Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

THIRD SEMESTER B.TECH (E & C) DEGREE END SEMESTER EXAMINATION - NOV/DEC 2016

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 Transform** unless specified.

1A. In the circuit shown in Fig. Q1A find the power delivered by 4V source and voltage across 2Ω resistor.

1B. For the circuit shown in Fig. Q1B, find voltage V_1 using superposition principle.

1C. Write KVL equations for the circuit shown in Fig. Q1C.

(5+3+2)

2A. In the circuit shown in Fig. Q2A, steady state is reached when switch S is open. At t=0 switch is closed. Find $V_c(0^-)$, $i_1(0^+)$, $i_2(0^+)$, $di_1/dt(0+)$, $di_2/dt(0+)$.

2B. In the network of the Fig. Q2B, the switch K is closed at t = 0 with the capacitor initially uncharged. For the numerical values given, find the general solution for i(t).

2C. Find the particular solution for the following homogeneous differential equation:

$\frac{d^2i}{dt^2} + 7\frac{di}{dt} + 12i = 0$, subject to the initial conditions: $i(0^+) = 2, \frac{di(0^+)}{dt} = 1$.

(5+3+2)

3A. A symmetrical square wave is applied to a high-pass RC circuit having R = 20 kΩ and C = 0.05 μF.

(i) If the frequency of the input signal is 1 kHz and the signal swings between ±5V, draw the output waveform and indicate the voltage levels.

(ii) What happens if the frequency of the signal is reduced to 100 Hz? Draw the output waveform.

3B. A limited ramp shown in the Fig. Q3B is applied to a low-pass RC circuit. Plot the output waveforms when (i) T = τ (ii) T = 0.3 τ (iii) T = 6 τ.

3C. Prove that, if a square wave signal is applied to the low-pass RC circuit, the average value of the output signal is same as that of the input.

(5+3+2)

4A. In the circuit shown in Fig. Q4A, switch 1 is closed at t = 0 and then, at t = t'= 6ms, switch 2 is opened. Find the current i(t) in the intervals 0 < t < t' and t > t' using Laplace Transform.

4B. For the network shown in Fig. Q4B, find i_1 *and* i_2, using Laplace Transform, when the switch is closed.

4C. Write the equation for v(t) and find V(S) for the waveform shown in Fig. Q4C.

(5+3+2)

5A. For the network shown in Fig. Q5A, determine the y parameters.

5B. Show that the overall transmission parameter matrix for cascaded two port network is the matrix product of the transmission matrices for each of the two port networks in cascade.

5C. The network N of Fig. Q5C is terminated at port 2 in impedance $Z_L = \frac{1}{Y_L}$. Show that the transfer impedance for the combination is

$$Z_{12} = \frac{z_{21} Z_L}{z_{22} + Z_L}$$

(5+3+2)

