falling water into mechanical energy i.e p.e of water into rotational energy (K.E). Turbines are of two types:

i) Impulse Turbine → Pelton Turbine (High heads)
ii) Reaction Turbine - is a horizontal or vertical
→ Kalpan Turbine (low heads)
→ Francis Turbine (middle heads)

⇒ ELECTRICITY TARRIF * (bone)

The rate at which electrical energy is supplied to the consumers is known as tarrif

Types

i) Simple Tarrif
When there is a fixed rate per unit of energy consumed is called as simple tarrif or uniform rate tarrif

ii) flat rate tarrif
When diff. types of consumers are charged at different per unit rates

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iii) Block rate tarrif

When a given block of energy is charged at a specific rate and the succeeding blocks of energy are charged at progressively reduced rate it is called as block rate tarrif.

iv) Two part tarrif

When the rate of electrical energy is charged on the basis of maximum demand of the consumer and the unit consumed it is called as two part tarrif.

v) Maximum demand tarrif

It is similar to two part tarrif with the only diff that the max. demand is actually measured by installing maximum demand meter.

vi) Power factor tarrif

The tarrif in which power factor of the consumer's load is taken into consideration.

vii) Three part tarrif

When a total charge to be made

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from the consumer is split into three parts i.e fixed charge, semi fixed charge and running charge is known as three part tarif.

POWER FACTOR IMPROVEMENT *

Power factor
the cosine of angle b/w the voltage and the current in an ac circuit is known as power factor.

Power factor improvement equipment are:
i) static capacitor
ii) Synchronous condensor
iii) Phase advancer.

DISADVATAGE OF LOW POWER FACTOR. *

1. Large copper losses.

$$P = V_L I_L \cos\phi$$

$$I_L = \frac{P}{V \cos\phi}$$

from the above relation it is clear that if power factor is low then the current withdrawn by

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the power system is very high and hence large i^2R losses. (Copper loss)

1. Large KVA Rating of Equipment

KVA → Kilo Volt Ampere.

$KVA = VI$

Power $\cos\phi$ inversely $\propto$ to KVA

$$P = \underbrace{VI}_{KVA} \underbrace{\cos\phi}_{\text{Power factor}}.$$

$$KW = KVA \cos\phi$$

$$KVA = \frac{KW}{\cos\phi} \Rightarrow \cos\phi = \frac{KW}{KVA}$$

from the above eqn it is observed that if the $\cos\phi$ is increased then the KVA requirement is reduced.

2. Greater Conductor Size

To transmitt or distribute a fixed amount of power at const voltage the conductor will have to carry more current at low power factor.

POWER FACTOR IMPROVEMENT

So as to avoid the losses in the

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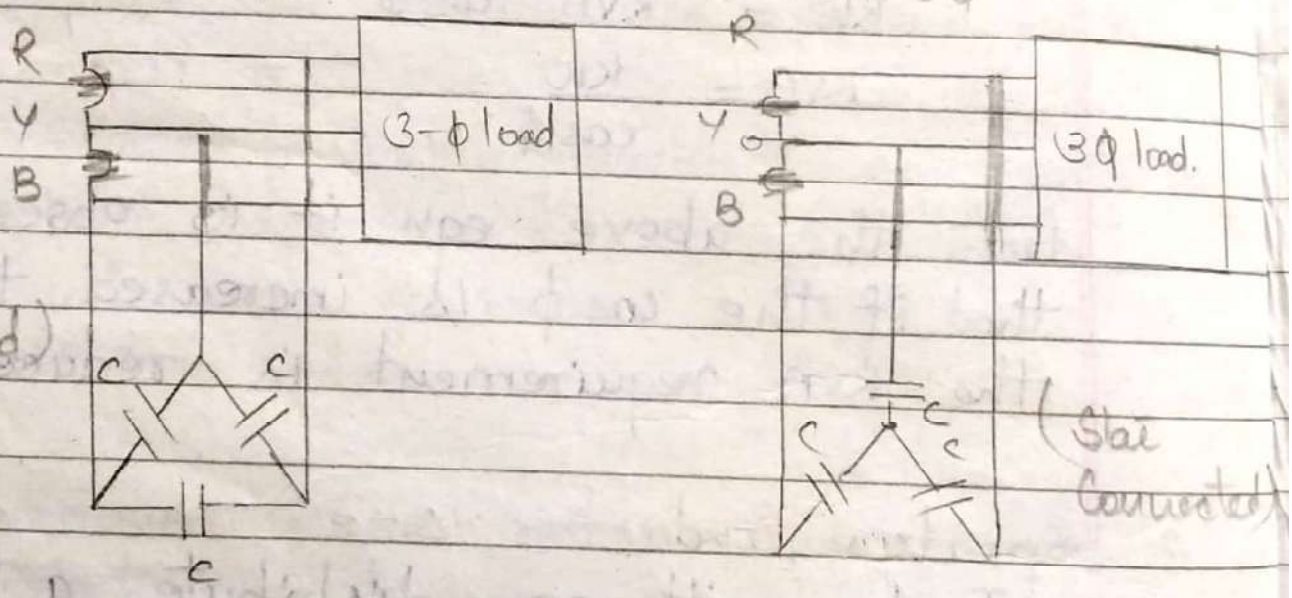
transmission line or to maintain the the power factor should ~~beforo~~ low. So we use following device to improve the cos ϕ. power factor

