

Course Title: Transmission and Distribution

Course Code: EPEG 406

Credit Hours: 3

Course Description:

This course is concerned to study the various aspects of energy demand, Load requirements and economic factors relating to the design of electrical distribution systems.

Course Contents:

Unit 1: Characteristics of Electrical Loads

Domestic, Commercial, and industrial; Voltage and frequency dependence; Load duration curves and load factor; Daily variation, Seasonal and annual variation, Long and short term prediction of load, Diversity factor, Load uncertainty, Power factor and its correction; Purity of wave forms; Harmonics; Characteristics of electrical loads in Nepal

Unit 2: Elements of Transmission and Distribution

Transmission of electrical energy; Effect of increase of voltage on weight of copper used for transmission; Efficiency of the line and line drop; Practical working voltage; Underground cable or overhead system; Different systems of transmission and circuits; Volume of copper used for different systems of transmission of power

Unit 3: Short Transmission Lines

Effects of (R-L-C), Line regulation, Line efficiency, and line calculation; Mixed condition for sending and receiving end; Nominal T method, and nominal pi method; Faranti effect and lines losses in an open circuit line

Unit 4: Long Transmission Lines

Auxiliary line constants and evaluation of auxiliary constants; Complex angle and evaluation of complex angle; Surge impedance; Evaluation of auxiliary constant and generated auxiliary line constants; Line with parallel circuit and transmission line with parallel circuit; Transmission line with series impedance at receiving end and sending end and with transformer at both ends; Generalized two port or terminal network; Generalized constants for an equivalent pi circuit; Generalized constants for an equivalent T- circuit.

Unit 5: D.C. Distribution

Distribution system, Two wire distribution, and different types of distributors. DC distributors fed at one end, Distribution fed from both ends with unequal potential, Uniform loaded distributed feeder fed at one end and both end; Power loss in the distributor fed from both ends; Three wire distributor fed from ends; Tapered distributor or stepped distributor and ring mains.

Unit 6: A.C Distribution

Introduction, Method of solving ac distributors; Thevenin's theorem as applicable to ac circuits; Superposition theorem as applicable to ac circuits; Load supply through parallel lines

Unit 7: Cables

Classification of cables, Cable conductors, and requirement of the cables; Cable construction, Cable insulation, and metallic sheathing protective covering; Mechanical protection and low tension cable; Capacitance of single core cable and dielectric stress in a cable; Economical core diameter, grading of cables, and ionization in the cable; Heat produced within the cable and mechanism of heat flow in a cable; Thermal resistance of cable for single core and three core construction

Unit 8: Transmission and Distribution Systems Design for Nepal

References:

1. W. Stevenson, *Elements of Power System Analysis*, McGraw Hill
2. S. L. Uppal, *Electrical Power*
3. Asfaq Hussain, *Elements of Electrical Power Systems*

Evaluation:

In-Semester Evaluation: 50%

End-Semester Evaluation: 50%