



Daffodil International University
Department of Electrical and Electronic Engineering
Faculty of Engineering
Final Examination, Fall – 2025

Course Code: 0713-111

Course Title: Electrical Circuit I

Section: A, B, C, D, E, F, G, H

Level-Term: L1-T1

Full Marks: 40

Exam Date: December 17, 2025

Teacher's Initial: MRK, FHT
Time: 2 Hours

[Answer all questions. Figures in the right margin indicates full marks.]

- Q1. (a) State superposition theorem. Use superposition to find V_x in the circuit of Fig. 1.

CO2 [6]
C(3)

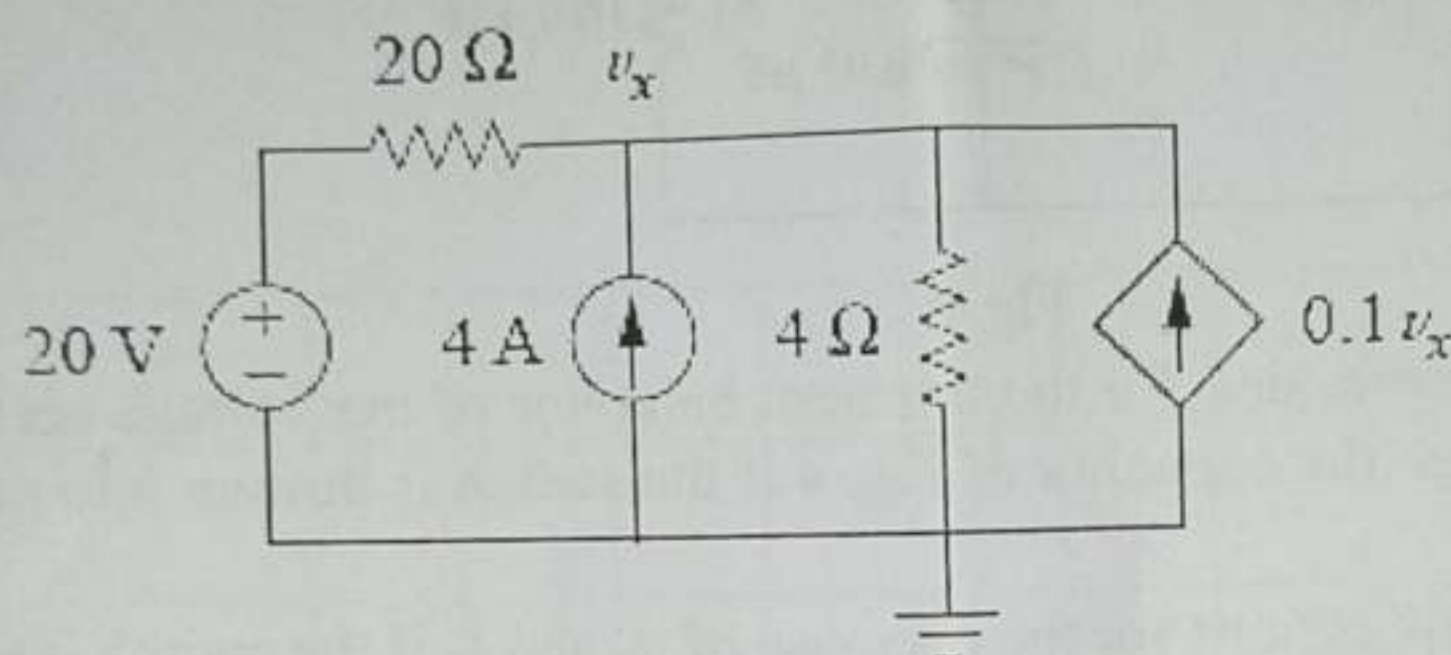


Fig.1

- (b) Find i_o in the circuit of Fig. 2 using source transformation.

