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DEPT.: **ELECTRICAL AND ELECTRONICS ENG**

1. The power factor of a synchronous motor is changed with a change in

 the excitation. When the excitation of the motor is increased, the

 power factor changes from lagging to unity and then to a leading

 power factor. This property of the motor is utilized to improve the

 power factor of the leads, having a low lagging power factor. Normally,

 when the motor is utilized in this way to improve the factor, the

 synchronous motor is run without any mechanical load. The excitation

 is adjusted in such a manner that it works at a leading power factor.

 The synchronous motor is then referred to a synchronous condenser.

2. That means that the three phase current entering the stator winding

 has an angle difference with the voltage. The purpose of using

 synchronous motors is to use it in leading power factor, by controlling

 the field current in the rotor.

3. An over-excited synchronous motor has a leading power factor. This

 makes it useful for power factor correction of industrial loads. Both

 transformers and induction motors draw lagging (magnetizing)

 currents from the line. ... This improves the plant power factor and

 reduces the reactive current required from the grid.

4. A synchronous motor has better power factor as compared to that of

 an equivalent induction motor. This is mainly because

* synchronous motor has no slip.
* stator supply is not required to produce magnetic field.
* mechanical load on the rotor remains constant.
* synchronous motor has large air-gap.

5. Synchronous motors are used for the power factor correction Now,

 since the set up of the magnetic flux (which can be considered as the

 reactive power component) inside the motor is done by the dc

 excitation provided on the rotor terminals, the power factor can also

 be controlled by controlling this dc excitation.

6. A synchronous motor running on no-load with leading power factor-

 will act as synchronous condenser. The same motor when

 operated with lagging power factor on no-load will draw a reactive

 current from the system depending upon the system voltage.

7. Like an induction machine, an under excited synchronous machine too

 will consume reactive power; a properly excited synchronous

 machine neither consumes nor produces reactive power; An over

 excited synchronous machine can produce reactive power.

8. Efficiency is higher than that  of an induction motor of the same

 output and voltage rating because there are neither losses related to

 slip nor the additional losses due to magnetizing current.

 With synchronous motors, there is no difference of speed between air

 gap rotating magnetic field and rotor.

9. Power factor of induction motor depends on load and speed, Power

 factor of a synchronous might be fixed, usually such motors are huge

 and therefore their reactive power causes huge losses

10. The real power is nothing to do with it. The real power will be

 proportional to the mechanical load. If the motor is uncoupled it will

 be (close to) zero, regardless of the reactive situation. If the load is

 consuming power, the motor will take it from the supply to pass on. If

 the load is supplying power the converse will apply.

11. Large synchronous motors have adjustable power factor, they can

 even have leading power factor. They are often set this way

 compensate for all the other induction motors. This can effect the

 efficiency of the motor depending on load. With the system tuned to

 near unity the entire distribution system benefits. It is a good way to

 go. There is not just one type of synchronous motor but they most

 often do better than standard induction motors.

12. Synchronous motor always rotates with synchronous speed,

 irrespective of the loading conditions. So, the effective output is not

 reduced, compared to induction motor. So, more efficiency is

 observed in this case. Also, the operating power factor is constant in

 synchronous motors. It is also a doubly excited machine, unlike

 induction motor.

13. Synchronous machine have separate DC excitation which reduces

 machine's excitation dependency on main supply, hence better PF.

 where as IM have no such provisions, hence low PF .

14. Power factor is a number which tells us about the efficiency of an AC

 machine like induction motor. As we know, in an inductive load

 current it lags the voltage by a certain angle. The higher the lag, the

 lesser the power factor. **Cosine of the angle between Voltage and**

 **Current is called power factor.**

15. An over-excited synchronous motor has a leading power factor. This

 makes it useful for power factor correction of industrial loads. Both

 transformers and induction motors draw lagging (magnetising)

 currents from the line. ... This improves the plant power factor and

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