Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

THIRD SEMESTER B.TECH. (E & C) DEGREE END SEMESTER EXAMINATION
DECEMBER 2018/JANUARY 2019
SUBJECT: NETWORK ANALYSIS (ECE -2103)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates

- Answer **ALL** questions.
- Missing data may be suitably assumed.
- Do not use **Laplace Transforms** unless specified.

1A. In the network shown in Figure 1A, find the current through 10Ω resistor using Norton's theorem.

1B. Write the loop equations for the coupled network shown in Figure 1B.

1C. Find an equivalent resistance between A and B in the network Figure 1C.

(4+3+3)

2A. For the circuit shown in Figure 2A, the switch is closed at t=0. Find

a) $i_1(0^+)\ and\ i_2(0^+)$

b) $\frac{di_1(0^+)}{dt}$ and $\frac{di_2(0^+)}{dt}$

c) $i_1(\infty)\ and\ i_2(\infty)$

2B. In the network shown in Figure 2B, the switch is moved from position 1 to 2 at t = 0, after reaching the steady state. Determine the expression for current $i(t)$.

2C. In the network shown in Figure 2C, the switch is closed at t = 0. Determine $v(t)$, assuming $v_c(0) = 0.5V$.

(4+3+3)

3A. A symmetrical square wave whose average value is zero has a peak-to-peak amplitude of 20V and a period of 2μs. This waveform is applied to a low pass RC circuit whose upper 3dB frequency is $\frac{1}{2\pi}MHz$. Calculate and sketch the steady state output waveform. What is the peak-to-peak output amplitude?

3B. A limited ramp shown in Figure 3B is applied to an RC differentiating circuit. Draw to scale the output waveform for the following cases:
(i) T = RC (ii) T = 0.2 RC (ii) T = 5 RC

3C. With the help of circuit and relevant expressions explain how high pass RC circuit can be used as a differentiator.

(4+3+3)

4A. A series *RC* circuit, with R = 10 Ω and C = 4 μF, has an initial charge Q_0 = 800 μC on the capacitor at the time the switch is closed, which results in applying a constant-voltage source V = 100 V. Find the resulting current transient if (i) Q_0 is of the same polarity, and (ii) Q_0 is of the opposite polarity. Use **Laplace Transform.**

4B. In the series RLC circuit shown in Figure 4B, there is no initial charge on the capacitor. If the switch is closed at t = 0, determine the resulting current using **Laplace Transform**.

4C. Find y(t), if $Y(s) = \frac{s-1}{s^2+4s+20}$

(4+3+3)

5A. Find the open circuit impedance parameters for the network shown in Figure 5A.

5B. For the network shown in Figure 5B, find $Z_{11,}(s)\ and\ \ G_{12}(s)$.

5C. Express z parameters in terms of ABCD parameters.

(4+3+3)

