

**M.TECH SECOND SEMESTER  
REACTIVE POWER CONTROL IN ELECTRICAL SYSTEMS**

**17EEPC2T5C**

**Lecture: 4 periods/week**

**Credits: 4**

**Internal Assessment: 40 marks**

**End Semester Assessment: 60 marks**

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**Course Objective:**

This subject deals with load side compensation, reactive power compensation in transmission system and reactive power co-ordination.

**Course Learning Outcomes:** At the end of the course the student will be able to

1. Understand the need of load compensation.
2. Analyze various reactive power compensation techniques.
3. Understand reactive power coordination and demand side management.
4. Illustrate reactive power control requirements in domestic, traction and arc furnace systems.

**UNIT - I**

Power system loads: Load characteristics that influence voltage stability & reactive power such as – Discharge lighting, Induction motor, Air conditioning and heat pumps, Electronic power supplies, Over Head lines and cables.

Reactive Power compensation: Generation and absorption of reactive power – Reactive power compensators & voltage controllers: - shunt capacitors, synchronous phase modifier – static VAR system – on load tap changing transformer, booster transformers

**UNIT-II**

Objectives and specifications of reactive power compensation – reactive power characteristics -Types of compensation – Passive shunt and series and dynamic shunt compensation - Characteristic time periods – passive shunt compensation – static compensations- series capacitor compensation –compensation using synchronous condensers, Basic concepts of quality of power supply – disturbances- steady –state variations – effects of under voltages – frequency – Harmonics

**UNIT-III**

Demand side management: Load patterns – basic methods of load shaping - KVAR based tariffs penalties for voltage flickers and Harmonic voltage levels – Distribution System losses –loss reduction methods –Reactive power planning – objectives – Economics Planning capacitor placement – retrofitting of capacitor banks

**UNIT - IV**

KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor - Typical layout of traction systems – reactive power control requirements for traction systems - Electric arc furnaces – basic operations – Reactive power requirement and power factor correction of an arc furnace

**TEXT BOOKS:**

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

**REFERENCE BOOK:**

1. C.W.Taylor, “Power System Voltage Stability”, Tata McGraw Hill.