

**B. Tech. Sem – III (Biomedical Engg.) (2014 COURSE) (CBCS) :
SUMMER - 2019**

SUBJECT: CIRCUIT THEORY

Day : Tuesday
Date : 14/05/2019

S-2019-2586

Time : 02.30 PM TO 05.30 PM
Max. Marks: 60.

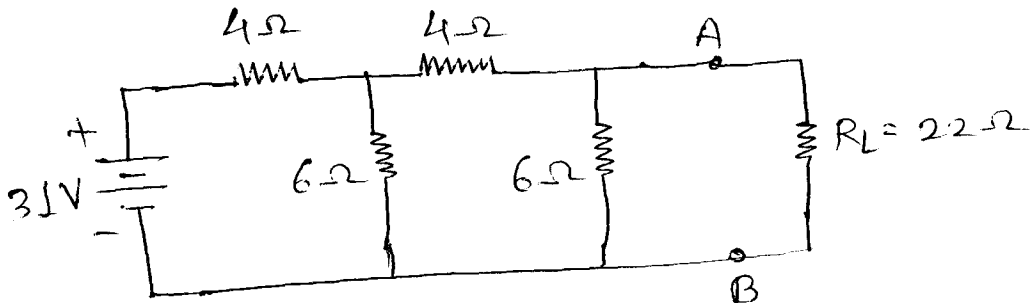
N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate full marks.
- 3) Draw neat labeled diagrams **WHEREVER** necessary.

Q.1 State and explain superposition and reciprocity theorem. (10)

OR

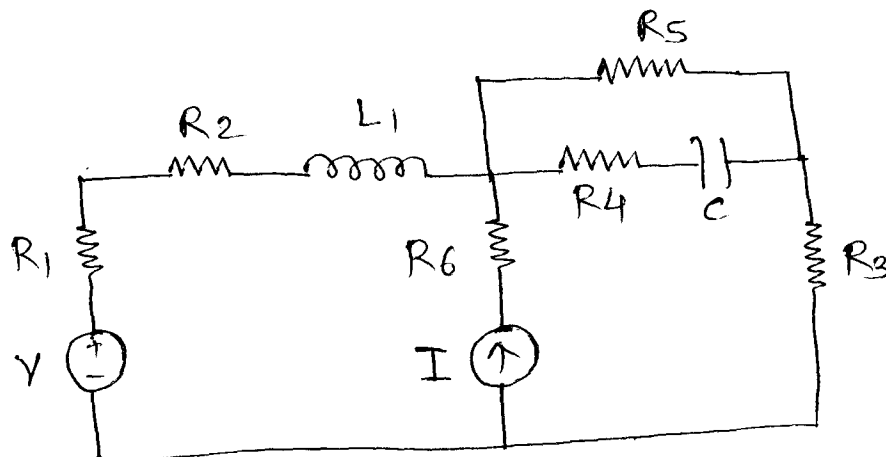
Applying Thevenin's theorem, find the current flowing through the load resistance $22\ \Omega$ in the given circuit. (10)



Q.2 Explain the principle of duality with suitable example. Write down the steps involved in constructing the dual of a network. (10)

OR

For the circuit shown in the figure, draw the oriented graph and write the (a) incidence matrix, (b) tieset matrix and (c) f-cutset matrix. (10)

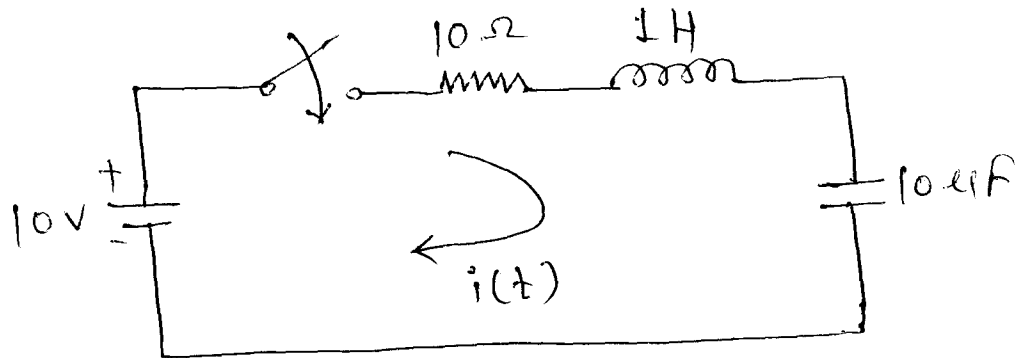


Q.3 Derive the expressions for driven and undriven RC circuit. (10)

OR

P.T.O.

In the network shown in the figure, the switch is closed. Assuming all initial conditions as zero, find i , $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t=0^+$. (10)



- Q.4** For the parallel resonant circuit derive the following expressions. (10)
- Resonant frequency
 - Q factor
 - Parallel resonant circuit as current amplifier

OR

Find the resonance frequency of a series RLC circuit where $R = 2.5\Omega$, $L = 25\text{mH}$ and $C = 50\ \mu\text{F}$. Evaluate the Q factor also. (10)

- Q.5** a) Explain the working of constant-k low pass filter with impedance curves and derive the expression for cut-off frequency. (06)
- b) What are the disadvantages of prototype filters? (04)

OR

Design constant-k high pass filter T and π section having $f_c = 5\text{kHz}$ and nominal characteristic impedance, $R_0 = 600\Omega$. (10)

- Q.6** What are transmission parameters? Write the equations for transmission parameters. Derive these parameters in terms of Z-parameter and H-parameters. (10)

OR

Find the Y parameters for the network shown in the figure. (10)