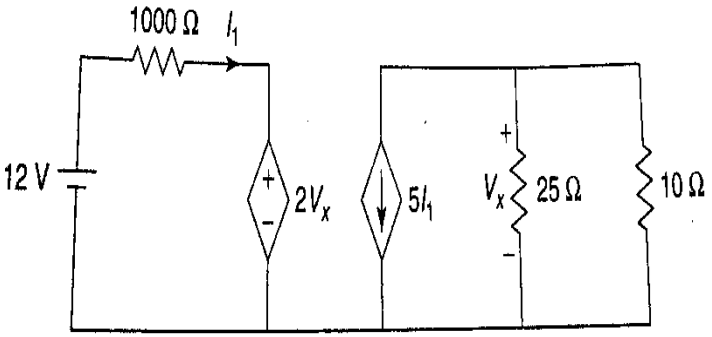

Figure. 1A

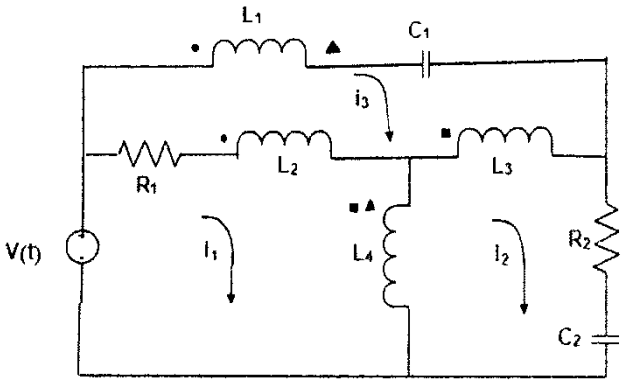

Figure. 1B

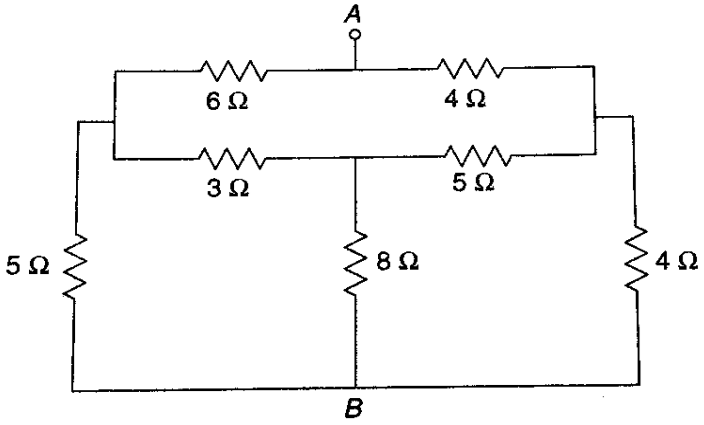

Figure. 1C

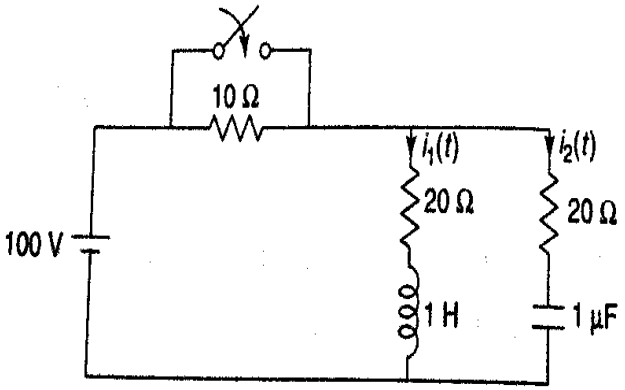

Figure. 2A

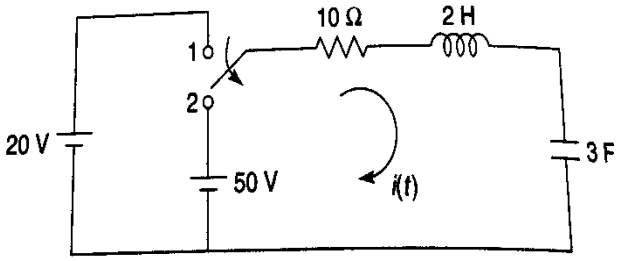

Figure. 2B

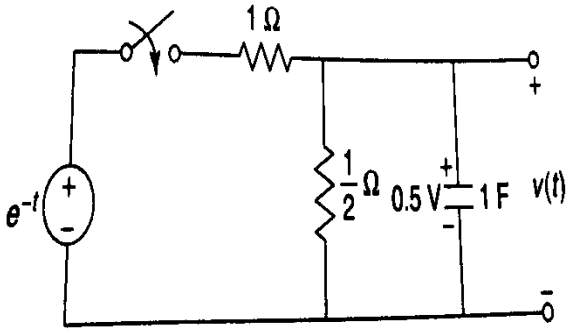

Figure. 2C

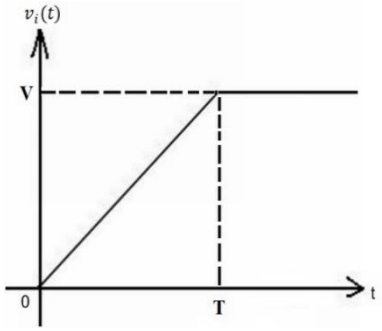

Figure. 3B

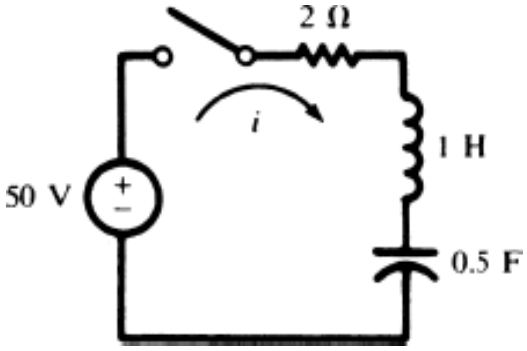

Figure. 4B

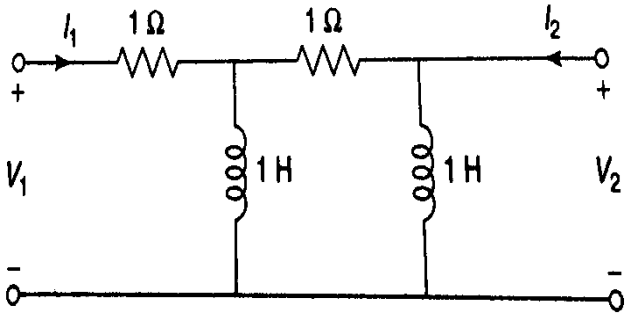

Figure. 5A

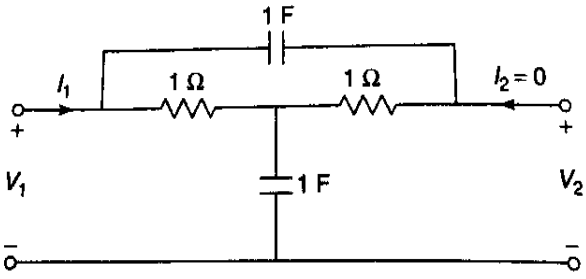

Figure. 5B