**ASSIGNMENT ON POWER FACTOR CORRECTIONS AND SYNCHRONOUS MOTORS**

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Answers

1. Increasing the device’s field winding excitation results in its furnishing reactive power (VARs) to the system, and decreasing the field winding excitation causes absorption of reactive power from the system (VARs). Hence, it acts a capacitor in over excited mode and an as inductor in under excited mode.
2. Synchronous motor are designed to operate at unity(1.0) power factor or 0.8 leading power factor. By varying the DC excitation of the motor, the power factor of the motor can be varied widely. Overexcited synchronous motors operate at leading power factor and provide reactive kVAR like capacitors.
3. An over-excited synchronous motor has a leading power factor. This makes it useful for power correction, both transformer and induction motor draw lagging (magnetism) currents from line. This improves the plant power factor and reduces the reactive current required from grid.
4. Higher power factor means low requirement of MMF for energy transfer, hence low magnetizing current requirement. Synchronous machine have separate DC excitation dependency on main supply,hence better power factor. Whereas induction motor has no such provisions for that.
5. Synchronous motors are doubly fed motors… now since the set up of the magnetic flux 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. When a synchronous motor operates with no load it can be said to take purely leading or lagging current by over exiting or under exciting its field windings. In fact such motors were used foe line compensation and known as synchronous phase modifier or synchronous condenser.
7. Like an induction machine ,an under excited synchronous machine will consume reactive power; a properly excited synchronous machine nether consumes or produces reactive power; an over excited synchronous machine can produce reactive power
8. The efficiency is higher than 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. For efficiency and economic reasons
10. It reduced reactive power.

11. Large synchronous motors can have adjustable power factor they can even have leading power factor. They are often set this way to compensate for all other induction motors. This can effect the efficiency of the motor depending on the load with the entire system tuned to near utility the entire system benefits. There is not just one type of synchronous motor but most often do better than standard induction motor

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 a constant in synchronous motors .it is also a doubly excited machine

13. Synchronous machine have separate DC excitation which reduces machine’s excitation dependency on main supply, hence better power factor.

14. Induction motor as we all know, in an inductive load current lags the voltage by a certain angle. Higher the lag, lesser will be the power factor. Consine of the angle between voltage and current is called power factor.

15. An overexcited synchronous motor has a leading power factor. This makest useful for power factor correction of industrial loads. Both transformer and induction motors draw lagging currents from the line. This improves the plant power factor and reduces the reactive current required from the grid.