SNS COLLEGE OF TECHNOLOGY

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Coimbatore-641035

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

19EET502 / POWER ELECTRONICS AND DRIVES

III YEAR / V SEMESTER

UNIT –V : AC MOTOR DRIVES

FREQUENCY CONTROL, VOLTAGE CONTROL OF AC DRIVE

TOPIC OUTLINE

What we'll discuss?

1. Stator frequency control - Intro

V/F - relation with graph

Mechanical Ch.

2.V/F methods

VSI and CSI fed drive

MATLAB model – VSI

3. Voltage Control Drive

Evaluation

1.FREQUENCY CONTROL - INTRODUCTION

We know, $V=2\pi fT\varphi K_W$

$$\varphi \ \alpha \ V/f$$

- **Low frequency operation at constant voltage:**

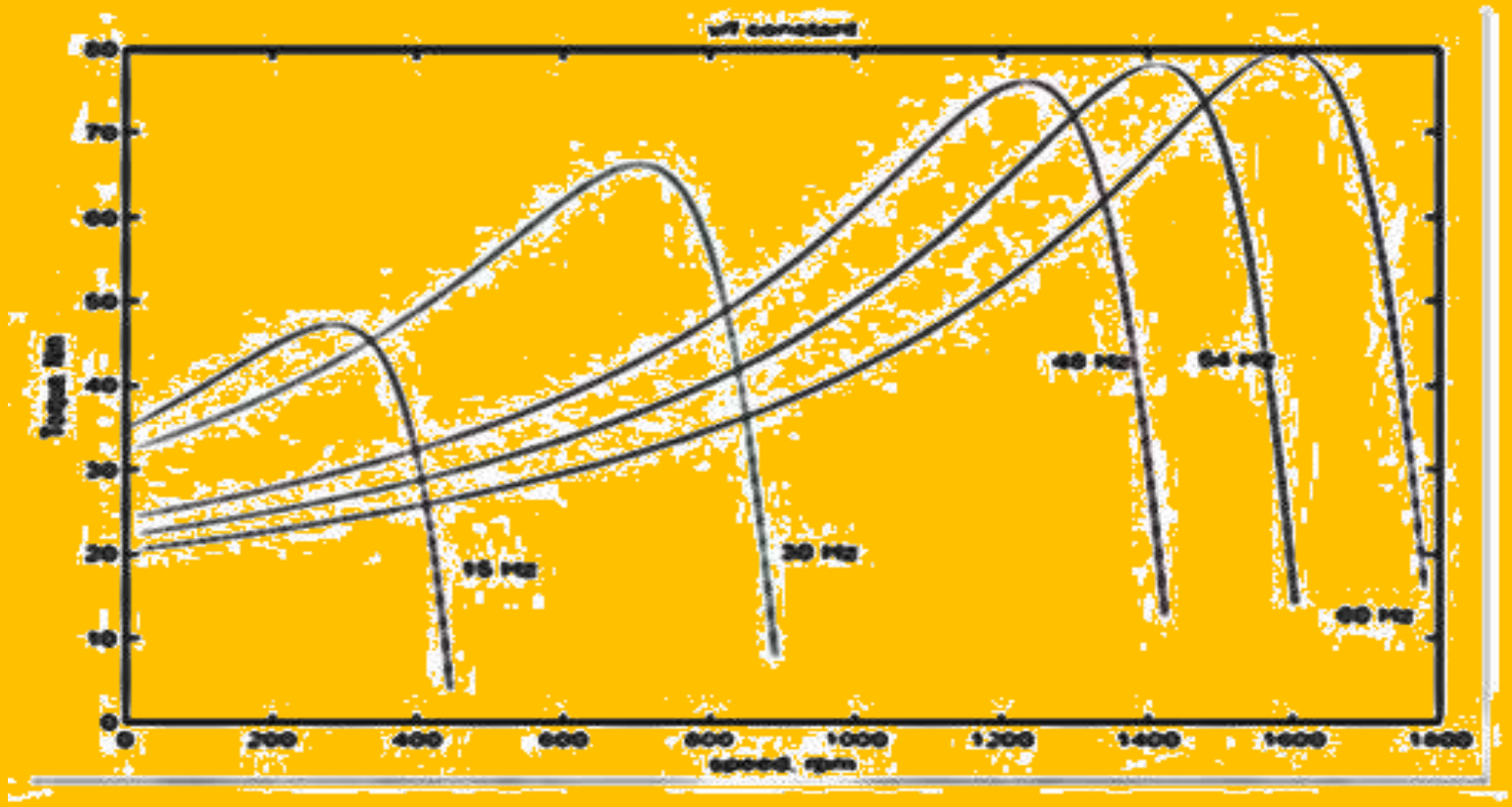
V constant; f decrease ; φ increases – gets saturated

