Mark Scored:

KATHMANDU UNIVERSITY
End Semester Examination [C]
May/June, 2019

Level : B. E.
Year : II
Course : EEEG 213
Semester : I

Exam Roll No. :
Time: 30 mins.
F. M. : 20

Registration No. :
Date 31 MAY 2019

SECTION "A"
[20 Q × 1 = 20 marks]

Choose the most appropriate answer

1. The Inductor doesn't allow sudden changes in _____
   a. Voltage b. Current c. Resistance d. Inductance

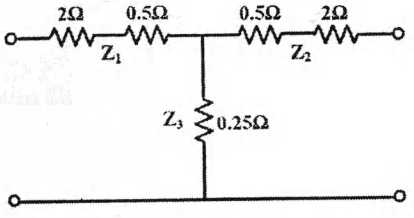
2. Time constant of an inductive circuit
   a. increases with increase of inductance and decrease of resistance
   b. increases with increase of inductance and increase of resistance
   c. increases with decrease of inductance and decrease of resistance
   d. increases with decrease of inductance and increase of resistance

3. The network function N(s) becomes _____ when s is equal to any of the zeros.
   a. 1 b. 2 c. 0 d. ∞

4. A network function can be completely specified by:
   a. Real parts of zeros
   b. Poles and zeros
   c. Real parts of poles
   d. Poles, zeros and a scale factor

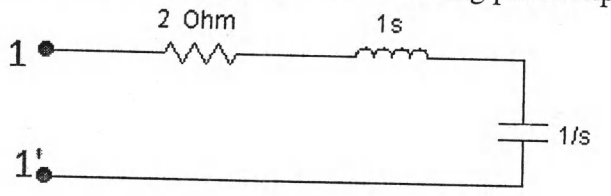
5. An ideal filter should have
   a. Zero attenuation in the pass band.
   b. Zero attenuation in the stop band.
   c. Infinite attenuation in the pass band.
   d. Finite attenuation in the stop band.

6. The impedance parameters Z_{11} and Z_{12} of the two-port network in the figure are



   a. $Z_{11} = 2.75\Omega$ *and* $Z_{12} = 0.25\ \Omega$
   b. $Z_{11} = 3\ \Omega$ *and* $Z_{12} = 0.5\Omega$
   c. $Z_{11} = 3\ \Omega$ *and* $Z_{12} = 0.25\Omega$
   d. $Z_{11} = 2.25\Omega$ *and* $Z_{12} = 0.5\ \Omega$

7. For the network shown in the figure, find the driving point impedance.



a. $(s^2-2s+1)/s$ b. $(s^2+2s+1)/s$ c. $(s^2-2s-1)/s$ d. $(s^2+2s-1)/s$

8. Which elements act as an independent variable in Z-parameters?
a. Current b. Voltage c. Both a and b d. None of the mentioned

9. The minimum amount of hardware required to make a lowpass filter is
a. a resistance, a capacitance and an opamp.
b. a resistance, an inductance and an opamp.
c. a resistance and a capacitance.
d. a resistance, a capacitance and an inductance.

10. Transfer admittance function is the ratio of Laplace transforms of _____
a. Current at one port to voltage at other port
b. Voltage at one port to current at other port
c. Current at one port to current at other port
d. Voltage at one point to voltage at other port

11. If the two ports are connected in cascade configuration, then which arithmetic operation should be performed between the individual transmission parameters in order to determine overall transmission parameters?
a. Addition b. Subtraction c. Multiplication d. Division

12. If a differential equation is said to be homogeneous, what would be the value of a forcing function?
a. 0 b. 1 c. ∞ d. -1

13. For a system to be stable
a. all poles and zeros of the transfer function must be in the right half of s-plane
b. all poles and zeros of the transfer function must be on the imaginary axis
c. all the poles of the transfer function must be in the left half of s-plane
d. all the zeros of the transfer function must be in the left half of s-plane

