Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

THIRD SEMESTER B.Tech. (E & C) DEGREE END SEMESTER EXAMINATION
NOV 2017
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. For the circuit shown in Fig.Q1A, the variable resistor R_L is adjusted until it absorbs maximum power from the circuit.
(i) Find the value of R_L for maximum power transfer.

(ii) Find the maximum power that can be delivered to the load R_L.

1B. For the circuit shown in Fig.Q1B, find current I using superposition principle.

1C. Determine V_1 and V_2 for the circuit shown in Fig. Q1C using nodal analysis.

(5+3+2)

2A. In the network shown in Fig.Q2A, the steady state is reached with switch open. At t = 0, switch is closed. Calculate the three loop currents at $t = 0^+$.

2B. The network of the Fig.Q2B reaches a steady state when the switch is closed. The switch is opened at $t = 0$. Solve for $i(t)$.

2C. In the network shown in Fig.Q2C, $V_1 = e^{-t}$ for $t \geq 0$ and is zero for all $t < 0$. If the capacitor is initially uncharged, $R1 = 10\Omega$, $R2 = 20\Omega$ and $C = \frac{1}{20}F$, calculate $V_2(t)$.

(5+3+2)

3A. A square wave whose peak-to-peak amplitude is 2V extends ±1V with respect to ground. The duration of the positive section is 0.1s and that of negative section is 0.2s. If this waveform is impressed upon an RC circuit, which has lower 3-dB frequency 1/π Hz, calculate the steady state maximum and minimum values of the output and sketch to the scale.

3B. The limited ramp shown in Fig.Q3B is applied to a low pass RC circuit. Draw to scale the output waveform for the cases: (a) T = RC (b) T = 0.2 RC (c) T = 5 RC

3C. A 10V step is switched on to a 50kΩ resistor in series with 500pF capacitor. Calculate the rise time of the capacitor voltage, the time for the capacitor to charge to 63.2% of its maximum voltage and the time required for the capacitor to be completely charged.

(5+3+2)

4A. In the two-mesh network of Fig.Q4A, the switch is closed at t = 0, determine the resulting current using Laplace Transform.

4B. In the *RL* circuit shown in Fig.Q4B, the switch is in position *1* long enough to establish steady-state conditions, and at *t* = 0 it is switched to position *2*. Calculate the resulting current using Laplace Transform.

4C. Write the equation for $f_2(t)$ and find $F_2(S)$ for the waveform shown in Fig.Q4C.

(5+3+2)

5A. For the network shown in Fig.Q5A, calculate z and y parameters.

5B. For the resistive two port network of Fig.Q5B, determine Z_{12}, G_{12} and α_{12}.

5C. Derive the expressions for z parameters in terms of ABCD parameters.

(5+3+2)