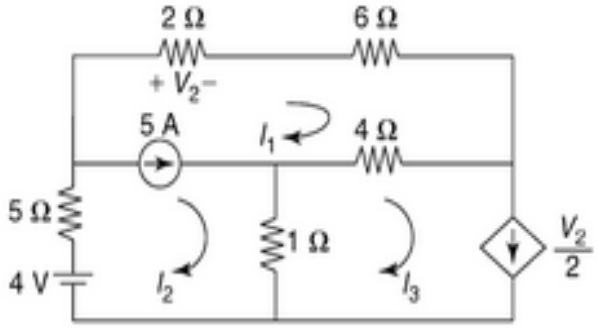

Fig. Q1A

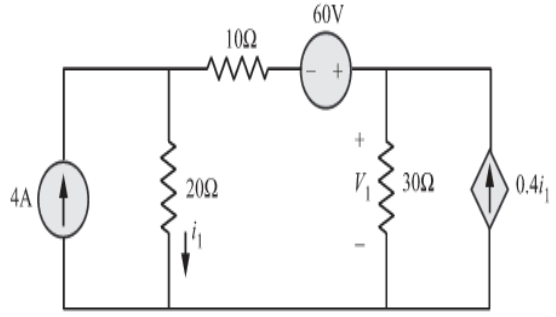

Fig. Q1B

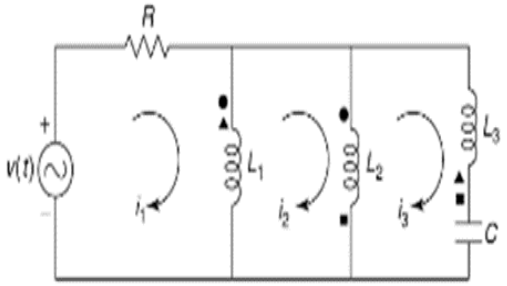

Fig. Q1C

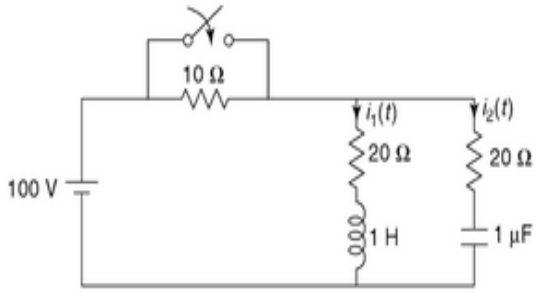

Fig. Q2A

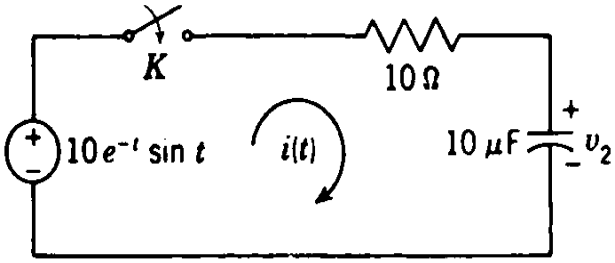

Fig. Q2B

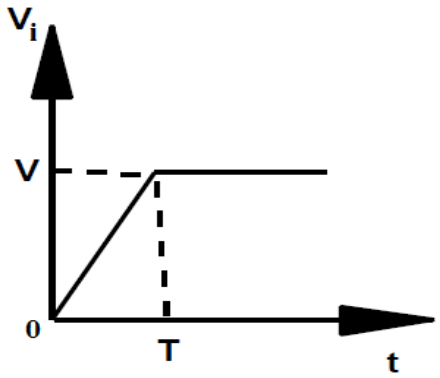

Fig. Q3B

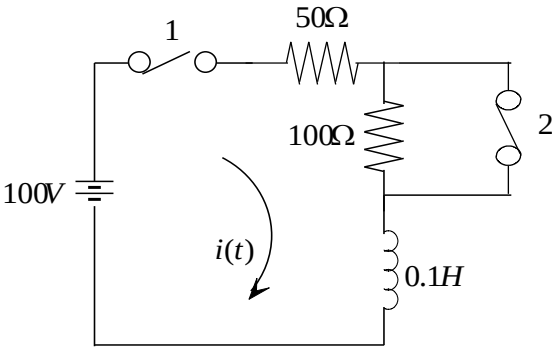

Fig. Q4A

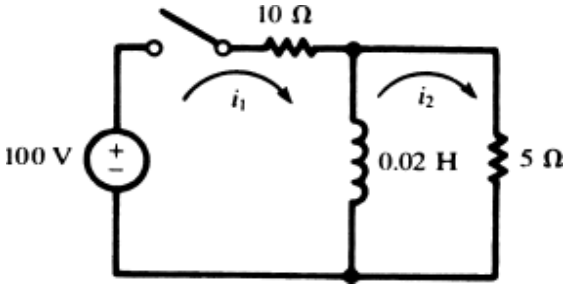

Fig. Q4B

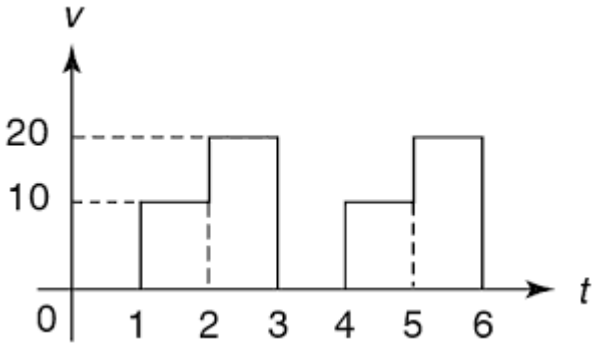

Fig. Q4C

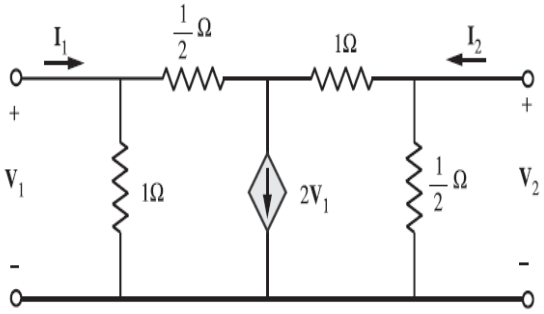

Fig. Q5A

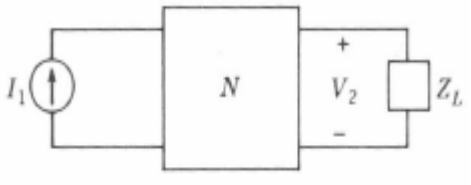

Fig. Q5C