LAHORE UNIVERSITY OF MANAGEMENT SCIENCES
Department of Electrical Engineering

EE240 Circuits I
Quiz 02 Solutions

Name: _____

Campus ID: _____

Total Marks: 10
Time Duration: 20 minutes

Question 1 (3 marks)

Do you agree with the following statements? Provide brief justification to support your answer.

(a) [1 mark] Ideal current sources cannot be connected in series.

Solution: Yes, except for the case when the current of the sources is same.

(b) [1 mark] Ideal voltage source and ideal current source in series is equivalent to the ideal current source only.

Solution: Yes! The current source ensures the same amount of current irrespective of the amount of voltage across current source.

(c) [1 mark] Practical voltage source can be modeled as an ideal voltage source with very small resistance in parallel.

Solution: No! Practical voltage source can be modeled as an ideal voltage source with very small resistance in **series**.

Question 2 (2 marks)

We can model a practical current source using an ideal current source and a resistance.

(a) [1 mark] Draw such model of the practical current source.

Solution: Practical voltage source can be modeled as an ideal voltage source with very small resistance in **series**.

(b) [1 mark] Write down an equation describing i-v characteristics of the practical current source. Sketch i-v characteristics of the the practical current source.

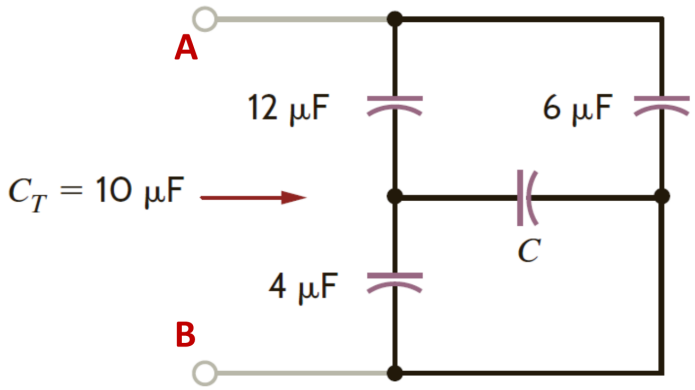
Solution: If V_o and r_s denote the voltage of the source and resistible respectively, the voltage $v(t)$ and current $i(t)$ at the output are related as

$$v(t) = V_o - i(t)\, r_s$$

Solution:

Question 3 (5 marks)

Consider a network of capacitors shown below. If the equivalent capacitance across terminals A and B is $C_T = 10\,\mu F$, find the value of capacitance C indicated in the network. Ignore the polarity of the capacitors.



Solution: We have 4μ and C are in parallel and their parallel combination is in series with 12μ, that is, $(4+C)12\mu/(4+C+12)$. Let $C_1 = (4+C)12\mu/(4+C+12)$. This equivalent capacitor C_1 is in parallel with 6μ and therefore $6 + C_1 = 10\mu$, which implies $C_1 = 4\mu\,\mathrm{F}$ and $C = 2\mu\,\mathrm{F}$.