Total number of printed pages: **4** **Programme (D)/3rd Semester/Paper Code: DIE301**

2023

ELECTRICAL CIRCUITS AND NETWORKS

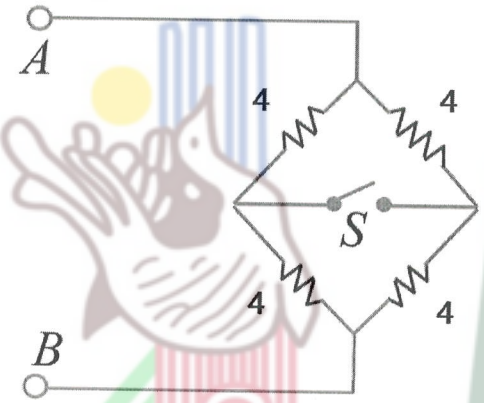
Full Marks : 100

Time : Three hours

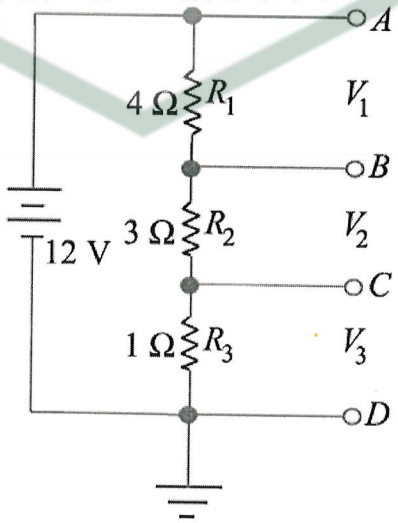
The figures in the margin indicate full marks for the questions.

Answer ***any five*** *questions.*

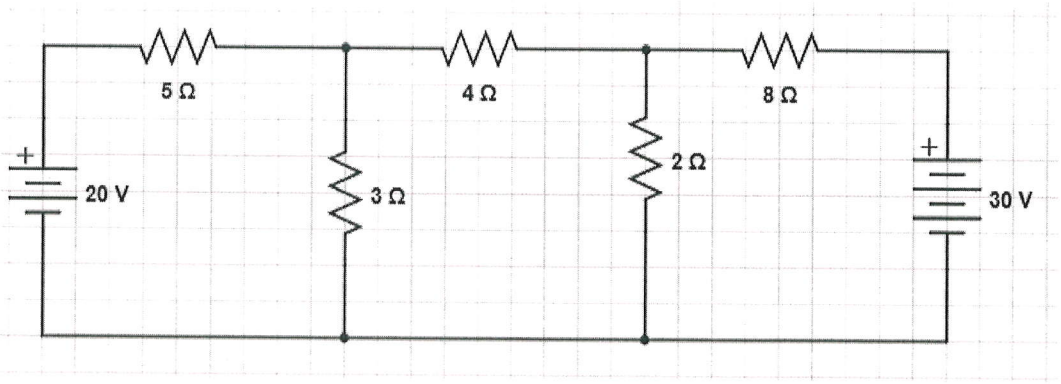
1. a) In the circuit below, find the resistance between terminals A and B when switch is: (a) open and (b) closed. 2+2



b) Find the values of different voltages (V1, V2 and V3) with the help of voltage divider rule. 4



c) 10

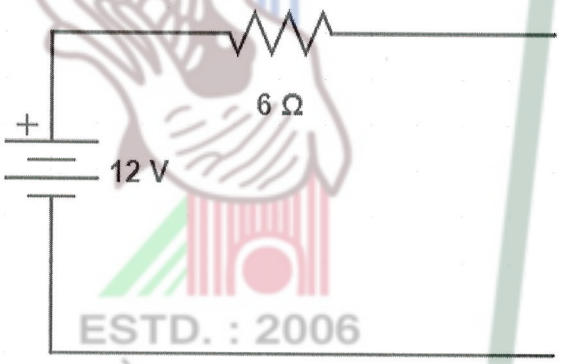


Find the current flowing through the 4Ω resistance using Maxwell's Loop Current Method.