- **High frequency operation at constant voltage:**

V constant ; f increase ; φ decrease - performance affected

- f increase ; N increase ; Tmax decrease
- V increase; Tmax increase

FREQUENCY CONTROL – Speed torque characteristics



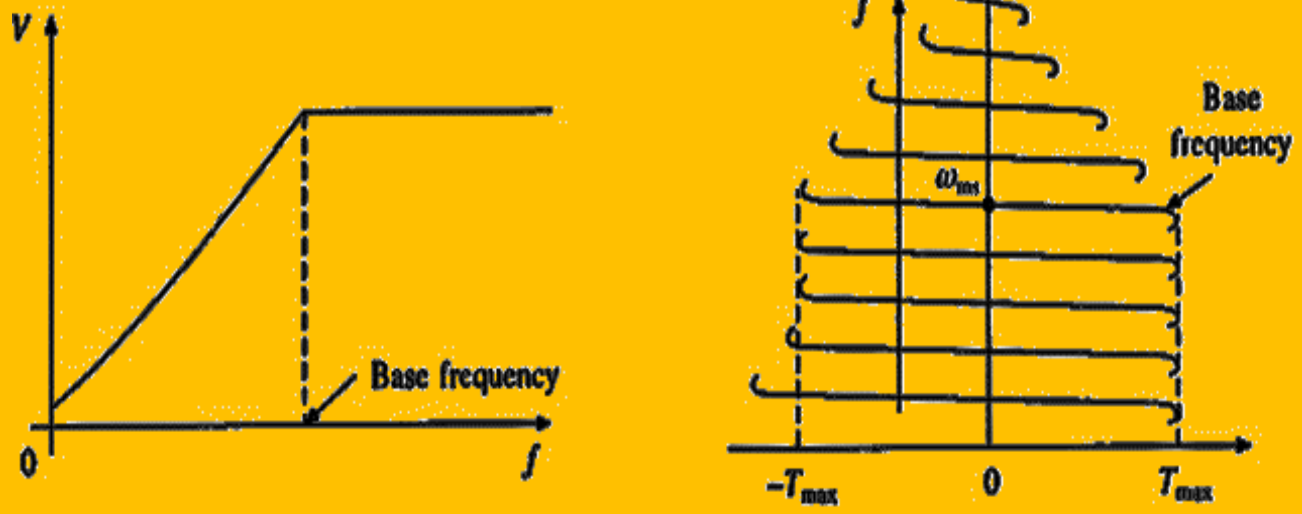
Mechanical Characteristics

2.V/F CONTROL – Relation with Graph

To avoid drawbacks:

Below base f: V/f ratio - maintained constant

Above base f: V - made constant



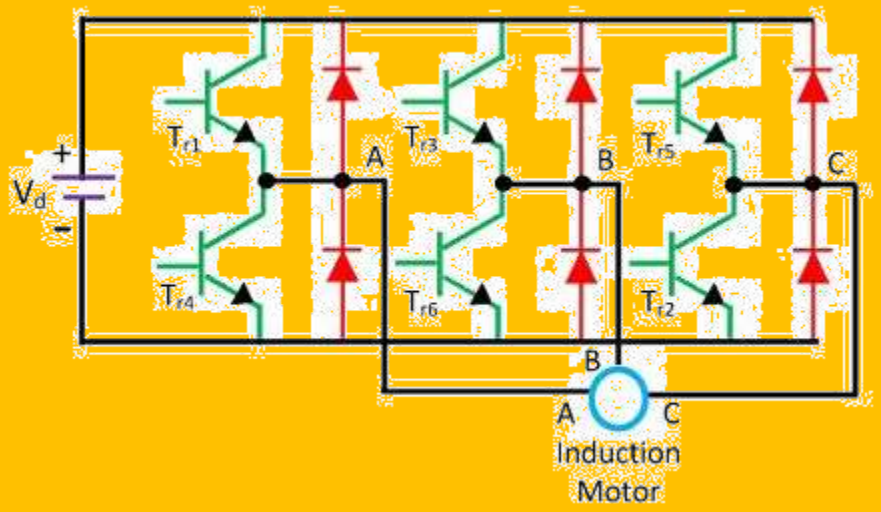
V-f relation & Speed torque Characteristics

