

# TUTORIAL-9

EE 101: Basic Electronics

DEPARTMENT OF ELECTRONICS & ELECTRICAL ENGINEERING

INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI

*(First question is the Pre-Tutorial Assignment problem to be solved in the space provided.)*

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Name:

Roll No.

Tutorial Group:

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1. Two wattmeter method is employed to measure the 3-phase power. A 3-phase line supplies to a balanced inductive delta connected load. The current coil of Wattmeter  $W_1$  is in line A and its voltage coil is connected across the line voltage  $V_{AC}$ . The current coil of Wattmeter  $W_2$  is in line B and its voltage coil is connected across the line voltage  $V_{BC}$ . Derive the expressions for the readings of  $W_1$  and  $W_2$  in terms of the line voltage ( $V_L$ ) and the line current ( $I_L$ ) and the phase angle  $\theta$  (angle between the phase voltage and phase current). Assume the line voltage  $V_{AB}$  as the reference. Draw the phasor diagram to explain your derivations.

2. Three identical coils, each having a reactance of  $20\ \Omega$  and a resistance of  $20\ \Omega$  are connected (a) in star, (b) in delta, across 440 V, 3-phase line. Calculate for each method of connection, the line current and the readings on each of the two watt-meters connected to measure the power.
3. Fig. 1(a) shows a rectangular magnetic core with an air gap. Find the exciting current needed to cause a flux density of  $B_g = 1.2\text{ T}$  in the air gap. Given  $N = 400\text{ turns}$  and  $\mu_r(\text{iron}) = 4000$

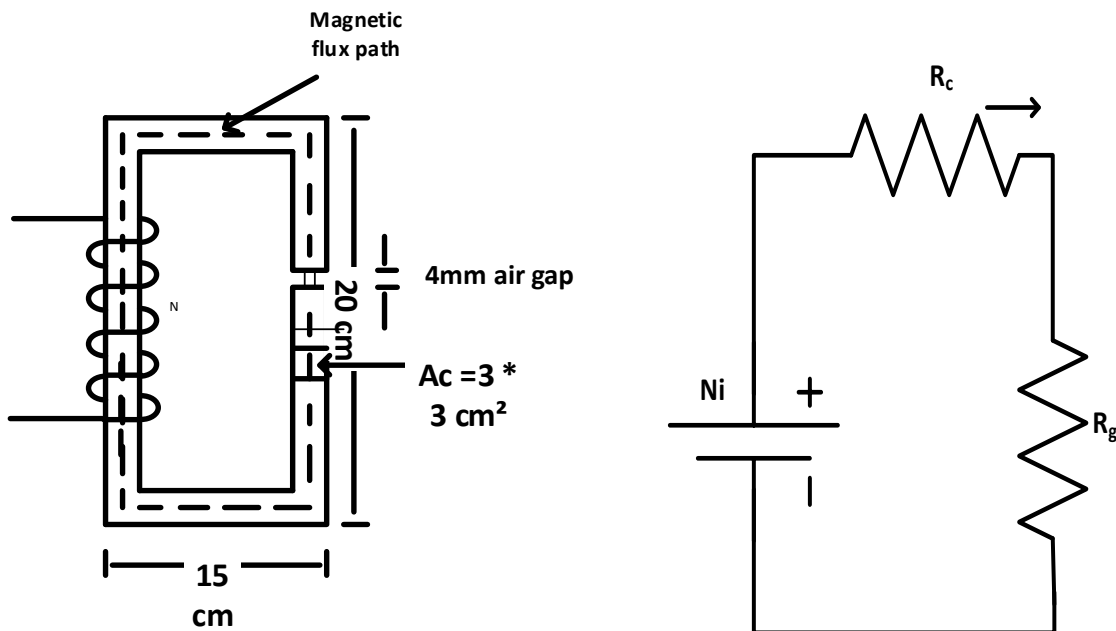


Fig. 1(a).

4. Given the function  $f(A,B,C,D) = \sum m(1,2,3,5,13) + \sum d(6,7,8,9,11,15)$ .
- Find a minimal sum-of-products expression.
  - Find a minimal products -of-sums expression.
  - Compare the expression obtained in (a) and (b).  
If they do not represent identical function. Explain why?
5.  $f(A,B,C,D) = (A+B+D)(B+C)(\bar{A}+\bar{D})(\bar{A}+C)$  is the minimal product-of-sums expression obtained by simplifying  $f(A,B,C,D) = (A+B+D)(\bar{A}+B+C)(\bar{A}+\bar{B}+C)(\bar{A}+\bar{B}+\bar{C}+\bar{D})$  through k-map. Is there any don't care terms in the k-map? If so, determine the don't care terms.