Indraprastha Institute of Information Technology, Delhi

Mid Term Examination

ECE 113 Basic Electronics

Date: 11.6.2022 Maximum Marks: 40 Time: 10.00 – 11.00 am

Answer any three questions from Q1. to Q4.

Question 5 and 6 are compulsory.

Q1. Find the current in the 10 Ω resistance in the circuit shown in Fig.1. [5 Marks]

Q2. Use the Principles of Superposition to find the current in 2 Ω resistance connected between A and B in circuit shown in Fig. 2.

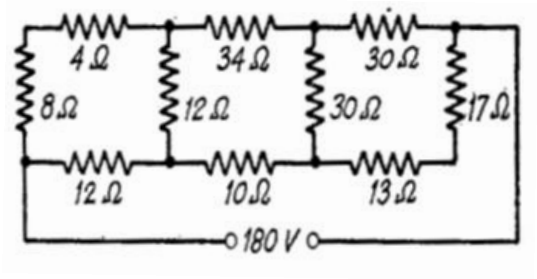

Figure 1

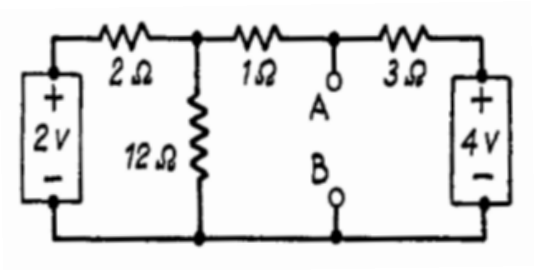

Figure 2

[5 Marks]

Q3. Determine the (a) current given by 120 V battery (b) potential difference across RS and (c) magnitude and direction of current in PR for the circuit shown in Fig. 3. [5 Marks]

Q4. What is the difference in potential between the points X and Y, in the circuit shown in Fig, 4.

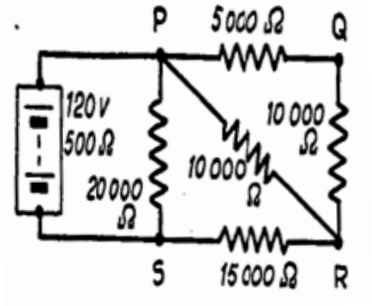

Figure 3.

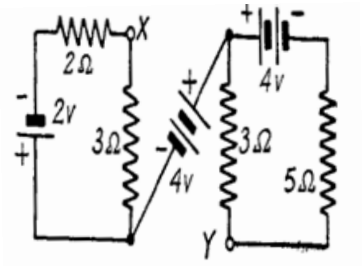

Figure 4.

[5 Marks]

Q5. State whether the following statements are TRUE or FALSE. Give appropriate justification for your answer in brief.

I. In Fig. 5(a), the switch has been in position A for a long time. If the switch is moved suddenly from A to B at t = 0, the current flowing through the resistance 2 K ohm at time t = 20 ms will be equal to 10 mA.

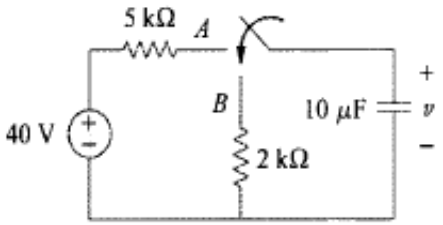

Figure 5(a)

II. A DC voltage of 200 V is suddenly applied across a series circuit consisting of resistance 10 ohm in series with an inductance of 0.1 H. The voltage across the inductance just after the application of voltage is equal to 0 V and current at 0.01 s is also 0 A.

III. Transient disturbance is produced in a circuit only when its applied voltage or applied current are suddenly changed.

IV. There are no transients in a circuit consisting of only resistance because the circuit obeys Ohm's law

V. The time constant associated with the circuit in Fig. 5(b) is 4 s.

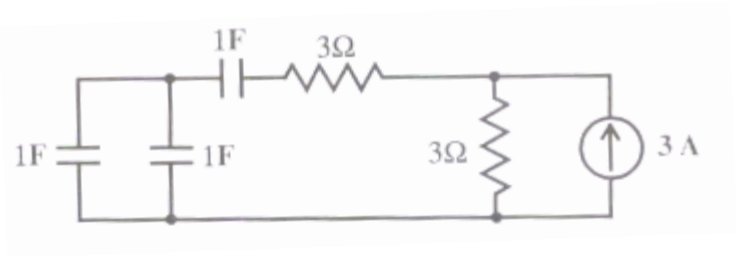

Figure 5(b)

[5 X (1+3) = 20 Marks]

Q6. A student is given an unknown resistive network as illustrated in Figure 6(a). She/he wishes to determine whether the network is linear, and if it is, what its Thévenin equivalent circuit is.

The only equipment available to the student is a voltmeter (assumed ideal), 100-k Ω and 1-M Ω test resistors that can be placed across the terminals during a measurement as in Figure 6(b).

The following data were recorded:

Test Resistor	Voltmeter Reading
Absent	1.5 V
100 k Ω	0.25 V
1 M Ω	1.0 V

What should the student conclude about the network from these results? Support your conclusion with plots of the network *v i* characteristics.

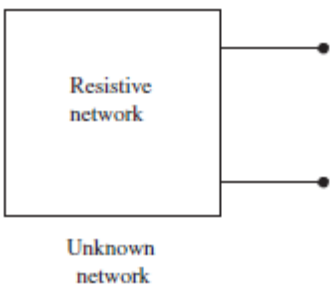

Figure 6(a)

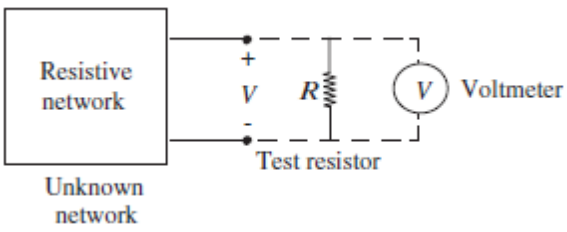

Figure 6(b)

[5 Marks]