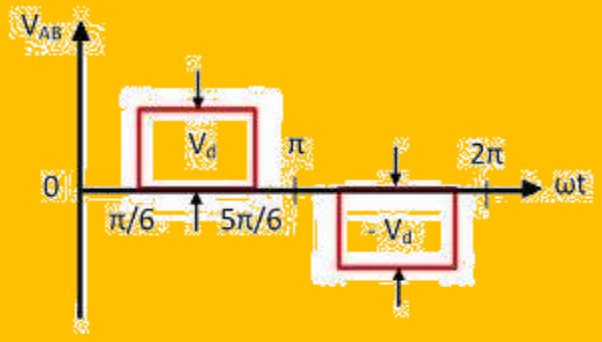
V/F - METHODS

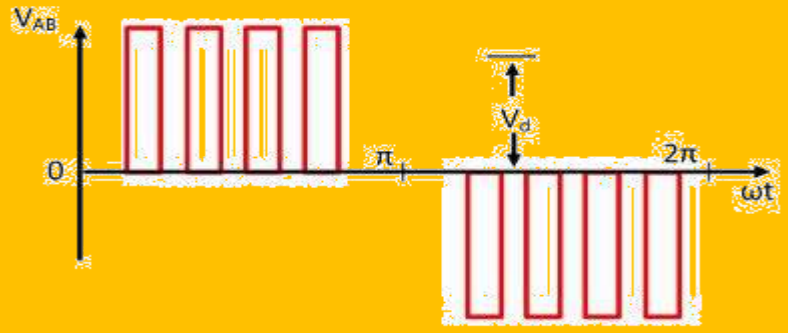
- Voltage source inverter (VSI) control
- Current source inverter (CSI) control
- Cyclo-converter control

