



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



COIMBATORE-35

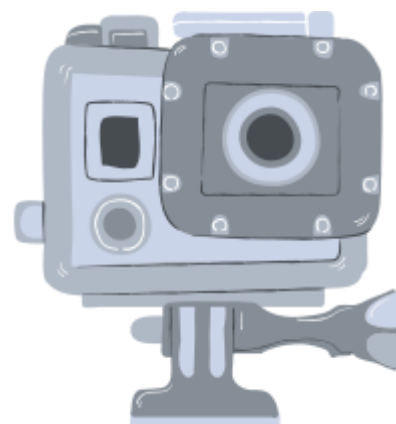
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UNIT 2

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Modelling of Power System Components

19EET302 – Power System 1
III year / V Semester





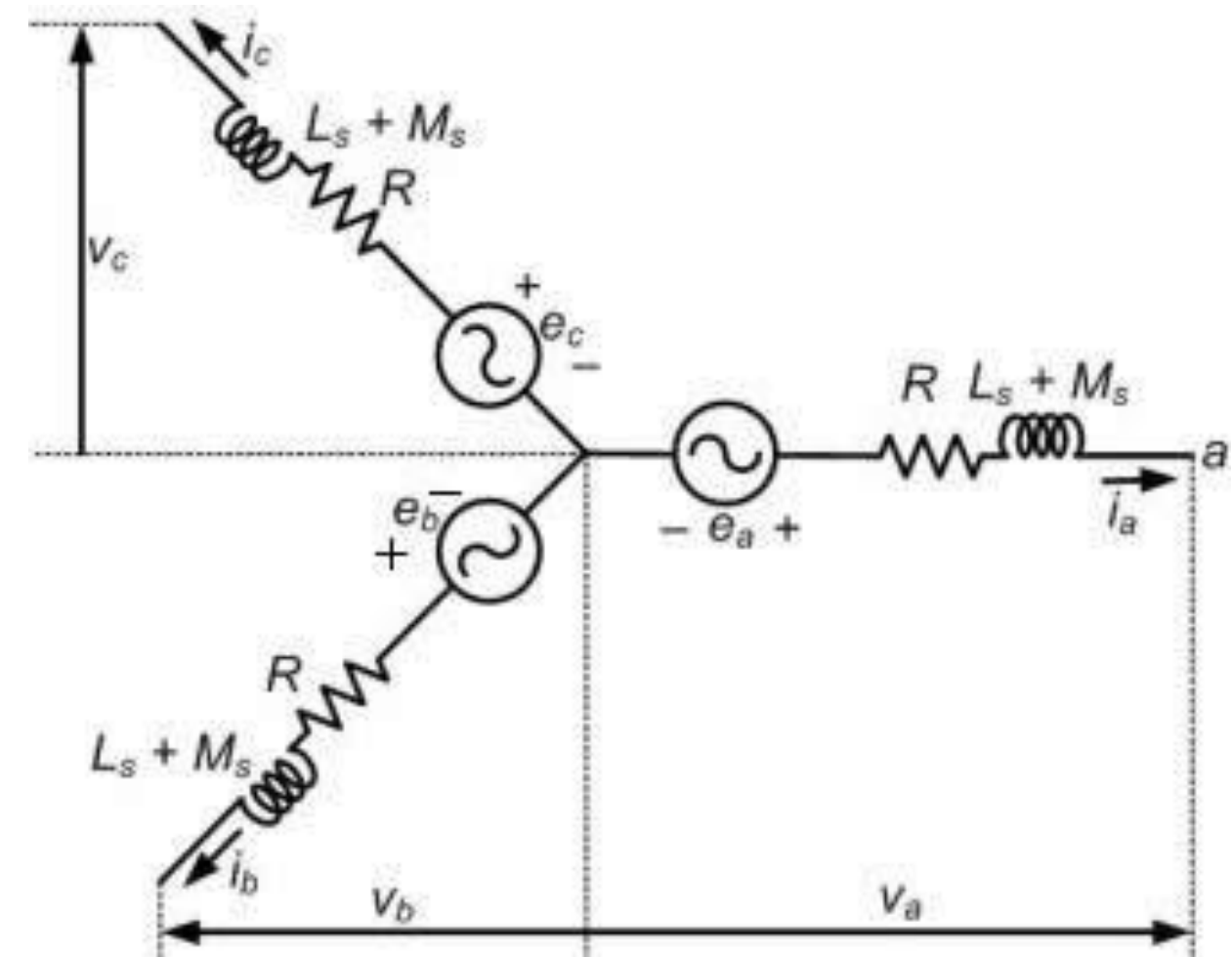
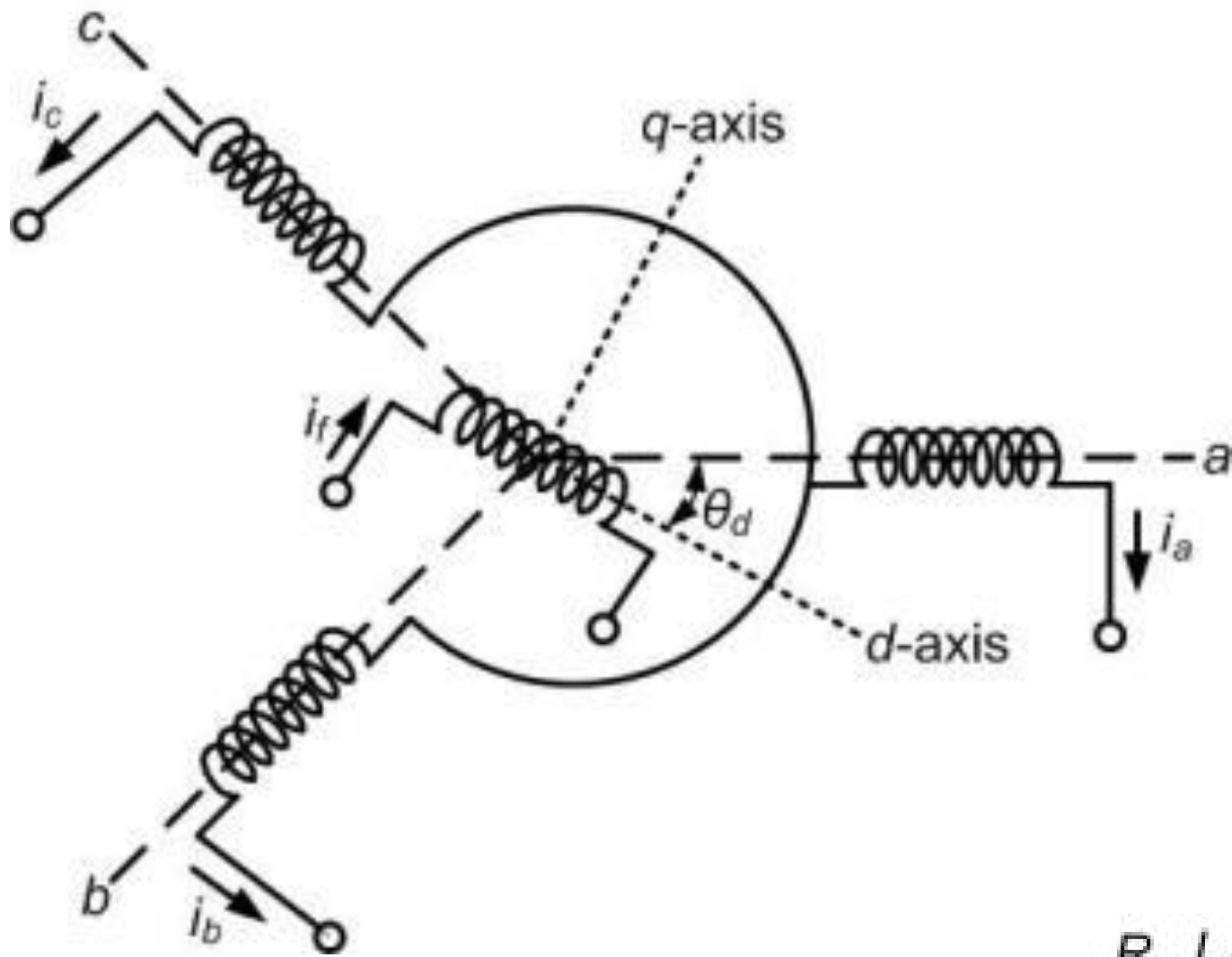
INTRODUCTION