CO2 [4]
C(3)

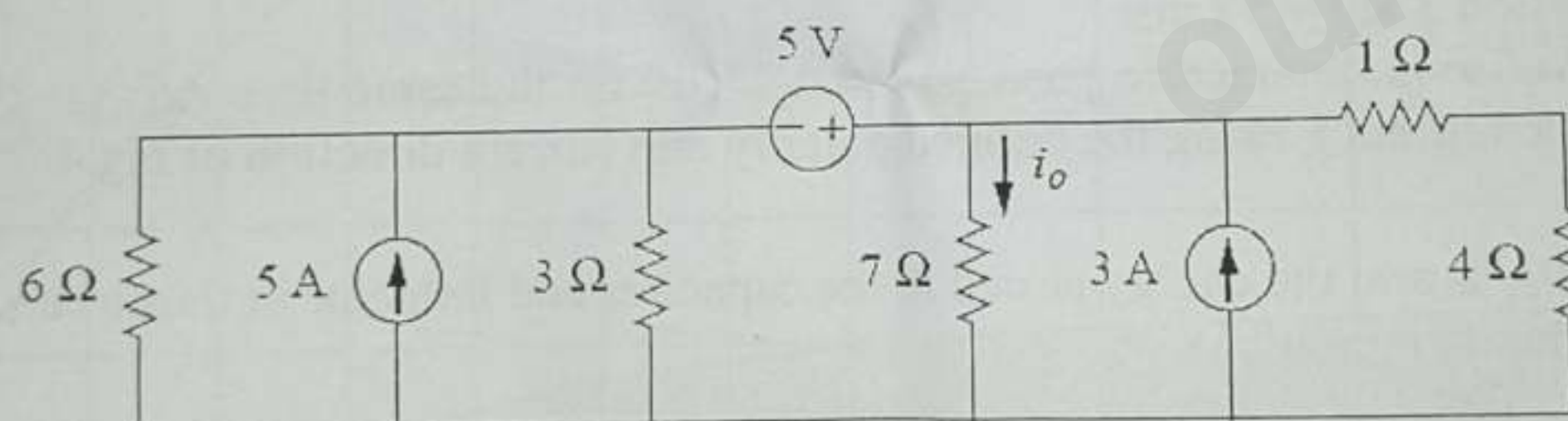


Fig. 2

- Q2. (a) State and prove the Maximum Power Transfer Theorem for a DC circuit.

CO2 [5]
C(2)

- (b) Determine the value of resistor connected across terminals a-b which will absorb maximum power from the circuit shown in Fig.3. Determine that power.

CO2 [5]
C(3)

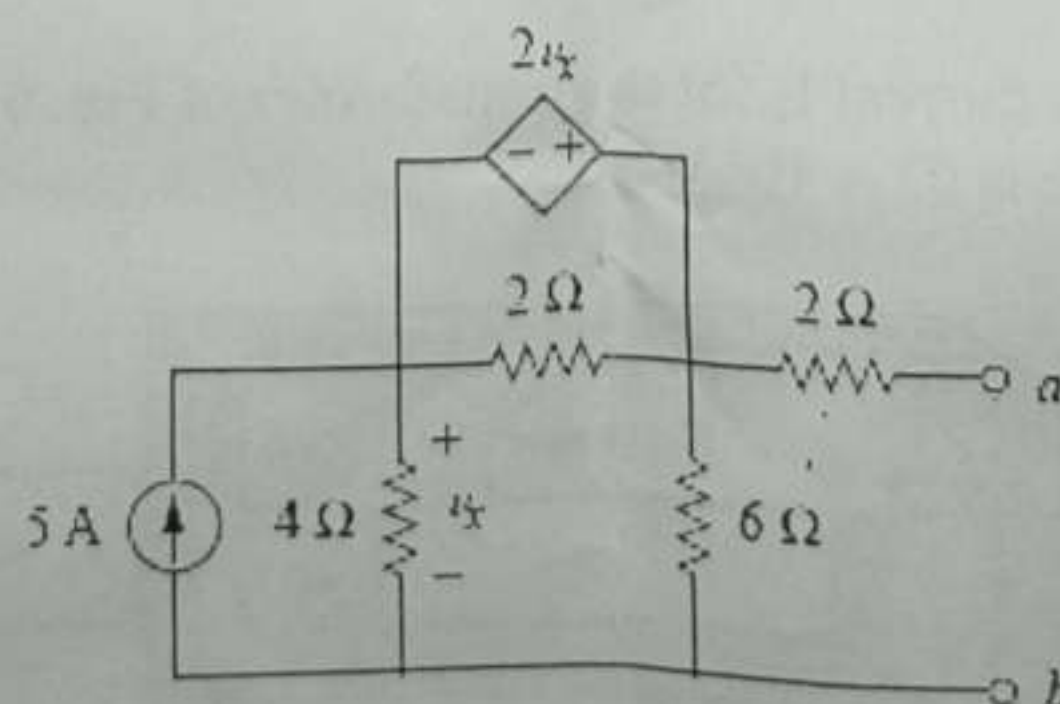


Fig.3

B-H

Q3. (a) Explain the transient charging behavior of a capacitor in an RC network, and sketch the corresponding voltage and current waveforms.