V/F – VSI FED DRIVE

Inverter

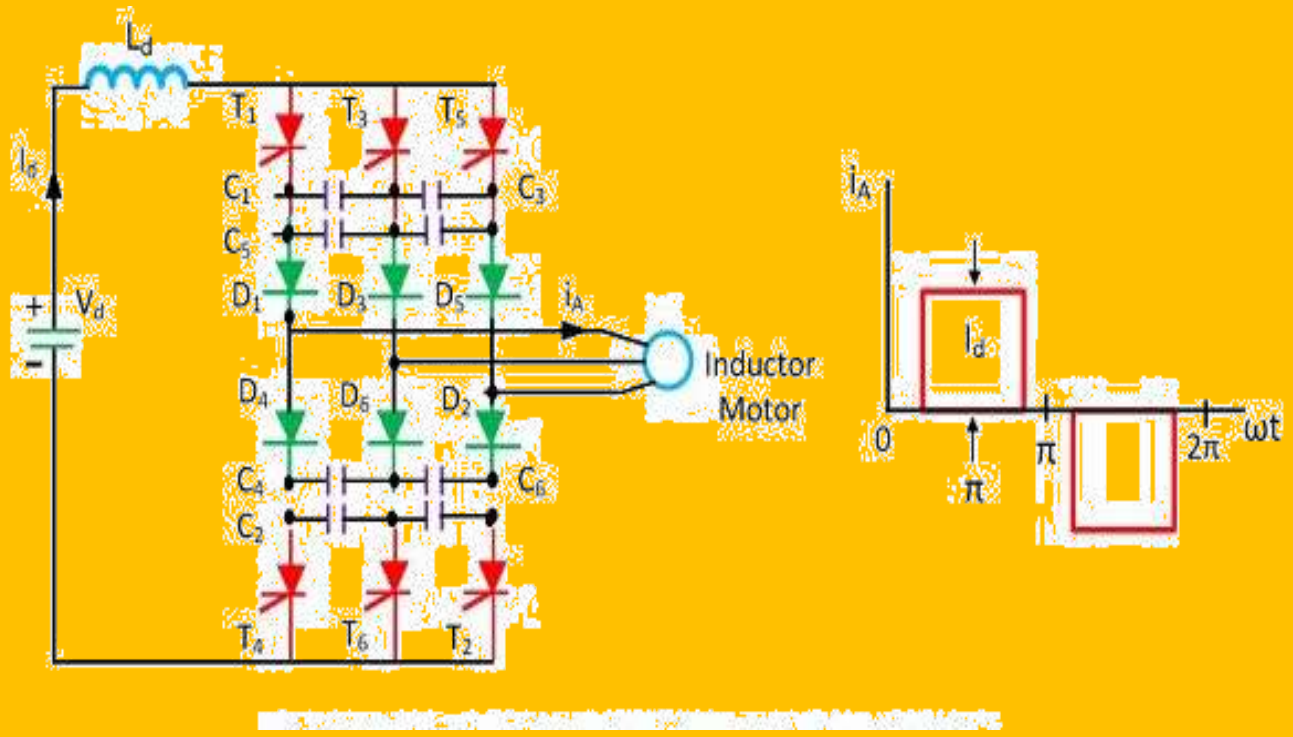