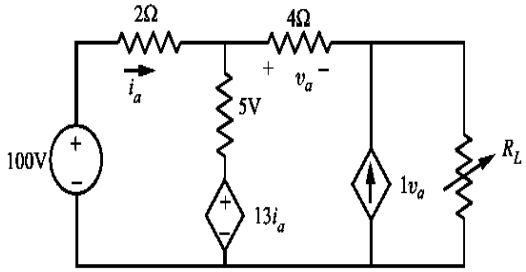

Fig.Q1A

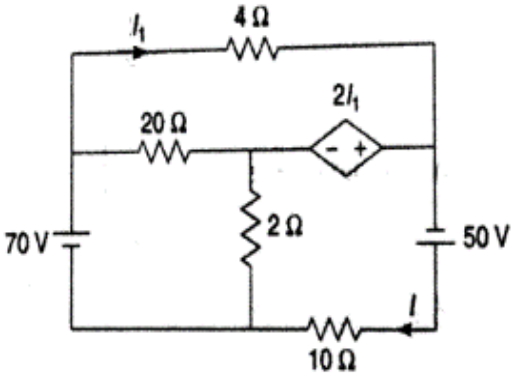

Fig.Q1B

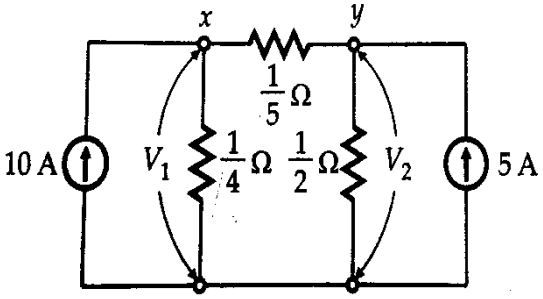

Fig.Q1C

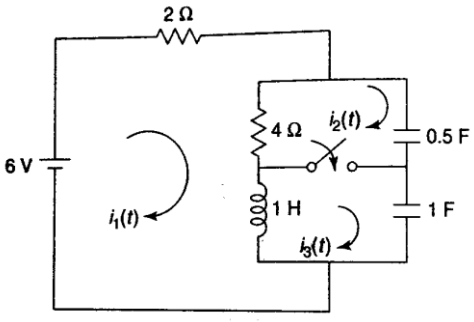

Fig.Q2A

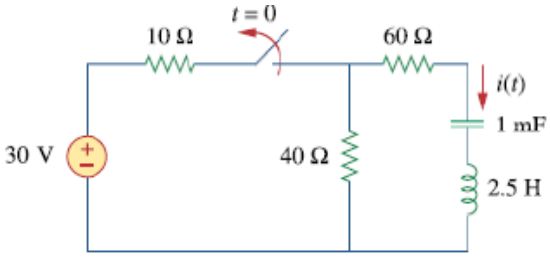

Fig.Q2B

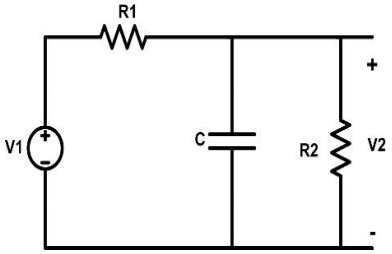

Fig.Q2C

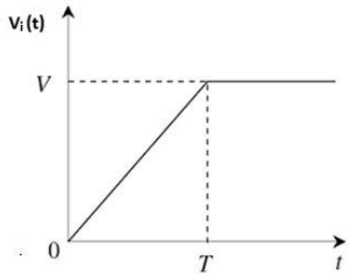

Fig.Q3B

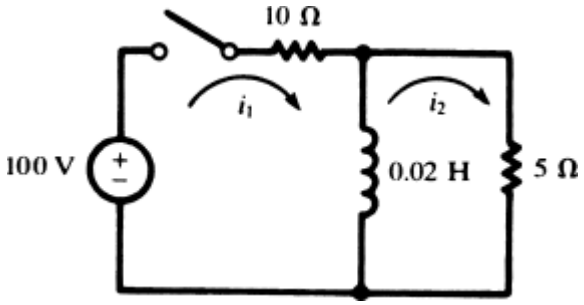

Fig.Q4A

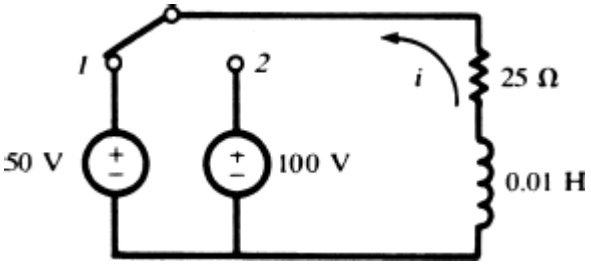

Fig.Q4B

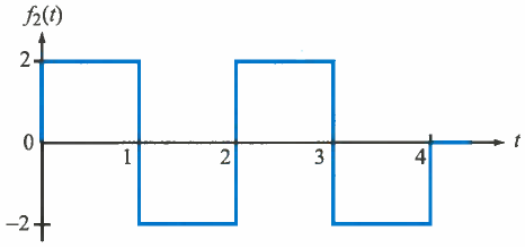

Fig.Q4C

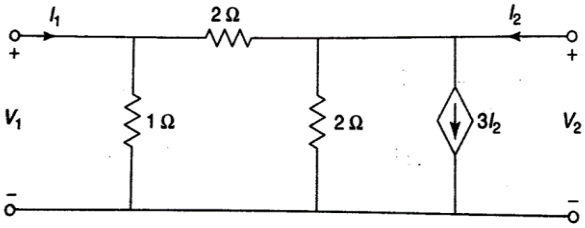

Fig.Q5A

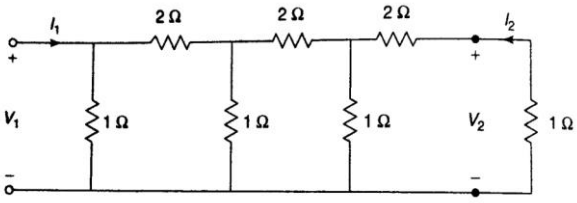

Fig.Q5B