

KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2019

Mark Scored:

Level : B. E.
Year : II

Course : EEG 213
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No. :

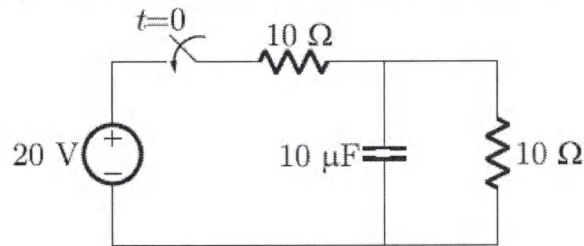
Date

05 MAR 2019

SECTION "A"
[20 Q × 1 = 20 marks]

Choose the most appropriate answer:

- An RC circuit has $R = 2 \Omega$ and $C = 4 F$. The time constant is:
a. 0.5 s b. 2 s c. 0.125 s d. 8 s
- In the figure given, the initial capacitor voltage is zero. The switch is closed at $t=0$. The final steady state voltage across the capacitor is.....



- 20 V b. 10 V c. 5 V d. 0 V
- A unit step voltage is applied at $t = 0$ to a series RL circuit with zero initial conditions.
a. It is possible for the current to be oscillatory
b. The voltage across the resistor at $t = 0+$ is zero
c. The energy stored in the inductor in the steady state is zero
d. The resistor current eventually falls to zero
- A DC voltage source is connected across a series R-L-C circuit. Under steady state conditions, the applied DC voltage drops entirely across the.....
a. R only b. L only c. C only d. R and L combination
- If the roots of an equation are real and unequal, then the response will be.....
a. critically damped b. under damped
c. over damped d. damped
- In a series RLC circuit.....
a. increasing the frequency decreases the resistance.
b. increasing the frequency increases the resistance.
c. both X_L and X_C change as frequency changes
d. total impedance always remains same regardless of the change in frequency.
- Considering that $s = j\omega$, if $F(s)$ is a positive-real function, then $Ev\{F(s)\}$
a. must have a single zero for some value of ω .
b. must have a double zero for some value of ω .
c. must not have a zero for any value of ω .
d. may have any number of zeros at any values of ω but $Ev\{F(s)\} \geq 0$ for all ω .

05 MAR 2019

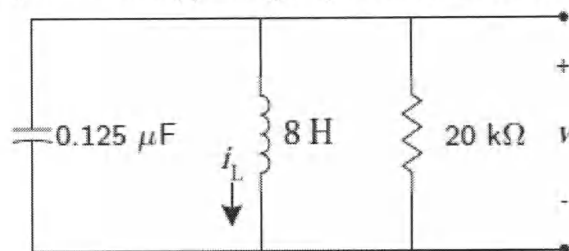
Level : B. E.
 Year : II
 Time : 2 hrs. 30 mins.

Course : EEG 213
 Semester : I
 F. M. : 55

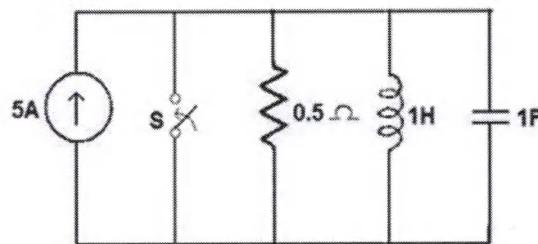
SECTION "B"

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

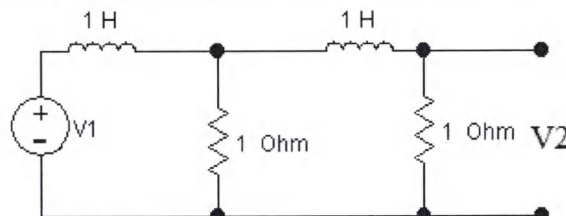
1. a. A series R-C circuit with $R=10$ ohms and $C= 2F$ has a sinusoidal voltage source $200 \sin 500t$. Find the expression for current through the circuit. [5]
- b. In the following figure, $v(0) = 0V$ and the current through the inductor is $i_L(0^-) = -12.25 mA$, solve for $v(t)$ using Laplace transformation method. [4]