CO3 [4]
C(4)

(b)

CO3 [6]
C(4)

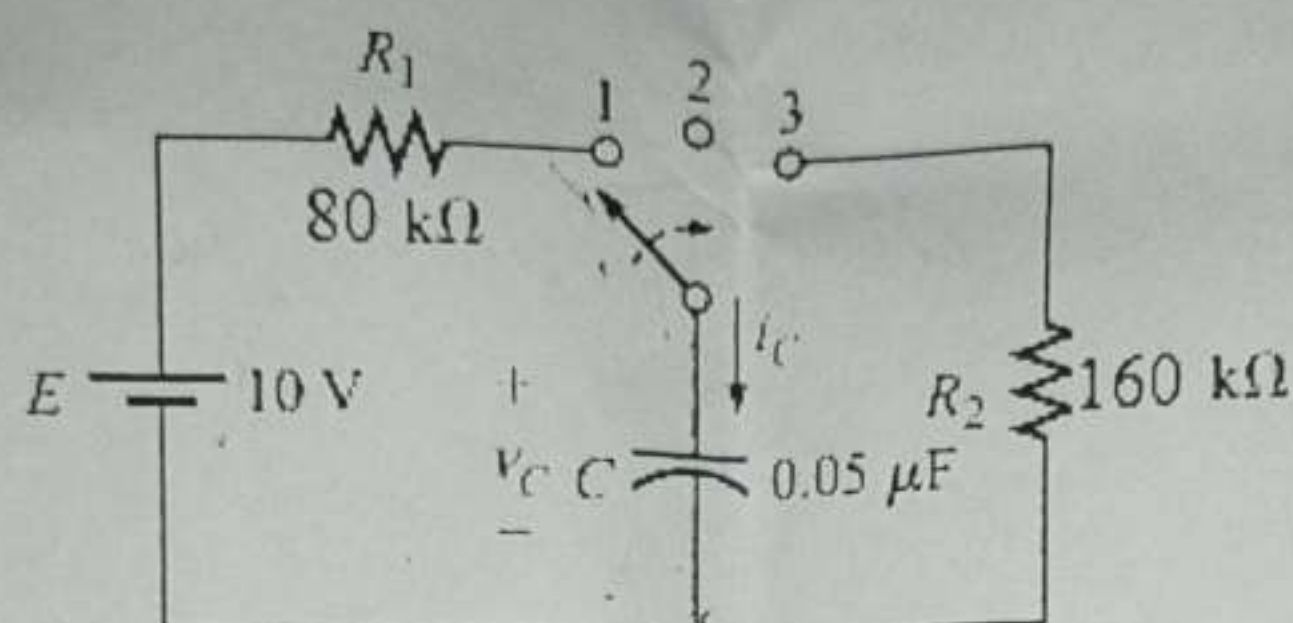


Fig. 4

i) Find the mathematical expression for the transient behavior of the voltage across the capacitor and current through the capacitor of Fig. 4 if the switch is thrown into position 1 at $t = 0$ s.

ii) Find the mathematical expressions for the response of v_C and i_C if the switch is thrown into position 2 at 32 ms (assuming that the leakage resistance of the capacitor is infinite ohms).

iii) Find the mathematical expressions for the voltage v_C and current i_C if the switch is thrown into position 3 at $t = 52$ ms.

iv) Plot the waveforms obtained in parts (i) through (iii) on the same time axis for the voltage v_C and the current i_C using the defined polarity and current direction of Fig. 4.

Q4. a) Determine v_C , i_C and the energy stored in the capacitor and inductor in the circuit of Fig. 5 under dc conditions.

