Total No. of Questions : 8]

SEAT No. :

PA-1210

[Total No. of Pages : 6

[5925]-232

S.E. (Electrical Engineering)

NETWORK ANALYSIS

(2019 Pattern) (Semester - IV) (203147)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What is time constant? State time constant in case of Series R-L circuit and series R-C circuit. **[6]**

b) In the network shown in Fig. 1, switch is closed at $t = 0$ with capacitor is uncharged. Find the value of $i(0^+), \frac{di(0^+)}{dt}, \frac{d^2i(0^+)}{dt^2}$. **[6]**

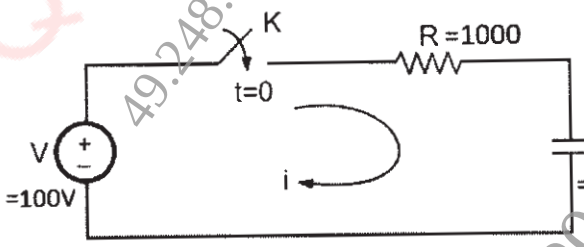

Fig. 1

c) In the circuits in Fig. 2. The switch is closed at $t = 0$. **[6]**

i) Obtain expression for current in the circuit for $t > 0$. Using the classical method.

P.T.O.

ii) Find value of current at $t = 0.25$ sec.

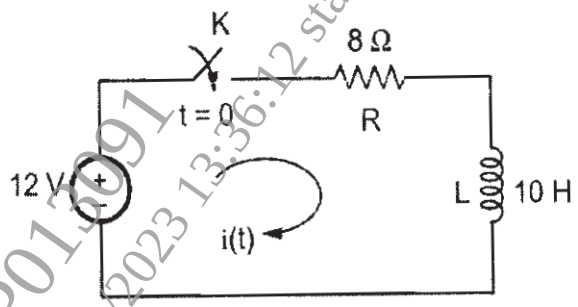

Fig. 2

OR

Q2) a) A coil which has an inductance of 40mH and a resistance of 2Ω is connected to form an LR series circuit. If they are connected to a 20V DC supply. Find **[6]**

i) Value of the induced emf after 10ms $\left[v(t) = ve - \frac{R}{L} t \right]$.

ii) The final steady state value of the current.

iii) Time constant of the RL series circuit.

b) In the network shown in Fig. 3, switch is closed at $t = 0$. Find the value of $i(0^+), \frac{di(0^+)}{dt}, \frac{d^2 i(0^+)}{dt^2}$ Assume the initial current of inductor to be zero. **[6]**

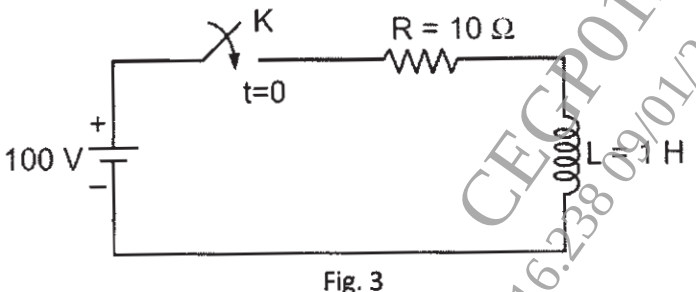

Fig. 3

c) In R-L-C circuit Fig. 4 is excited by D.C. voltage source. Find current $i(t)$ using conventional method. The switch is closed at time $t = 0$. **[6]**

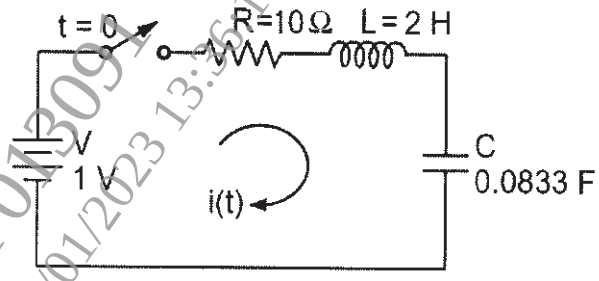

Fig. 4

Q3) a) Find the inverse Laplace transform of given network given F(s). **[5]**

$$F(s)=\frac{(s+2)}{s(s+3)}$$

b) Find the Laplace transform of given network given $f(t)$. **[5]**

$$f(t)=e^{3t}.\sin 2t+t.e^{-2t}$$

c) Obtain $f(t)$ for the signal shown in Fig. 5. Also determine Laplace transform of $f(t)$. **[7]**