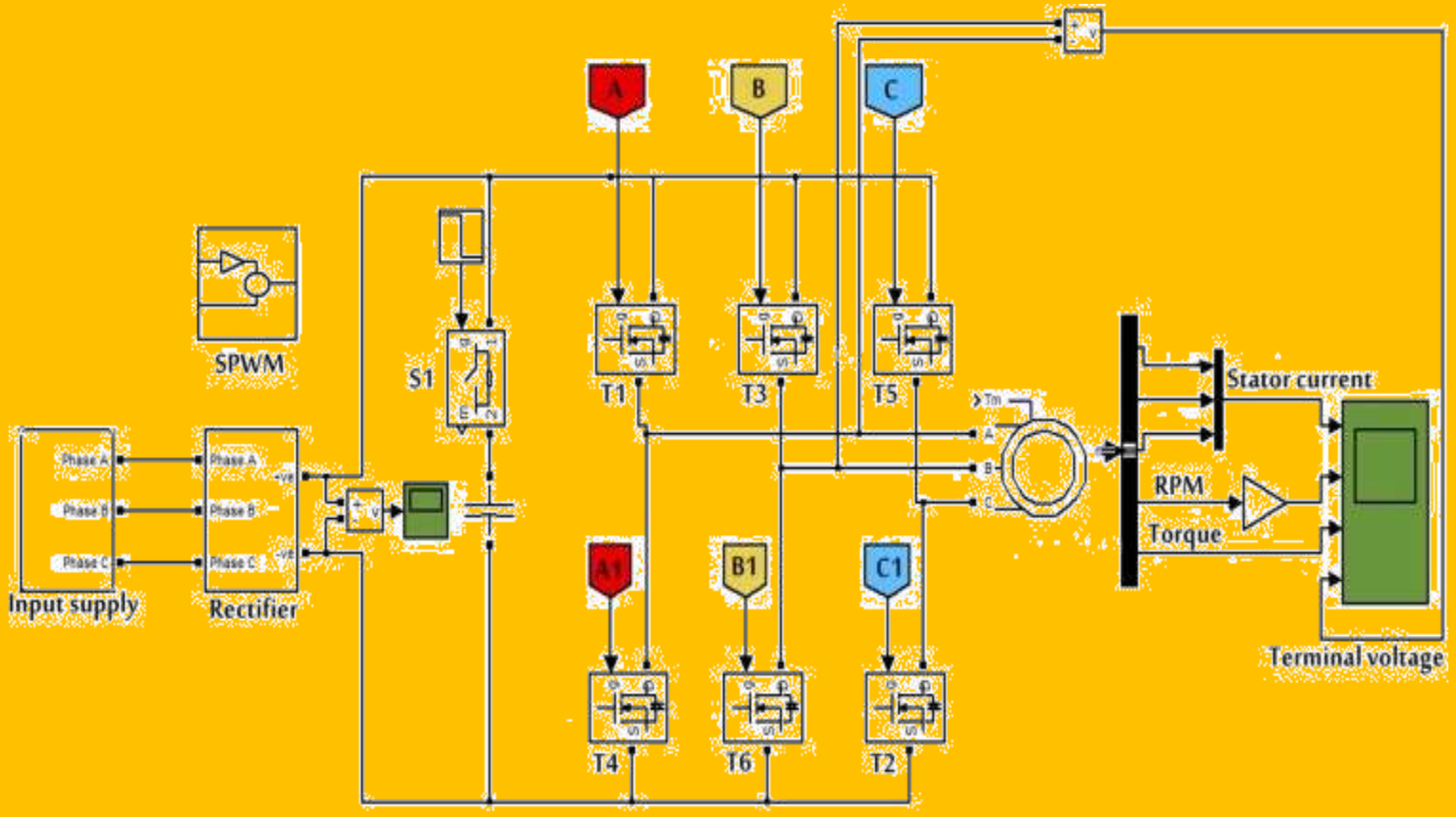
Stepped wave & PWM wave output line voltage