[4]

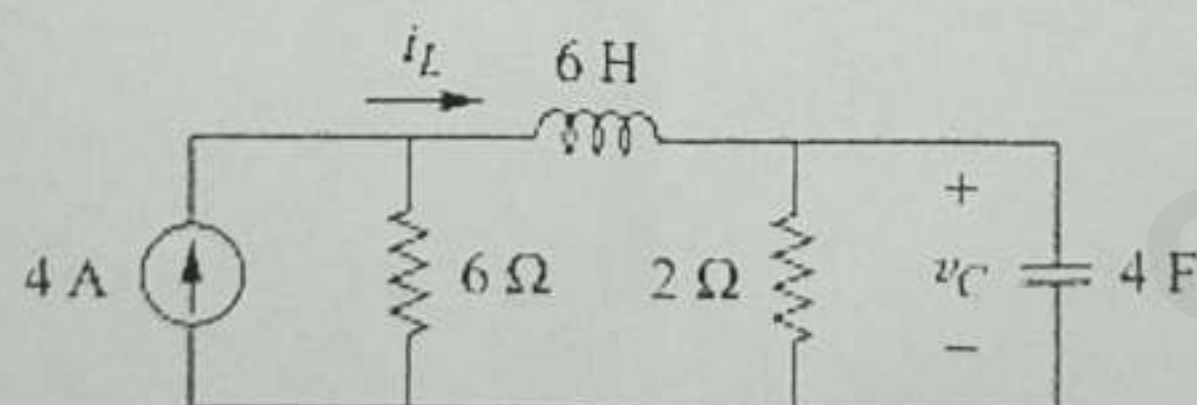


Fig. 5

b) Define the terms permeability and magnetizing force as used in magnetic circuits.

[2]

c) Determine the secondary current I_2 for the transformer of Fig. 6 if the resultant clockwise flux in the core is 0.2×10^5 Wb.

[4]