modelling of power system components

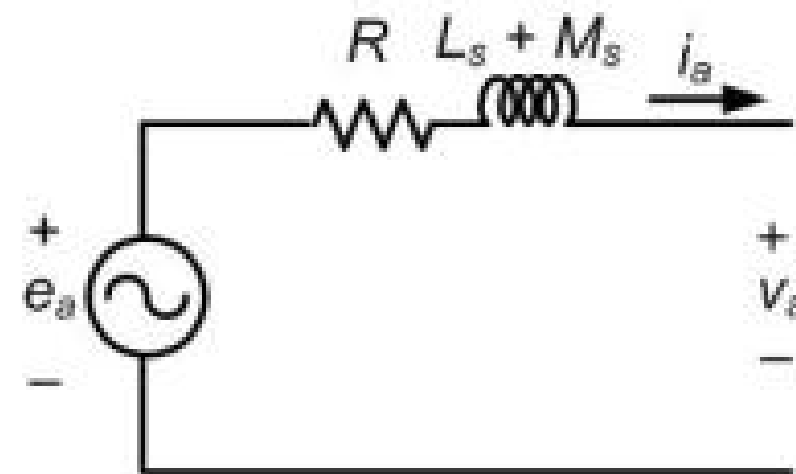
- Generator models
- Transformer model
- Transmission system model
- Load representation



Synchronous Machine Model



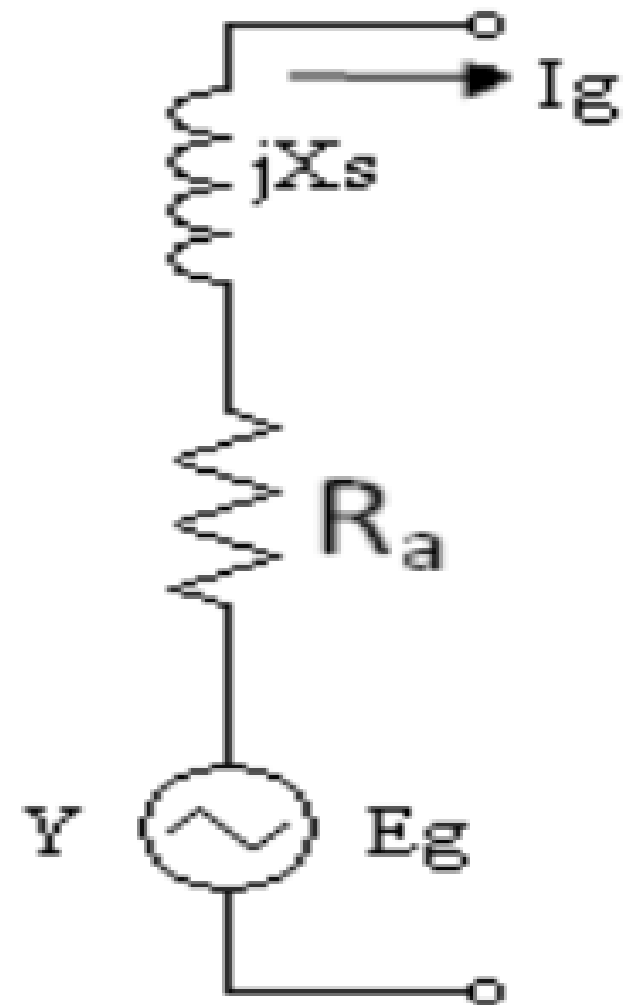
Three-phase equivalent circuit of a synchronous generator.



