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- 1- Find the current in the $2\ \Omega$ resistance of the circuit shown in Figure 1 using Norton's Theorem. (10 Marks)

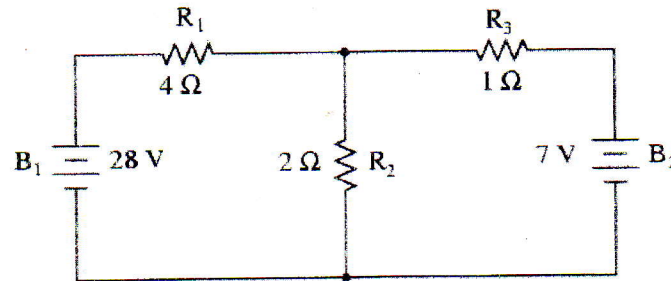


Figure 1

- 2- Find the current in the $2\ \Omega$ resistance of the circuit shown in Figure 2 using: (20 Marks)
 (a) Superposition theorem, and
 (b) Thevenin's theorem.

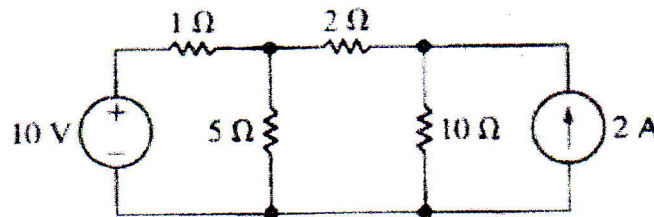


Figure 2

- 3- An iron-ring of mean length 30 cm is made of three pieces of cast iron, each has the same length but their respective diameters are 4, 3 and 2.5 cm. An air-gap length 0.5 mm is cut in the 2.5 cm piece. If a coil of 1000 turns is wound on the ring, find the value of the current it has to carry to produce a flux density of $0.5\ \text{Wb/m}^2$ in the air gap. B/H characteristic of cast-iron may be drawn from the following table: (10 Marks)

B (Wb/m^2):	0.1	0.2	0.3	0.4	0.5	0.6
H (AT/m):	280	620	990	1400	2000	2800

Permeability of free space $= 4\pi \times 10^{-7}\ \text{H/m}$. Neglect leakage and fringing.

- 4- An inductor having a resistance of a 10 ohm is connected to a 240 V, 50 Hz alternating current supply. The current flowing through the coil is found to be 12 A. (10 Marks)
 a. Calculate the impedance, inductive reactance and inductance of the inductor.
 b. Determine the phase angle between the current and the applied voltage.
 c. Draw a phasor diagram showing the relation between the current and various voltages across the circuit components.