V/F – CSI FED DRIVE

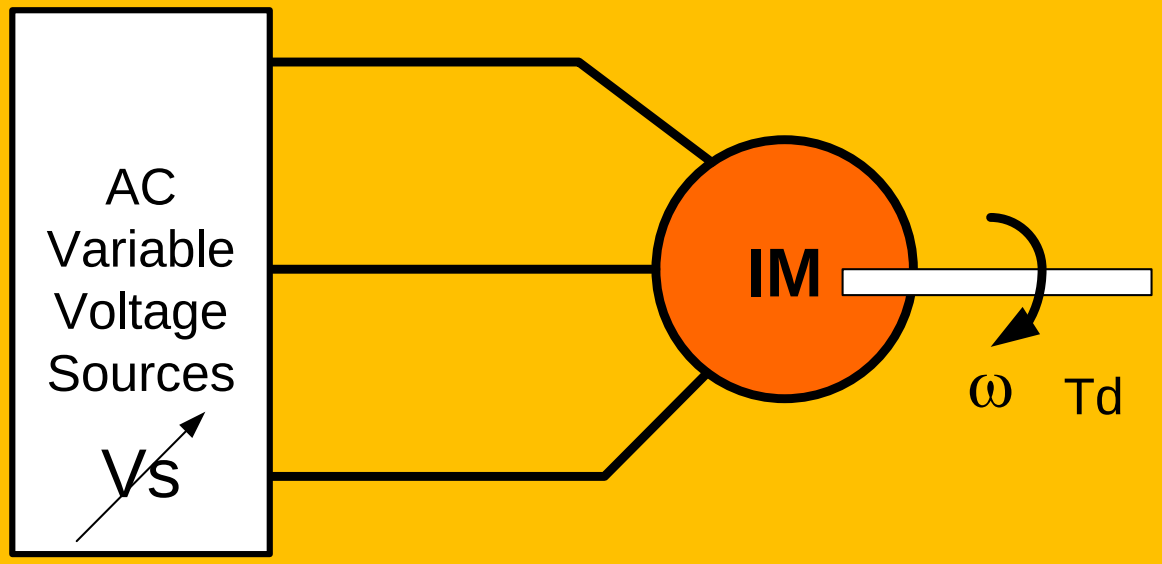


CSI Inverter (Auto seq.) & Output current waveform

V/F – MATLAB MODEL



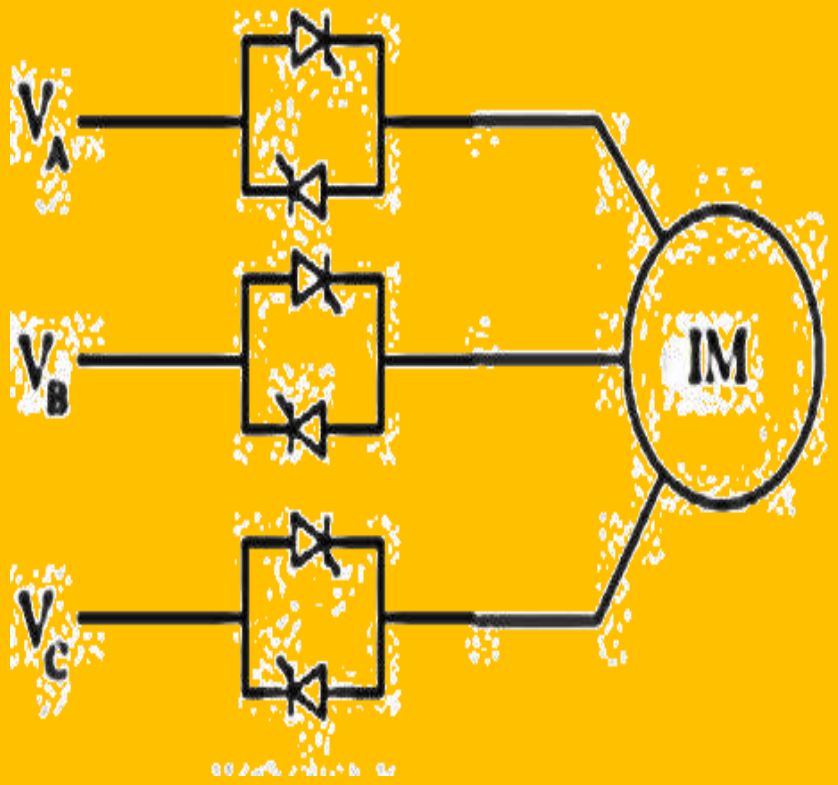
3.STATOR VOLTAGE CONTROL



Block Diagram:

