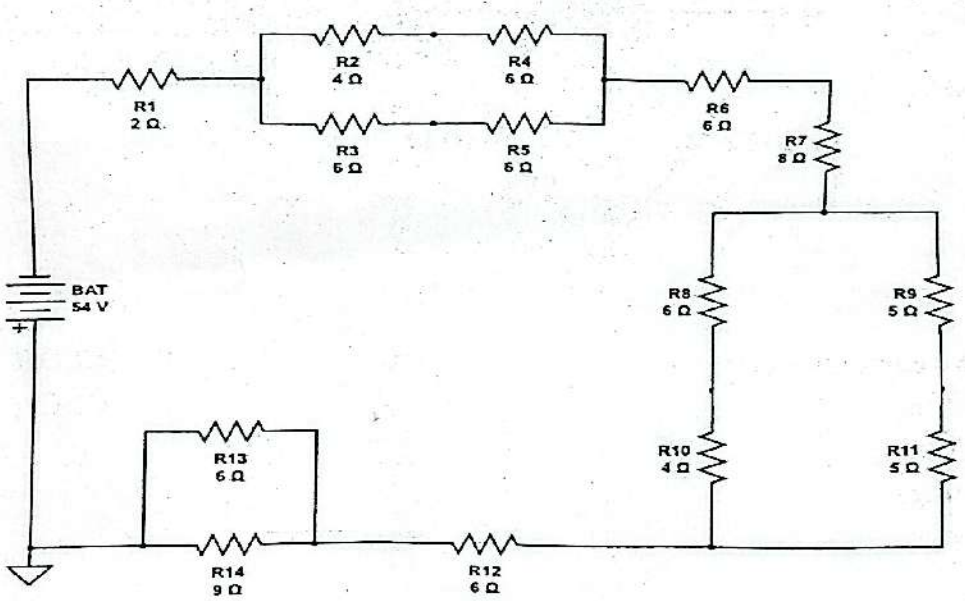
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Daffodil International University

Department of Textile Engineering (TE)
Faculty of Engineering
Mid Examination, Spring-2026

Course Code: 0713-221 **Course Title: Basic Electrical and Electronic Engineering**
Level & Term: L2T2 **Full Marks: 25, Time: 1.5 hours**
(Ans any 5 set of Questions)

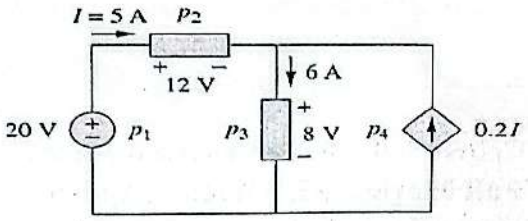
1. **a.** Explain **passive sign convention** with appropriate diagram. [CLO-2, C2,C3] [2+3]
b. Calculate the **equivalent resistance** of the circuit:



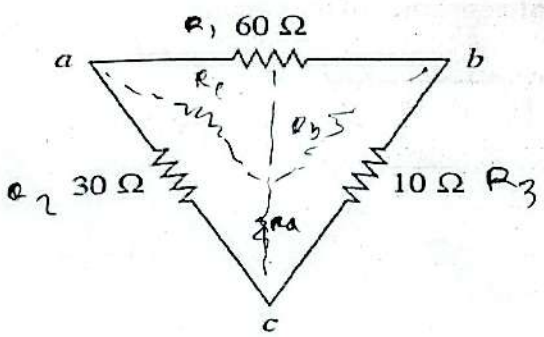
2. **a.** Determine the **total charge** entering a terminal in between t=1s to t=5s ; if current, $i = (10t^4 - 3t^2)$ A [CLO-2, C5,C5, C2] [2+2+1]
b. Determine the **total current** entering a terminal at t 0.2s; if total charge, $q = 15t^2\sin 4\pi t$ mC
c. Explain why it is said that '**Electric current is always through an element and electric voltage is always across the element**'

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3. **a.** State the **law of conversion of energy.** **[CLO-2, C2, C3]** **[1+4]**
b. From the following circuit **prove that** it obeys the law of conversion of energy.



4. **a.** Discuss different types of **dependent sources** with proper symbols. **[CLO-1, CLO-2, C1, C2]** **[2+3]**
b. Convert the delta network to an **equivalent ywe** network



5. **At a node, five currents meet:** **[CLO-2, C1,C2]** **[2+3]**
$i_1 = 2x$ (entering)
$i_2 = x + 5$ (leaving)
$i_3 = 6$ (entering)
$i_4 = x + 7$ (leaving)
$i_5 = 6$ (direction unknown)
a. Determine the **direction of i_5** (entering or leaving) with reasoning.
b. ***"KCL was useless in this problem because it could not find x."*** Write a precise counter-argument — what specific and valuable information did KCL actually provide in this problem?

6. **A closed loop contains only these elements:** **[CLO-2, C3,C2]** **[2+3]**
V = 60 V (single voltage source, rising)
$R_1 = 3x + 2$ (voltage drop)
$R_2 = 2x - 1$ (voltage drop)
$R_3 = x + 5$ (voltage drop)
$R_4 = 4x - 3$ (voltage drop)
Loop current i = 3 A
a. Calculate the **voltage drop across each resistor.**
b. Suppose the **polarity of R_4 is reversed** in the loop. Will the loop current still be 3A? Explain using KVL.