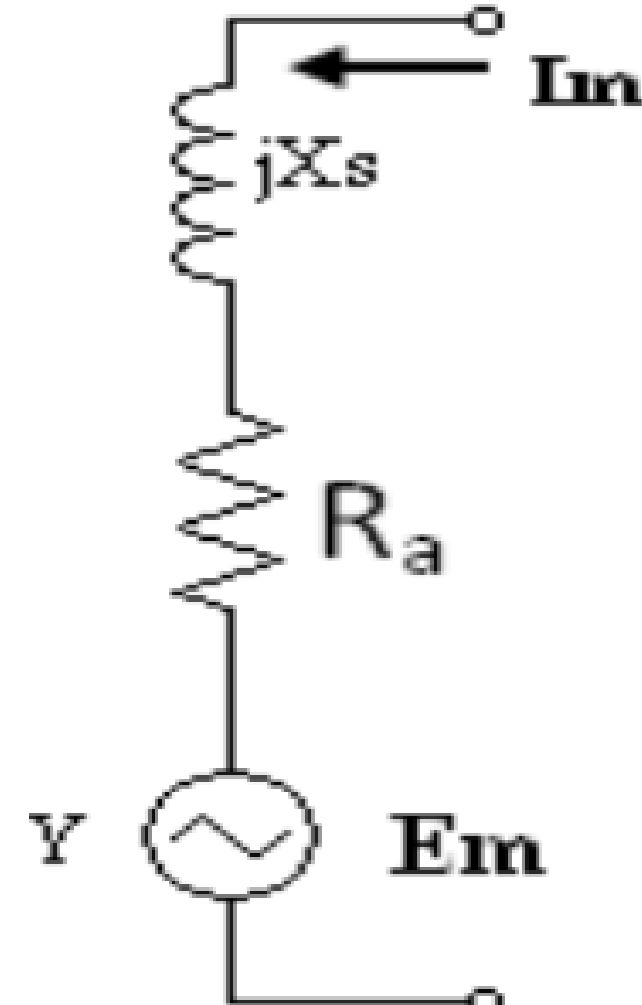
Single-phase equivalent circuit of a synchronous generator.