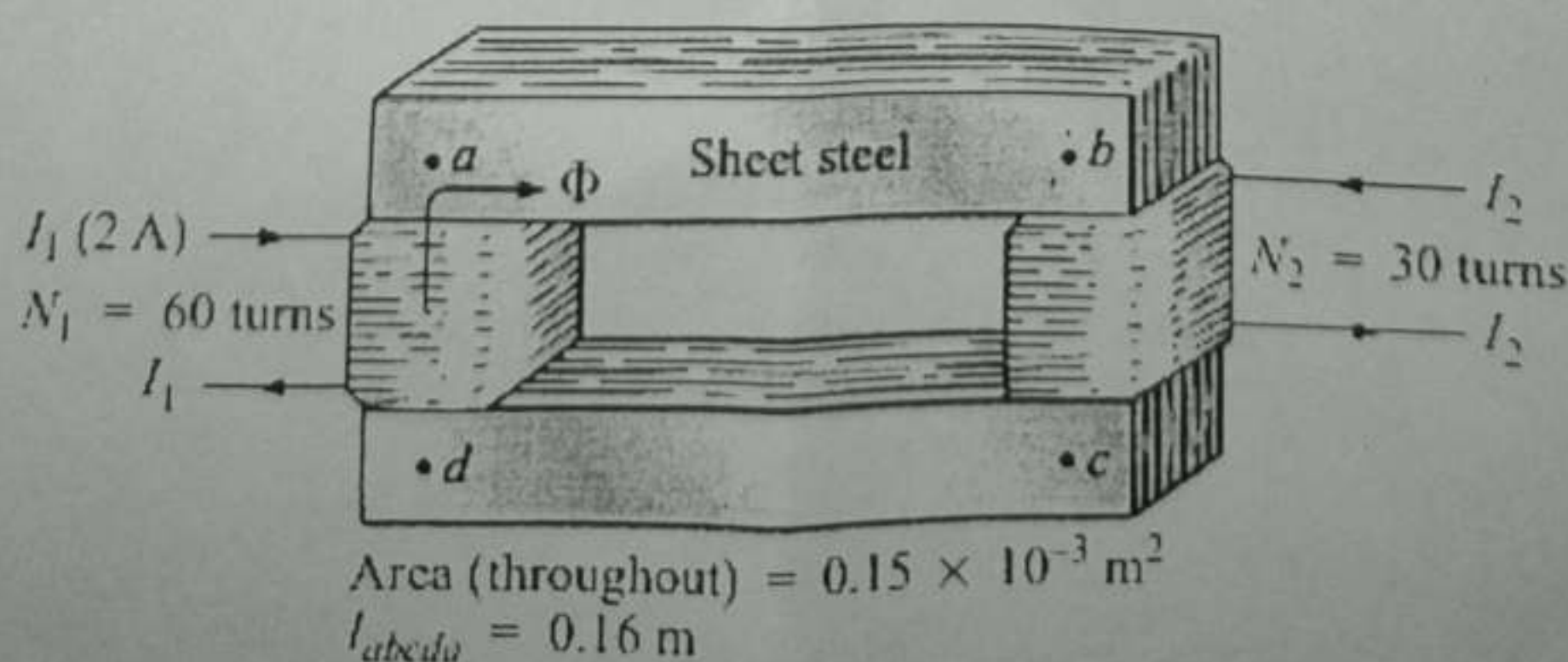


Fig. 6

B-H Curve:

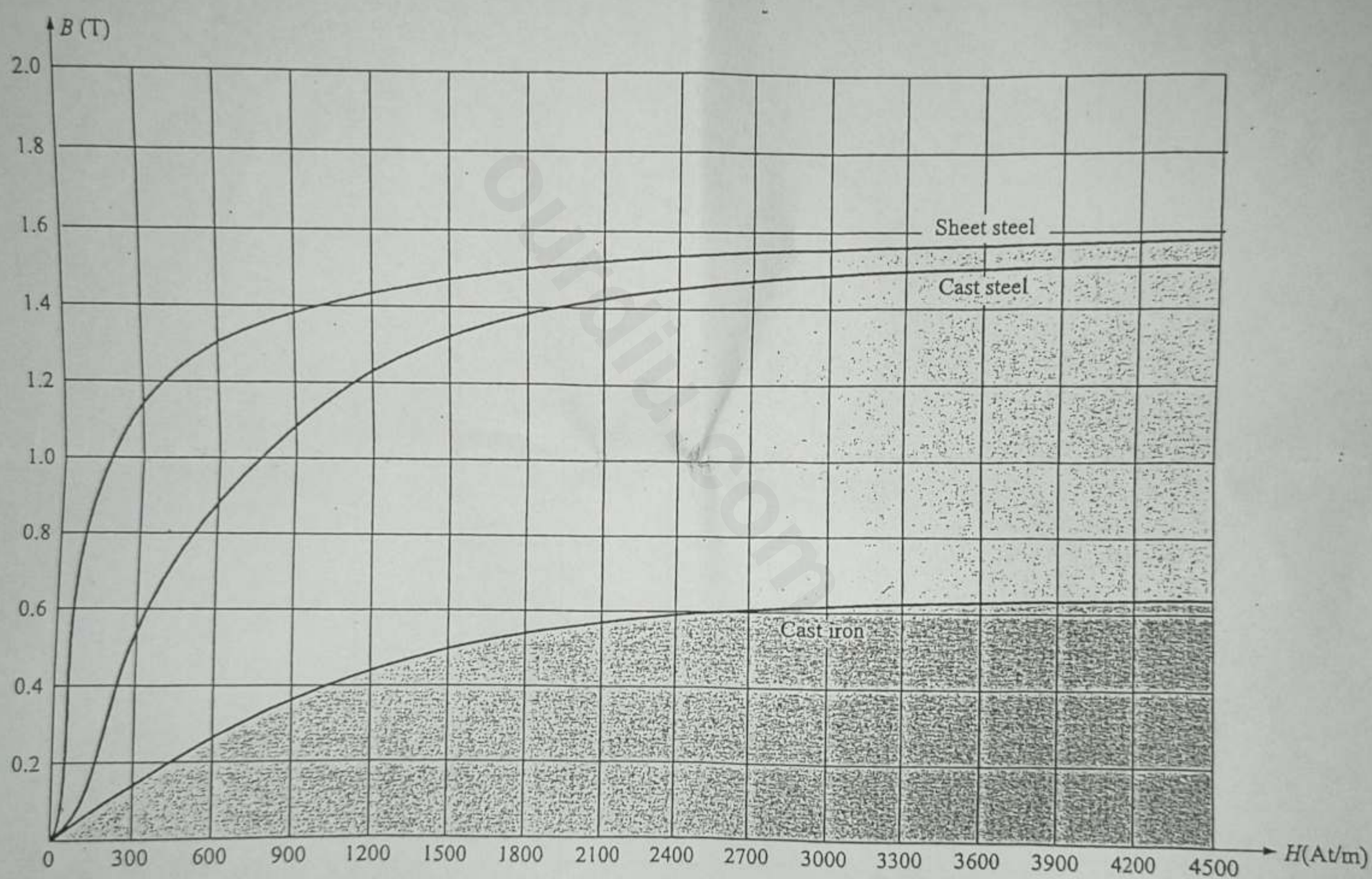
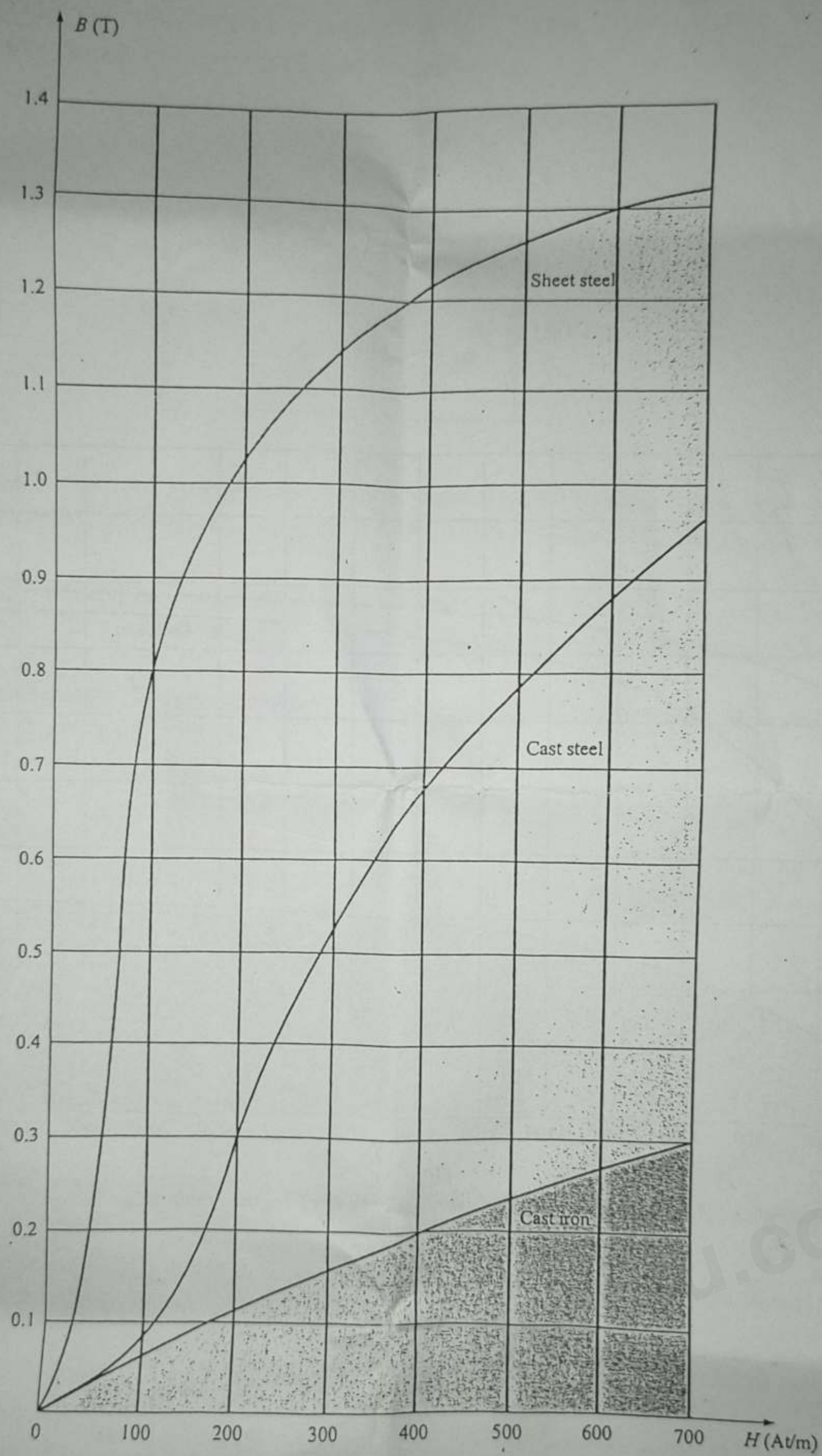


FIG.
Normal magnetization curve for three ferromagnetic materials.



Expanded view

FIG.
for the low magnetizing force region.