Controlling Induction Motor Speed by Adjusting the Stator Voltage

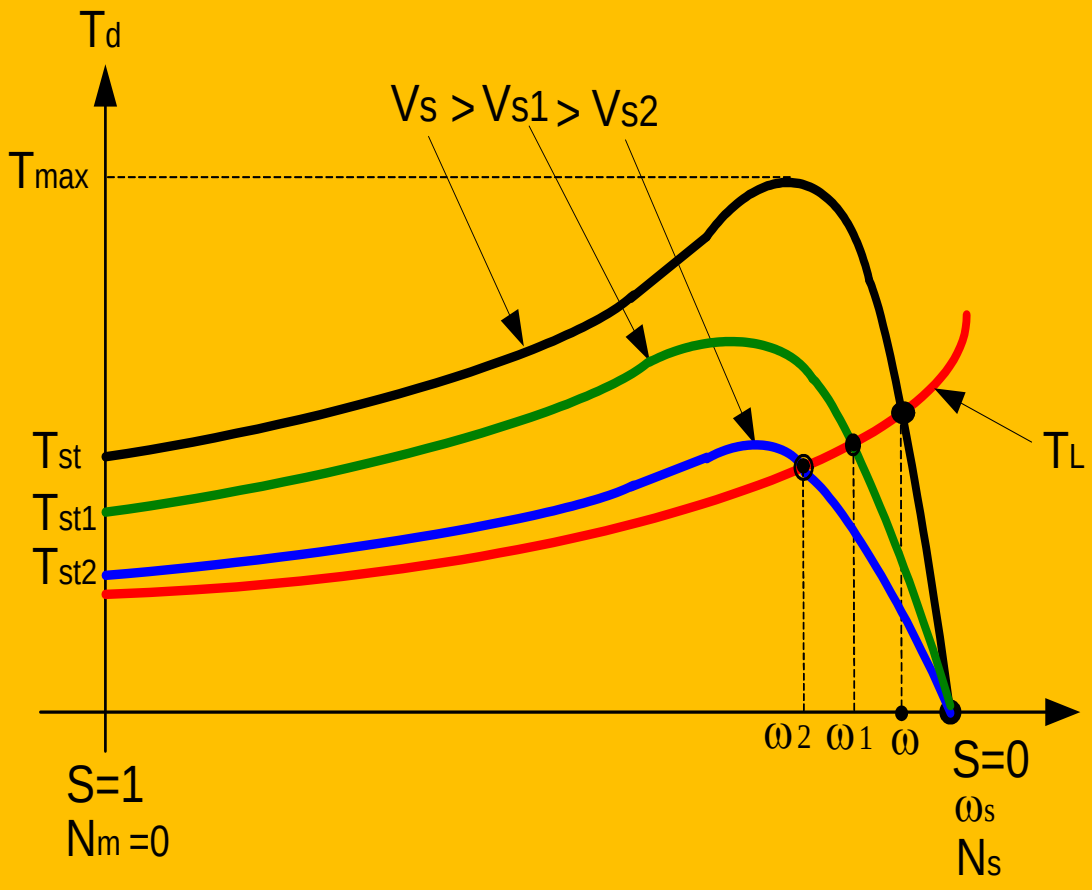
STATOR VOLTAGE CONTROL



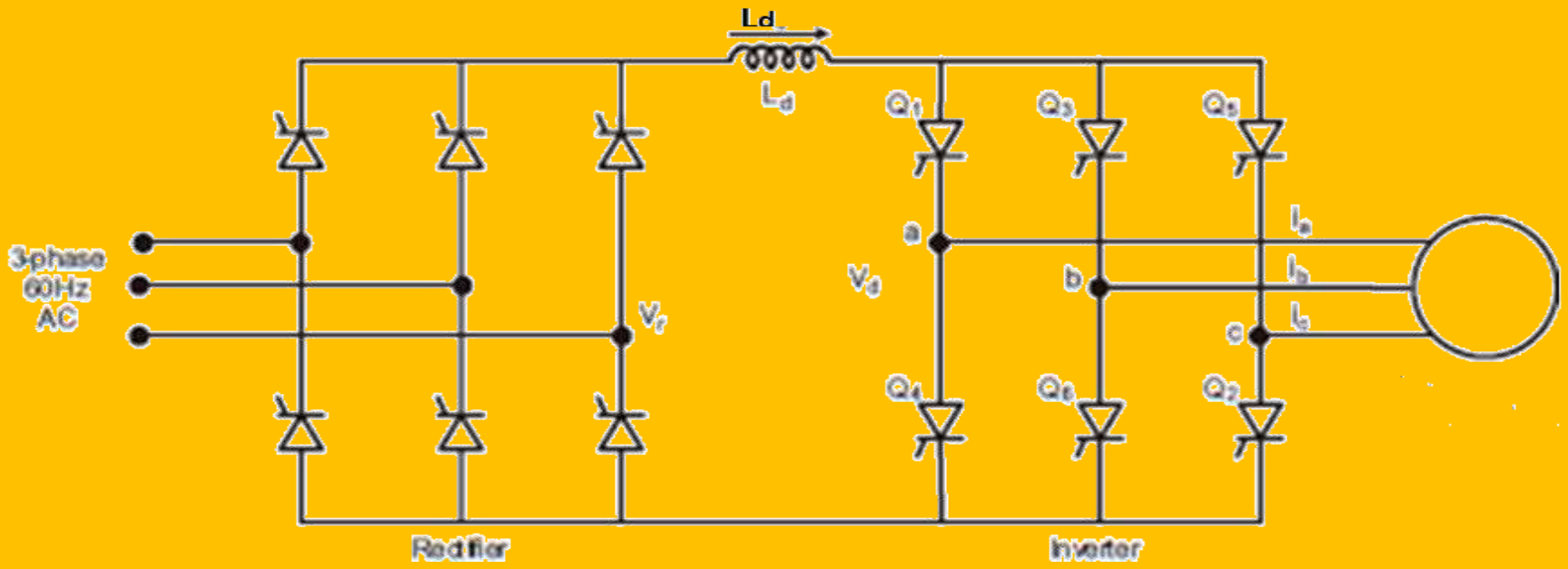
1. Six SCR or
2. 3 TRIAC

Three phase Voltage Regulator (fully control)

STATOR VOLTAGE CONTROL
Speed Torque Characteristics



EVALUATION TIME…



Circuit represent ?

RECOLLECT

Summarize the content…

Thanking You.