Synchronous Machine Model



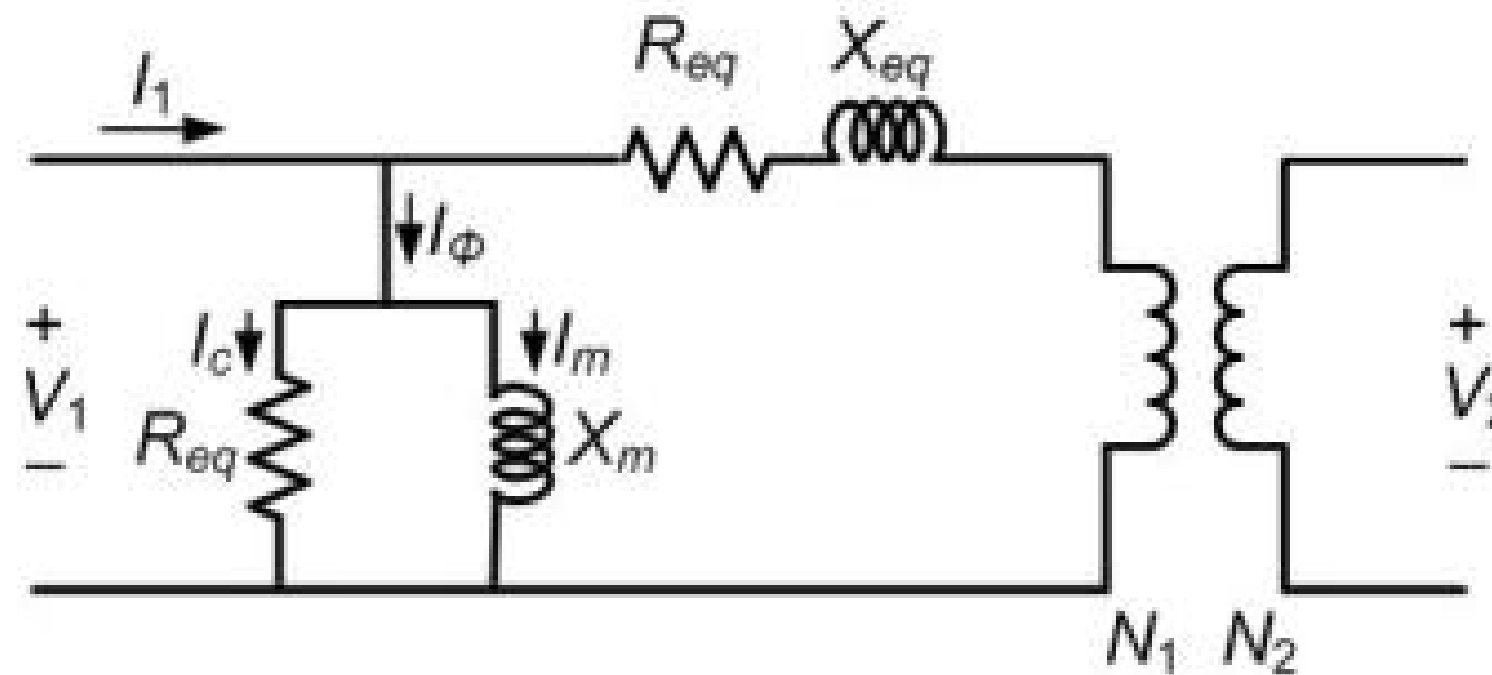
1 Φ equivalent circuit of generator



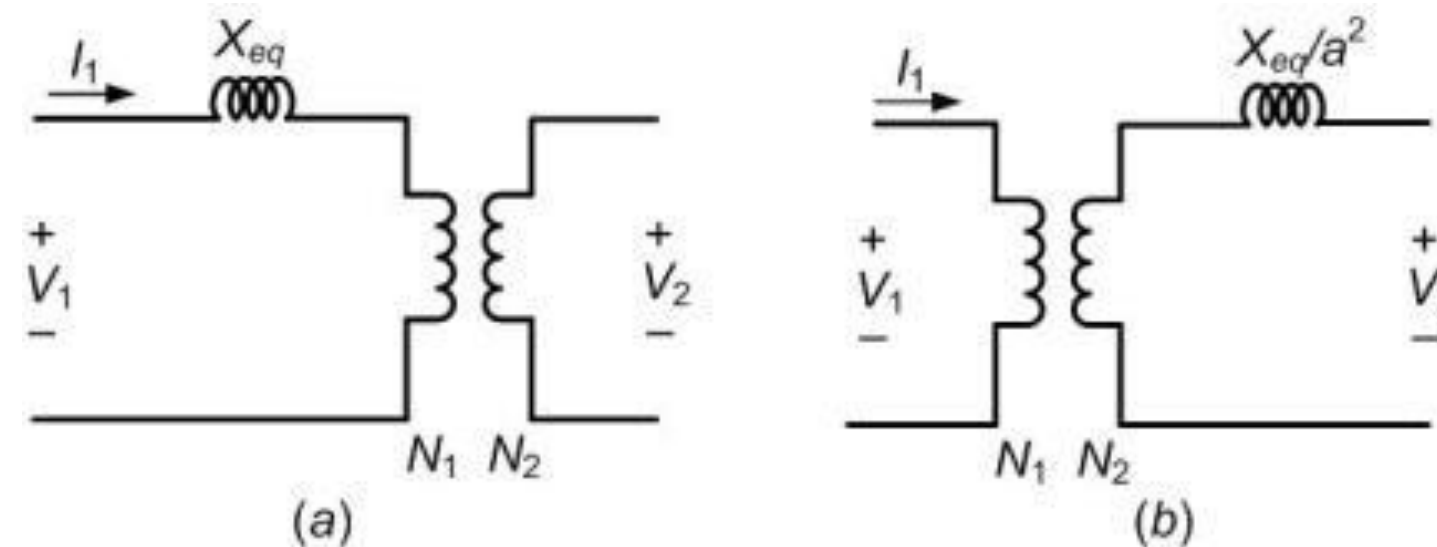
1 Φ equivalent circuit of synchronous motor



