

17PS12E3 - EHVAC TRANSMISSION

Instruction/week: 4 hrs.
Univ. Exam: 3 hrs.

Max. Sessional marks: 40
Univ. Exam marks: 60

UNIT – I

VOLTAGE GRADIENTS OF CONDUCTORS : Electrostatics , field of sphere gap, field of line charges and their properties, charge –potential relations for multi – conductor lines, surface voltage gradient on conductors, examples of conductors and maximum gradients on actual lines, gradient factors and their use, distribution of voltage gradient on sub –conductors of bundle, design of cylindrical cages for corona experiments.

UNIT – II

CORONA EFFECTS – POWER LOSS AND AUDIBLE NOISE : Corona loss formula, charge – voltage (q-v) diagram and corona loss ,attenuation of traveling waves due to corona loss, audible noise: generation and characteristics, limit of audible noise, A-N measurement and meters, formulae for audible noise and use in design , relation between single – phase and three-phase AN levels, day –night equivalent noise level, examples of A-N levels from EHV lines .

UNIT-III

THEORY OF TRAVELING WAVES AND STANDING WAVES: Traveling waves and standing waves at power frequency, differential equations and solutions for general case, standing waves and natural frequencies, open –ended line: response to sinusoidal excitation, line energization with trapped charge –voltage, corona loss and effective shunt conductance, the method of Fourier transforms, reflection and refraction of traveling waves, transient response to systems with series and shunt lumped parameters and distributed lines.

UNIT– IV

OVER VOLTAGE IN EHV SYSTEMS CAUSED BY SWITCHING OPERATIONS : Origin of over voltages and their types, short circuit current and circuit breaker, recovery voltage and the circuit breaker, over voltages caused by interruption of low inductive current, interruption of capacitive currents ferro – resonance over voltages, calculation of switching surges – single phase equivalents, distributed parameter line energized by source , generalized equations for single phase representation , generalized equations for three phase systems inverse Fourier transforms for the general case, reduction of switching surges on EHV systems , experimental and calculated results of switching surge studies.

UNIT – V

EHV TESTING AND LABORATORY EQUIPMENT : Standard specifications , wave shapes for testing, properties of double –exponential wave shapes, procedures for calculating α , β , ϵ ., wave shaping circuits, principles and theory .Impulse generators with inductance .Generation of switching surges for transformer testing .Impulse voltage generators , Practical circuits, Energy of impulse generators .Generators of impulse currents, Generators of high attenuating test voltage, High direct voltage measurement of high voltages .General layout of EHV laboratories.

TEXTBOOKS:

1. “Extra high Voltage AC transmission Engineering “ by R.D. Begamudra, Wilen Eastern Ltd.

REFERENCES:

1. "High voltage Engineering " by Naidu M.S. and Karmaraju , V.T.M.H. Pub .Co. High voltage technology – Alston L.L. Oxford University Press.