

## Tutorial -5 (Electrical Energy Management)

- 1) An alternator is supplying a load of 300 kW at a p.f. of 0·6 lagging. If the power factor is raised to unity, how many more kilowatts can alternator supply for the same kVA loading?
- 2) A 3-phase, 5 kW induction motor has a p.f. of 0·75 lagging. A bank of capacitors is connected in delta across the supply terminals and p.f. raised to 0·9 lagging. Determine the kVAR rating of the capacitors connected in each phase.
- 3) A factory takes a load of 200 kW at 0·85 p.f. lagging for 2500 hours per annum. The tariff is Rs 300 per kVA plus Rs.3 per kWh consumed. If the p.f. is improved to 0·9 lagging by means of capacitors costing Rs 420 per kVAR and having a power loss of 100 W per kVA, calculate the annual saving effected by their use. Allow 10% per annum for interest and depreciation.
- 4) A supply system feeds the following loads (i) a lighting load of 500 kW (ii) a load of 400 kW at a p.f. of 0·707 lagging (iii) a load of 800 kW at a p.f. of 0·8 leading (iv) a load of 500 kW at a p.f. 0·6 lagging (v) a synchronous motor driving a 540 kW d.c. generator and having an overall efficiency of 90%. Calculate the power factor of synchronous motor so that the station power factor may become unity.