Transformer Model



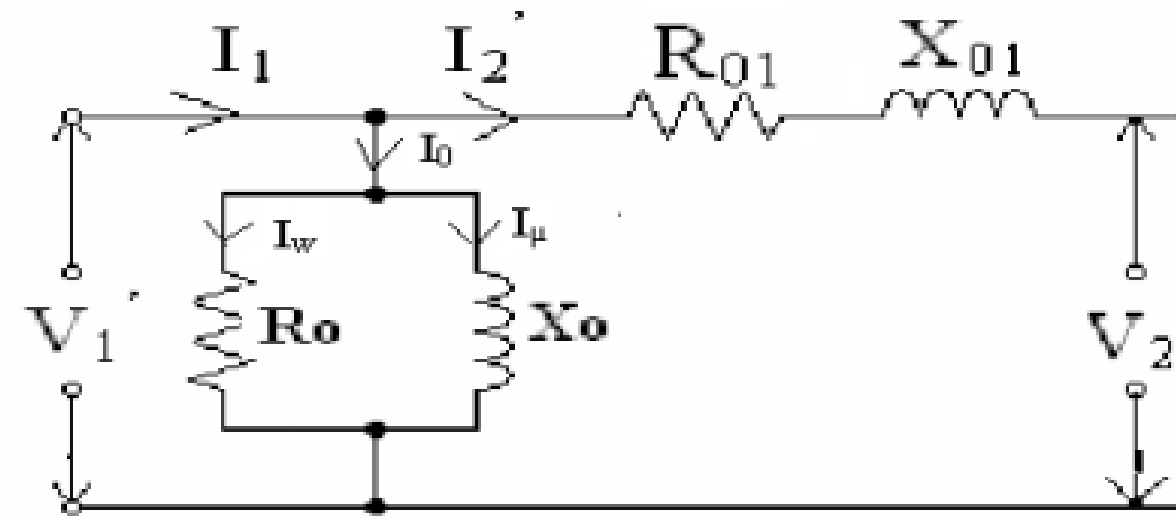
Equivalent circuit of a single-phase transformer



Simplified equivalent circuit of a single-phase transformer: (a) when referred to the primary side and (b) when referred to the secondary side.



Transformer Model



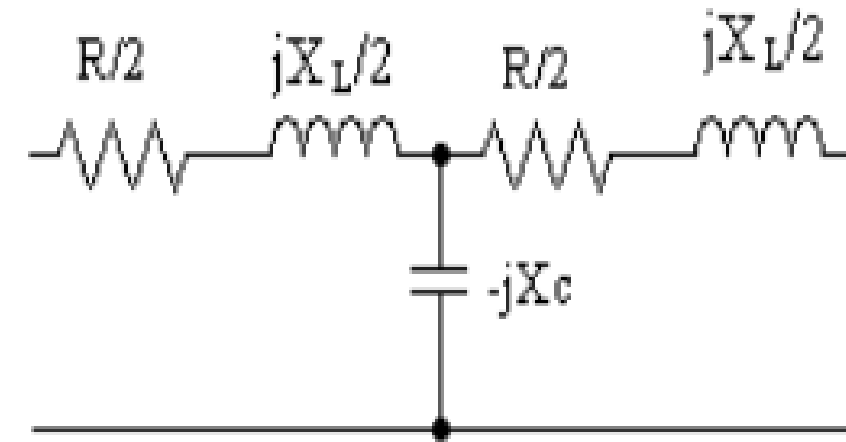
$$K = \frac{E_2}{E_1} = \frac{N_2}{N_1} = \frac{I_1}{I_2}$$

$$R_{01} = R_1 + R_2' = R_1 + \frac{R_2}{K^2} \quad \text{=Equivalent resistance referred to 1}^\circ$$