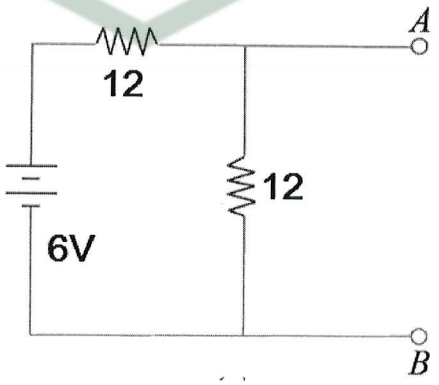
d) State the Ohm's Law. 2

2. a) Using Node voltage method, find the current in the 4Ω resistance for the network shown in Question No. 1(c). 10

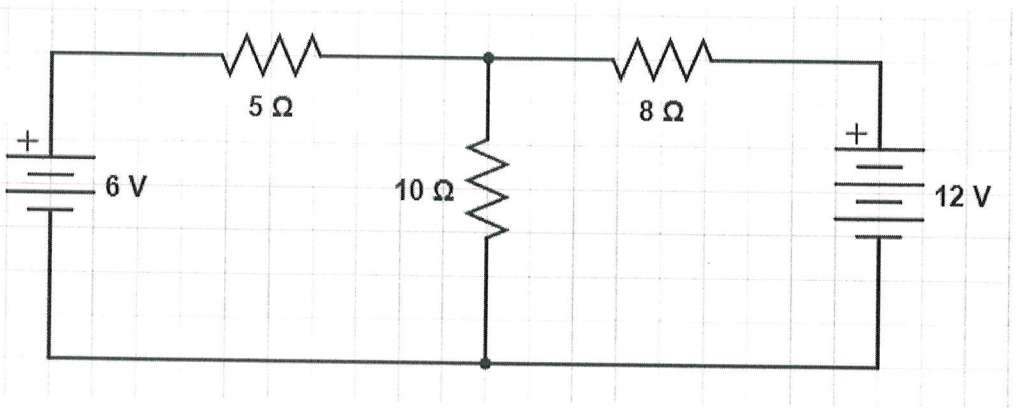
b) Convert the voltage source of Fig below into an equivalent current source. 5



c) Determine the Norton equivalent circuits between terminals A and B for the circuit below. 5



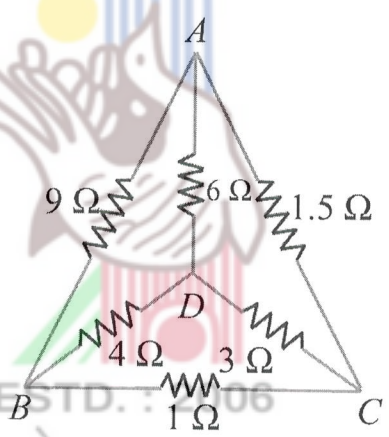
3. a) 10



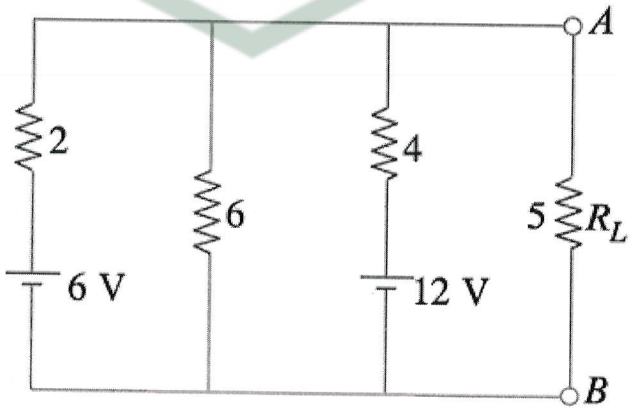
By using Superposition Theorem, find the current in resistance 10 Ω shown in Figure above.

b) Apply Thevenin's theorem to calculate the current through the 10 Ω resistor of the circuit given in Question No. 3(a) 10

4. a) Using star to delta conversion, compute the network resistance measured between terminals A and B. 10



b) Use Millman's theorem, to find the current flowing through the 5 Ω load resistance R_L. 10



5. a) State and prove the Maximum Power Transfer Theorem as applicable to dc networks. 10

b) An alternating current of frequency 50 Hz has a maximum value of 100 A. Write down the equation for its instantaneous value. 4

c) A 50-μF capacitor is connected across a 230-V, 50-Hz supply. Calculate (a) the reactance offered by the capacitor (b) the maximum current and (c) the r.m.s. value of the current drawn by the capacitor. 6

6. Write short notes on : 5x4

a) Form Factor

b) Resonance

c) Power Factor

d) Power Triangle

7. a) In a series circuit containing pure resistance and a pure inductance, the current and the voltage are expressed as : 10

$i(t) = 6 \sin(314t + 2\pi/3)$ and $v(t) = 18 \sin(314t + 5\pi/6)$

(a) What is the impedance of the circuit?

(b) What is the value of the resistance?

(c) What is the inductance in henry?

(d) What is the power factor?

b) A resistance of 20 Ω, an inductance of 0.2 H and a capacitance of 100 μF are connected in series across 220-V, 50-Hz mains. Determine the followings (a) impedance (b) current (c) voltage across R, L and C (d) power in watts and VA (e) p.f. and angle of lag. 10