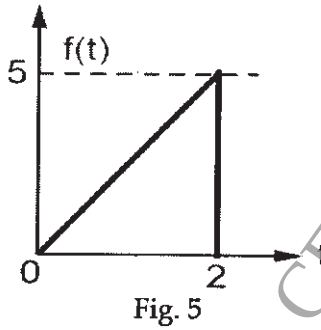

Fig. 5

OR

Q4) a) Determine resultant current $i(t)$ if switch is closed at $t = 0$. In R-L-C series circuit Fig. 6 by using Laplace transform. **[9]**

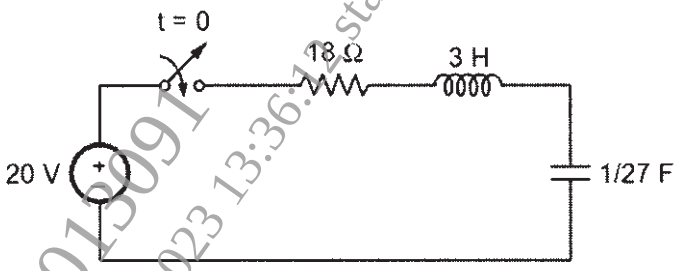

Fig.6

b) Solve the differential equation $\frac{d^2x(t)}{dt^2}+3\frac{dx(t)}{dt}+2x(t)=4e^t$, where $x(0^-)=1,\ x'(0^{-1})=-1$. **[8]**

Q5) a) Develop relation between 'Z' parameter and transmission parameter . **[5]**

b) Explain the following in relation with filters. **[6]**

i) stop band.

ii) pass band.

iii) cut-off frequency.

c) Obtain *y*-parameters of two port network for the given network in the fig.7. **[7]**

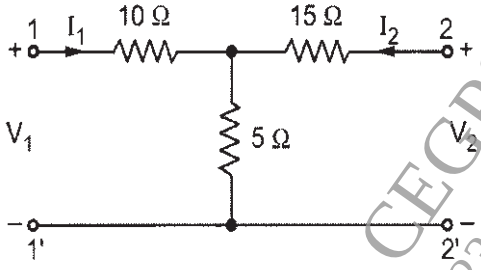

Fig. 7

OR

Q6) a) Define ABCD parameters and Hybrid parameters of two port networks. **[5]**

b) Design constant K-low pass filter to have a cut-off frequency of 796 Hz when terminated in a 600 Ω resistance in both the T and π configurations. **[6]**

c) Obtain Z-parameters of two-port network for the given network in the Fig. 8. **[7]**

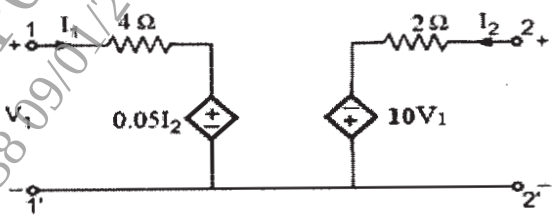

Fig. 8

Q7) a) Define : **[5]**

i) Poles of system function.

ii) Zeros of system function.

b) The voltage V(s) in a network given by : **[6]**

$$I(s)=\frac{2s}{(s+1)(s-3)}$$

Plot poles and zeros in the plane and obtain time domain response of current.

c) Find the driving point admittance $Y_{11}(s)$ for the network shown in Fig. 9 and plot pole-zone diagram. **[6]**

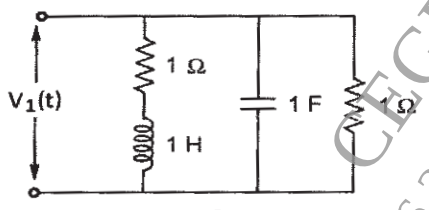

Fig. 9

OR

Q8) a) Define various network functions of a one-port network. **[5]**

b) Find the driving point impedance $Z_{11}(s)$ for the network shown in Fig. 10 **[6]**

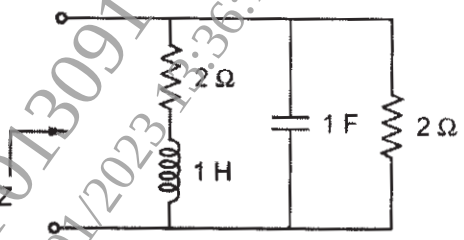

Fig. 10

c) The voltage V(s) in a network given by : **[6]**

$$V(s)=\frac{5(s+5)}{(s+2)(s+7)}$$

Plot poles and zeros in the plane and obtain time domain response of voltage.