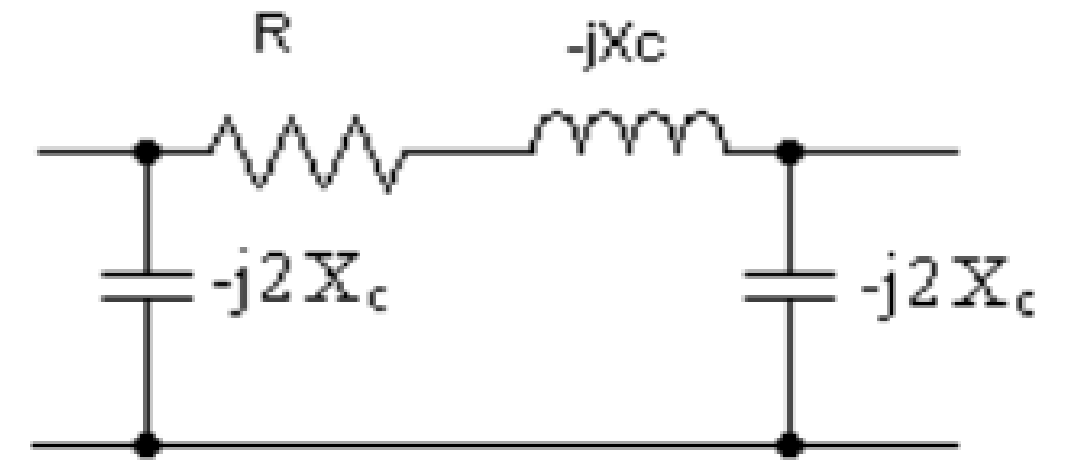
$$X_{01} = X_1 + X_2' = X_1 + \frac{X_2}{K^2} \quad \text{=Equivalent reactance referred to 1}^\circ$$