1. Static Capacitor

The cos ϕ can be improved by connecting the capacitor in parallel to the equivalent load operating at low cos ϕ

A static capacitor installed in // with 3ϕ



Advantage

1. Losses are low in static capacitors.
2. There is no moving part, therefore need low maintenance.
3. They are light weight so it can be easy to install

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Disadvantage → The age of static capacitor is low. (8-10 yrs)
→ If rated voltage ↑, then it causes damage

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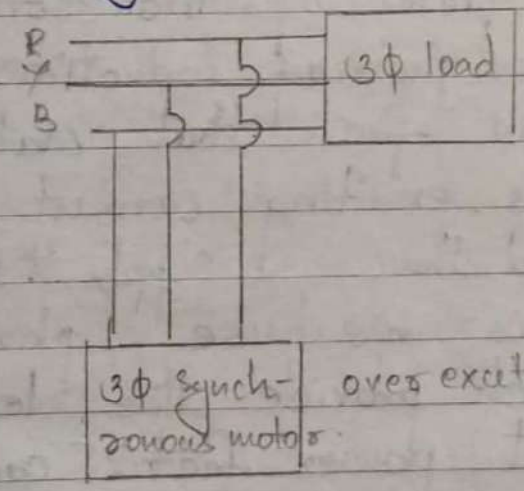
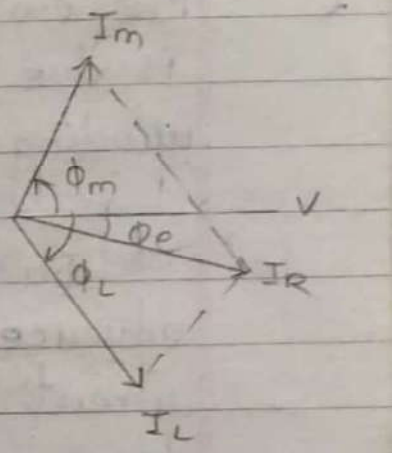
2. Synchronous Condensor

A synchronous motor takes a leading current when over excited and ∴ behaves as a capacitor. An overexcited synchronous motor running on no load is known as synchronous condensor.





Advantage

1. long life (25 yrs) almost
2. By varing the feel excitation, the magnitude of current drawn can be changed by any amount
3. The fault can be removed easily.
4. Require low maintenance.

Disadvantage

1. It produces noise

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2. The maintenance cost is high.
3. There are considerable losses in the motor.

8. Phase Advancer

Phase Advancer are used to improve the power factor of induction motor The low power factor of induction motor is due to the fact that stator winding draws exciting current which lags behind the supply voltage. So, in this we use phase advancer which provide the leading current so that power factor can be improved.

Advantage

→ It can be used where the synchronous motor is unacceptable

Disadvantage

→ Using P.A is not economical for motors below 200 H.P.

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