



# **SNS COLLEGE OF TECHNOLOGY**

**(An Autonomous Institution)**



**COIMBATORE-35**

**Accredited by NBA-AICTE and Accredited by NAAC – UGC with A+ Grade**

**Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE NAME: 23EET204/ ELECTRICALMACHINES II**

**II YEAR / IV SEMESTER**

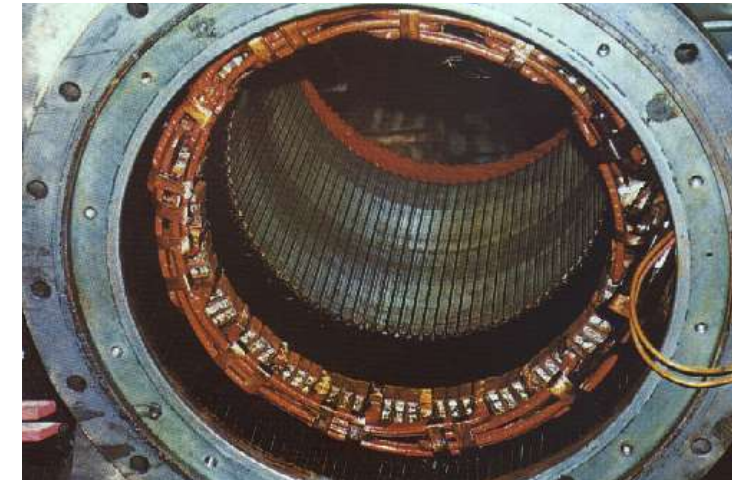
**Unit 2 – SYNCHRONOUS MOTOR**

**Topic 8: Synchronous condenser**





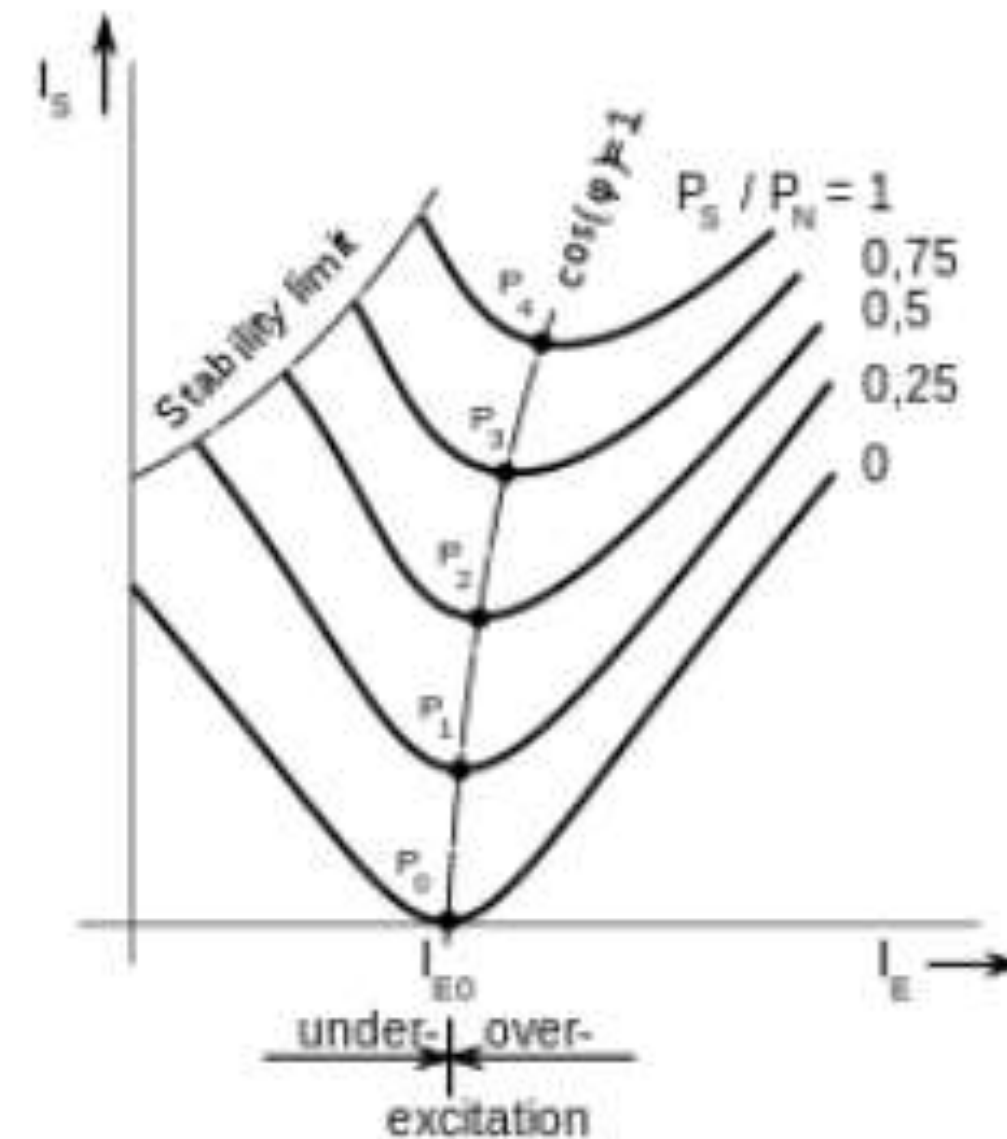
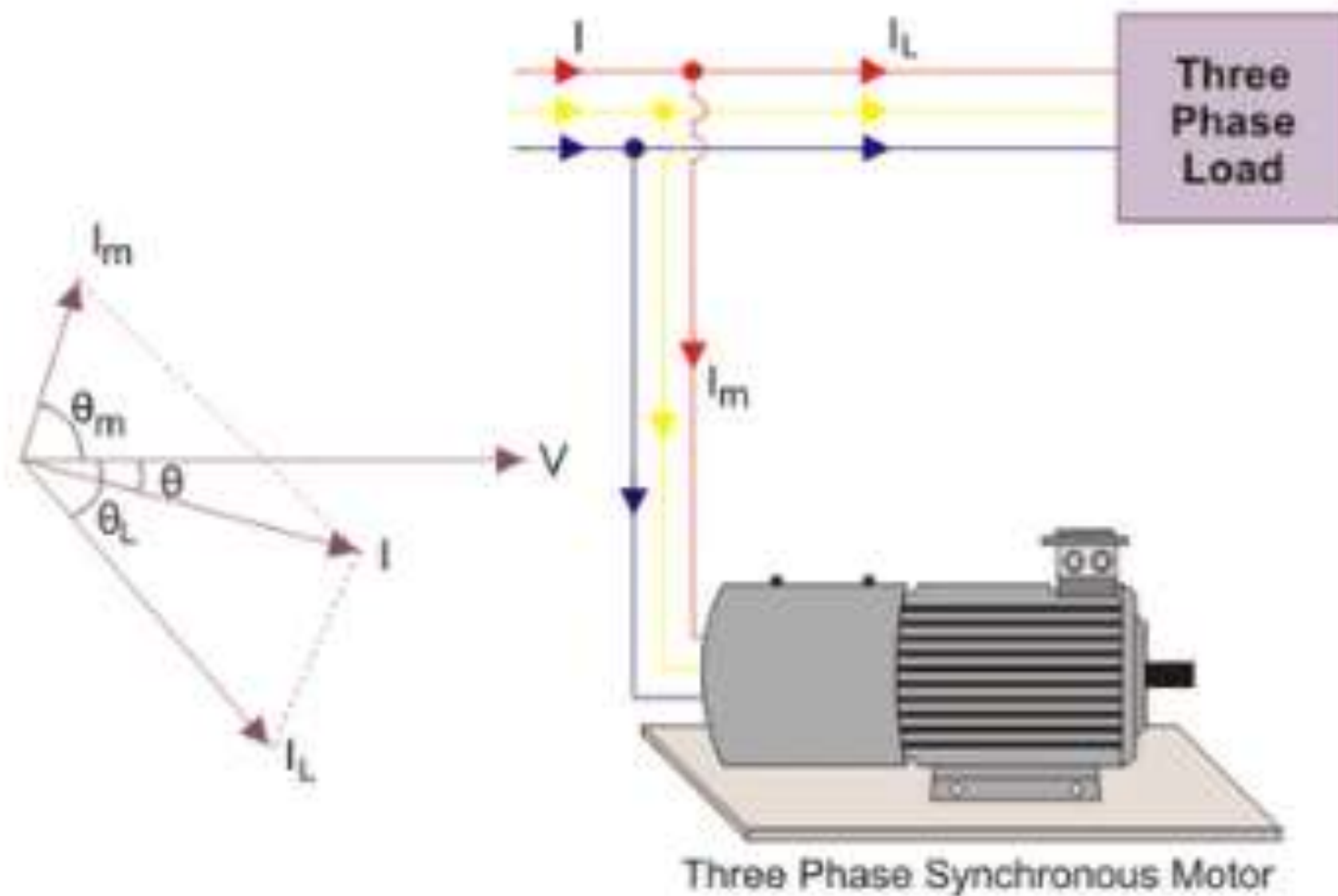
# GUESS THE TOPIC NAME...