14. The general solution of the differential equation $\frac{d^2i}{dt^2} + 3\frac{di}{dt} + 2i = 0$ is
a. $i(t) = K_1e^{-t} + K_2e^{-2t}$ b. $i(t) = K_1e^{t} + K_2e^{2t}$
c. $i(t) = K_1e^{t} + K_2e^{-2t}$ d. $i(t) = K_1e^{-t} + K_1K_2e^{-2t}$

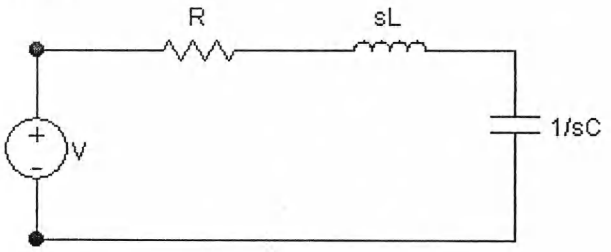
15. Find the Laplace transform of ramp function r (t) = t.
a. 1/s b. $1/s^2$ c. $1/s^3$ d. $1/s^4$

16. The resistance element _____ while going from the time domain to frequency domain.
a. does not change b. increases
c. decreases d. increases exponentially

17. The voltage and current in a capacitor are related as?
a. i=Cdt/dv b. v=Cdv/dt c. i=Cdv/dt d. v=Cdt/dv

18. If the poles or zeros are repeated, then the function is said to be having _____ poles or _____ zeros.
a. multiple, multiple b. simple, simple
c. multiple, simple d. simple, multiple

19. In the circuit shown below, if current is defined as the response signal of the circuit, then determine the transfer function.



a. $H(s)=C/(s^2 LC+RCs+1)$ b. $H(s)=sC/(s^2 LC-RCs+1)$
c. $H(s)=1/(s^2 LC+RCs+1)$ d. $H(s)=sC/(s^2 LC+RCs-1)$

20. The degree of the numerator polynomial and denominator polynomial in a driving point function in a PRF may differ by.....
a. 0 b. 1 c. 0 or 1 d. 2

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SECTION "B"

[5Q. × 11 = 55 marks]

Attempt *ANY FIVE* questions. Symbols and abbreviations have usual meanings. Assume suitable values for missing data.

1.

a. A dc voltage of 100V is applied to a series RC circuit at t =0, having R = 10 Ω and C 4 μF. Use Classical method to find the current through the capacitor $i_c(t)$ for t>0. Assume initial charge on the capacitor $q_c(0) = 800\ \mu C$. [5]

b. In the network shown in Figure. 1, the circuit was initially in the steady state condition with the switch S closed. Determine the value of current i(t) using Laplace Transform after the switch is opened. [4]

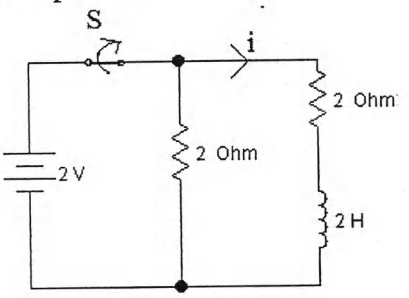

Figure 1

c. State initial and final value theorem. [2]

2.

a. An RL circuit shown in figure 2, with R= 5 Ohm and L=0.01 H, is connected to an ac voltage $v(t) = 100sin(500t + 30)$ volts at t=0. Find the equation for the current. Also, find the value of the circuit current at t=0.01 sec. [5]

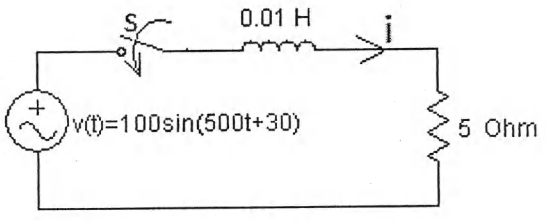

Figure 2

b. For the network shown below in figure 3, determine the voltage transfer ratio. [4]

