function $V(s) = \frac{s+20}{s(s+10)}$ and obtain time domain response. **[6]**

OR

Q8) a) State restrictions on Poles and Zeros locations for transfer functions and driving point function. **[6]**

b) Determine Driving Point Impedance function $Z_{11}(s)$ and Driving Point Admittance function $Y_{11}(s)$ for the network in Fig. 12. **[6]**

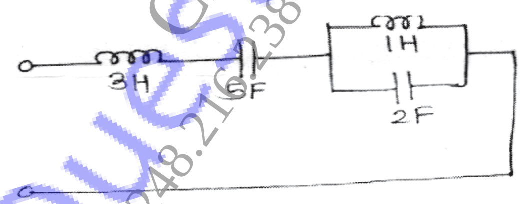

Fig. 12

c) Plot Poles and Zeros for the network function $I(s) = \frac{10(s+2)}{s(s+5)}$ and obtain time domain response. **[6]**

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