# Synchronous Condenser





# Synchronous Condenser



- Like capacitor bank, we can use an overexcited synchronous motor to improve the poor power factor of a power system. The main advantage of using synchronous motor is that the improvement of power factor is smooth.
- When a synchronous motor runs with over-excitation, it draws leading current from the source. We use this property of a synchronous motor for the purpose.
- Here, in a three-phase system, we connect one three-phase synchronous motor and run it at no load.



# Synchronous Condenser



- Suppose due to a reactive load of the power system the system draws a current  $I_L$  from the source at a lagging angle  $\theta_L$  in respect of voltage.
- Now the motor draws a  $I_M$  from the same source at a leading angle  $\theta_M$ . Now the total current drawn from the source is the vector sum of the load current  $I_L$  and motor current  $I_M$ .
- The resultant current  $I$  drawn from the source has an angle  $\theta$  in respect of voltage. The angle  $\theta$  is less than angle  $\theta_L$ . Hence power factor of the system  $\cos\theta$  is now more than the power factor  $\cos\theta_L$  of the system before we connect the synchronous condenser to the system.



# Synchronous Condenser



- The synchronous condenser is the more advanced technique of improving power factor than a static capacitor bank, but power factor improvement by synchronous condenser below 500 kVAR is not economical than that by a static capacitor bank. For major power network we use synchronous condensers for the purpose, but for comparatively lower rated systems we usually employ capacitor bank.
- The advantages of a synchronous condenser are that we can control the power factor of system smoothly without stepping as per requirement. In case of a static capacitor bank, this fine adjustments of power factor cannot be possible rather a capacitor bank improves the power factor stepwise.
- The short circuit withstand-limit of the armature winding of a synchronous motor is high.
- Although, synchronous condenser system has some disadvantages. The system is not silent since the synchronous motor has to rotate continuously.
- An ideal load less synchronous motor draws leading current at  $90^\circ$  (electrical).





# SUMMARY

Synchronous Condenser



KEEP  
LEARNING..  
**Thank u**

SEE YOU IN NEXT CLASS