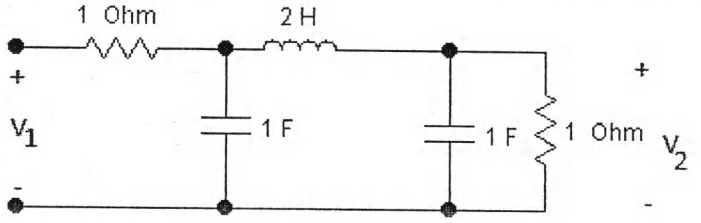

Figure 3

c. Define time constant. Write the time constant of RC, RL and RLC circuits. [2]

3.

a. The switch in circuit (figure 4) has been in position 1 for a very long time. It is moved to position 2 at t=0, find the voltage across the inductor for t>0. Use Laplace Transformation method. [6]

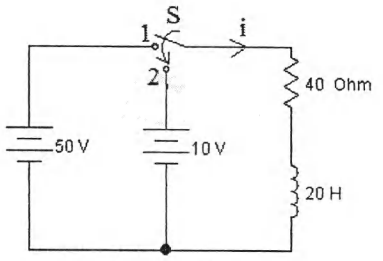

Figure 4

b. For the network shown in figure 5 below, determine the voltage response of the circuit when the switch is opened at t=0. [5]

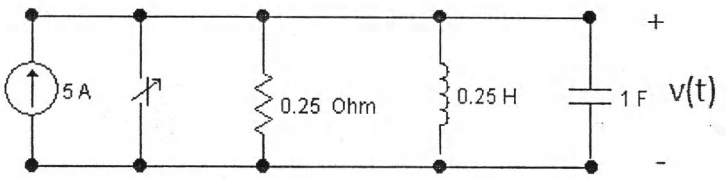

Figure 5

4.

a. In the circuit below (figure 6), switch is closed at t=0. Find the expression of current for t>0. [5]

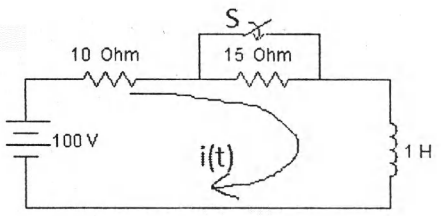

Figure 6

b. Draw the pole zero plot and obtain the time response for the following function. [4]

$$I(s)=\frac{4s}{(s+1)(s+3)}$$

c. Define transfer function. Differentiate poles and zeros of a transfer function. [2]

5.

a. The switch in the network below (figure 7) is opened at t=0. Determine v, dv/dt and d^2t/dt^2 at t=0+. [3]

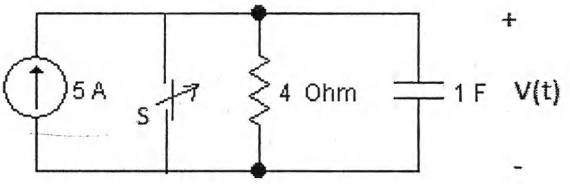

Figure 7

b. Sketch the bode diagram for the following transfer function. [5]

$$T(s)=\frac{1000(1+0.25s)(1+0.01s)}{(1+s)(1+0.025s)}$$

c. List the properties of a positive real function. [3]

6.

a. Find short circuit (y) parameters of the circuit shown in figure 8 below. [5]

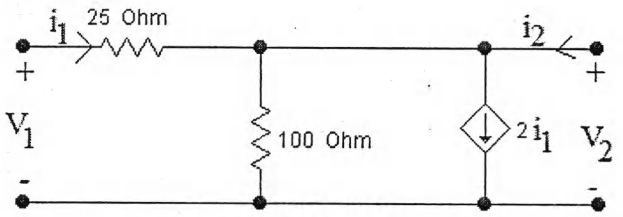

Figure 8

b. Examine the following network function and state whether it is positive real or not.

$$F(s)=\frac{s^3+4s^2+6s+10}{s^2(s+3)}$$

[4]

c. Find the transfer function of the first order RC high pass filter. [2]