- c. Discuss the advantages of Laplace transformation method over classical method. [2]
2. a. For the circuit shown below, the switch is initially closed. Find the voltage across the 0.5Ω resistor if the switch S is opened at $t=0$. Assume that there is no charge on the capacitor and no current in the inductor before switching. [5]

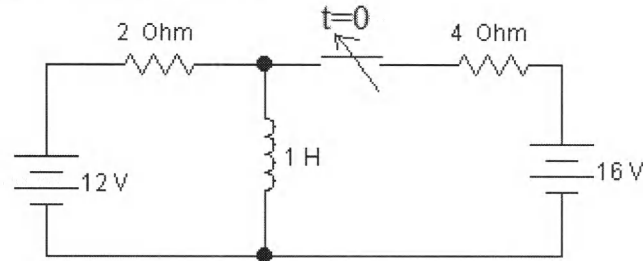


- b. For the network shown below, determine the transfer function V_2/V_1 . [4]

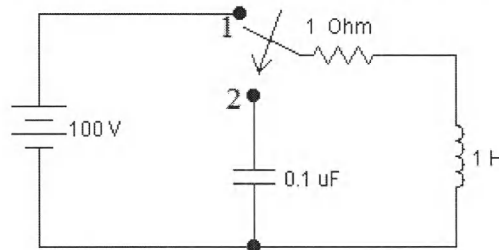


- c. Discuss the steady and transient response of the circuit with an example. [2]

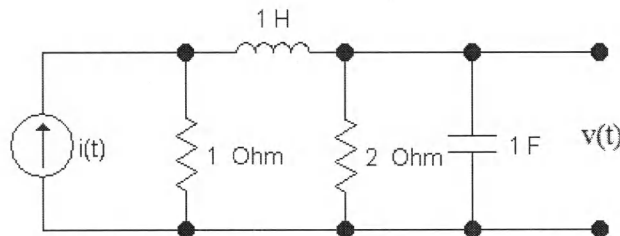
3. a. A DC source of 1V is suddenly applied to a series R-L-C circuit with $R=2\Omega$, $L = 1H$ and $C = \frac{1}{2} F$. Sketch the current response $i(t)$ in the circuit. [6]
- b. In the circuit shown below, the switch is opened at $t = 0$. If $i(t)$ represents the current through the 2Ω resistor, find $i(t)$ for $t > 0$. [5]



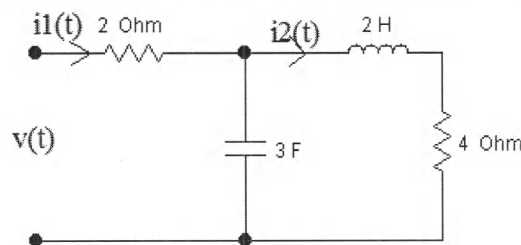
4. a. In the circuit below $i(t)$ represents the current through the $1 H$ inductor. If the switch is changed from position 1 to 2 at $t=0$. Find i , di/dt and d^2i/dt^2 at $t=0+$. [5]



- b. Find the differential equation relating $v(t)$ and $i(t)$ in the network shown below. [4]



- c. Define operational impedance and differential operator. [2]
5. a. Determine the driving point impedance $Z(s)$ for the network shown below. [3]

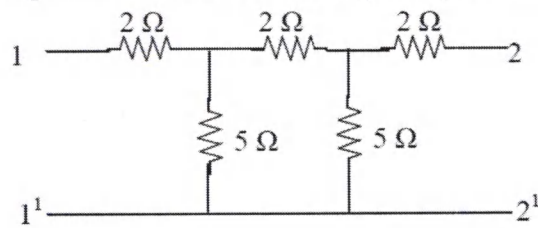


- b. Sketch the bode diagram for the following transfer function. [5]

$$T(s) = \frac{5000(s+10)}{(s+1)(s+500)}$$

- c. Design a passive low pass filter having cut off frequency $\omega = 1000 \text{ rad/sec}$. [3]

6. a. Find the Z and Y parameters of the following two port resistive network. [5]



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

$$F(s) = \frac{2s + 5}{s^2 + 5s + 6} \quad [4]$$

- c. What is a high pass filter? In what respects does it differ from a low pass filter? [2]