Transmission Line Model



T type



Π type



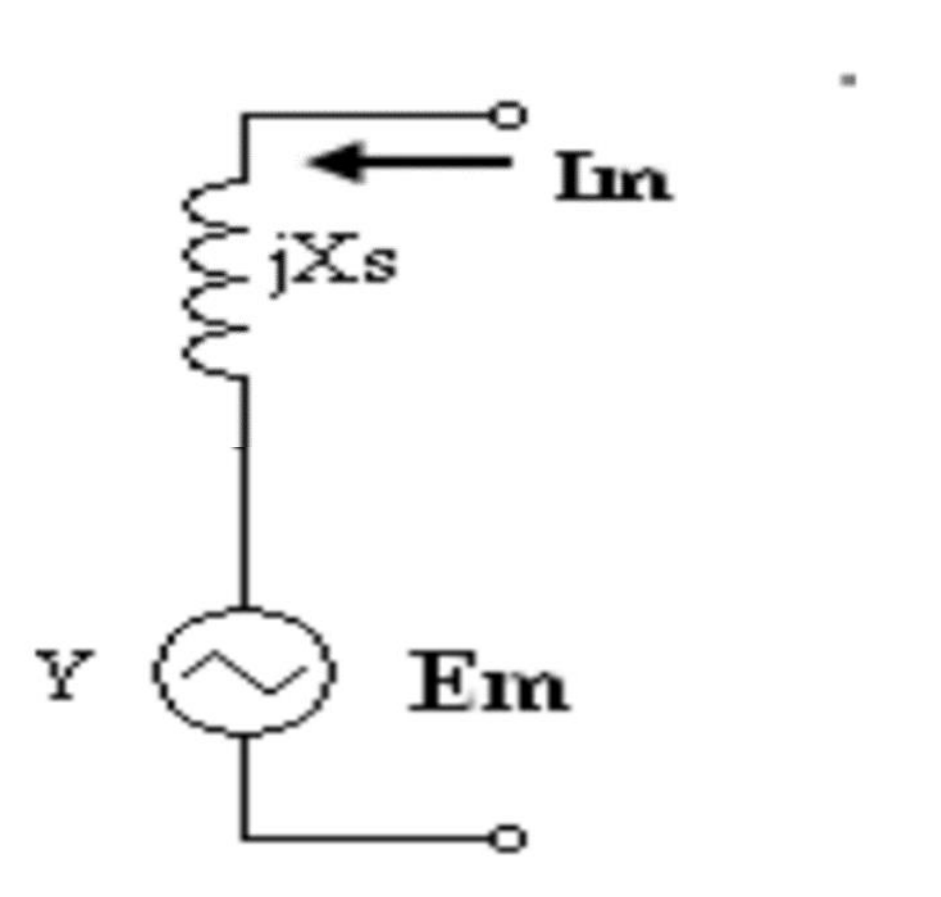
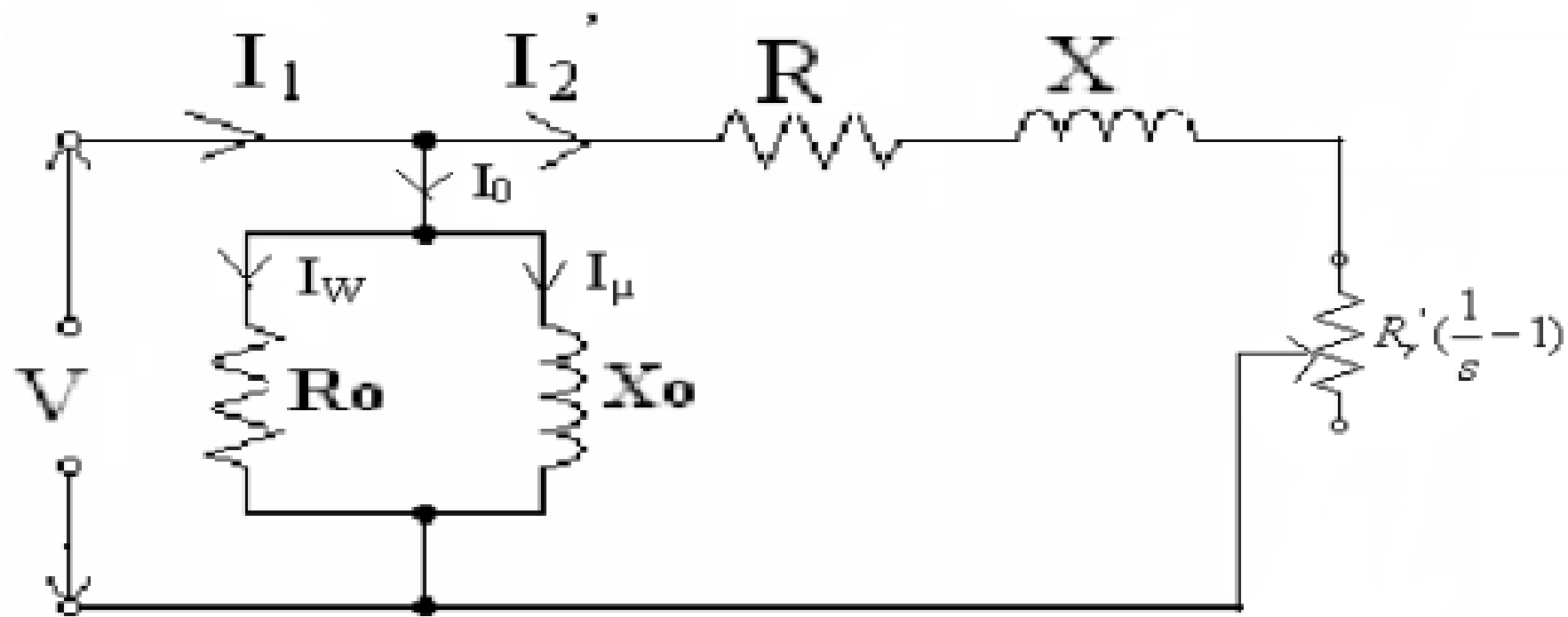
Representation of Loads

- Constant Impedance Representation
- Constant Power Representation
- Constant Current Representation





MODELLING OF INDUCTION MOTOR - Load



$R_r' \left(\frac{1}{s} - 1 \right)$ = Resistance representing load

$R = R_s + R_r'$ = Equivalent resistance referred to stator

$X = X_s + X_r'$ = Equivalent reactance referred to stator



Summary





**KEEP
LEARNING..
Thank u**

SEE YOU IN NEXT CLASS