I Year II Semester **L P C**

Code: 17PE232 **4 0 3**

REACTIVE POWER COMPENSATION & MANAGEMENT
(Common to PE, P&ID, PE&ED, PE&D, PE&S, EM&D, HVE, PSHVE)
(Elective III)

Prerequisites: Brief idea of power system analysis, electric traction systems and Arc furnaces

Course Educational Objectives:

1. To know the basic objectives of reactive power compensation.
2. To know the types of compensation and their behaviour.
3. To know the mathematical modeling of reactive power compensating devices.
4. To know the reactive power compensation has to be done at distribution side.
5. To know the role of reactive power compensation at electric traction systems and Arc furnaces.

UNIT-1: Load Compensation

Objectives and specifications – reactive power characteristics – inductive and capacitive approximate biasing – Load compensator as a voltage regulator – phase balancing and power factor correction of unsymmetrical loads- examples.

UNIT-2: Reactive power compensation in transmission system:

Steady state -Uncompensated line – types of compensation – Passive shunt and series and dynamic shunt compensation – examples Transient state - Characteristic time periods – passive shunt compensation – static compensations- series capacitor compensation –compensation using synchronous condensers – examples

UNIT -3: Reactive power coordination:

Objective – Mathematical modeling – Operation planning – transmission benefits – Basic concepts of quality of power supply – disturbances- steady –state variations – effects of under voltages – frequency – Harmonics, radio frequency and electromagnetic interferences

UNIT -4: Distribution side Reactive power Management:

System losses –loss reduction methods – examples – Reactive power planning – objectives – Economics Planning capacitor placement – retrofitting of capacitor banks User side reactive power management: KVAR requirements for domestic appliances – Purpose of using capacitors

– selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations

UNIT-5: Reactive power management in electric traction systems and are furnaces:

Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer –filter requirements – remedial measures –power factor of an arc furnace.

Course Outcomes:

After completion of this course the students will be able to:

- Learn various load compensations.
- Obtain the mathematical model of reactive power compensating devices.
- Get application of reactive power compensation in electrical traction & arc furnaces.

Reference Books:

1. Reactive power control in Electric power systems by T.J.E.Miller, John Wiley and sons, 1982.
2. Reactive power Management by D.M.Tagare,Tata McGraw Hill,2004.