UNIT 1

(a) Structure of Electrical Power Systems : Structure of electrical power system, Different factors associated with generating stations such as connected load, maximum demand, Demand factor, Average load, Load factor, Diversity factor, Plant capacity factor, Reserve capacity, Plant use factor, Load curve, Load duration curve, Concept of base load and peak load stations, Advantages of interconnected grid system, Fitting of available generating station into the area load duration curve.

(b) Tariff : Introduction of Tariff, Tariff setting principles, desirable characteristics of tariff, various consumer categories and implemented tariff such as two part tariff, three part tariff (Numerical on two part and three part tariff), Time of day tariff for H.T. and L.T industrial and commercial consumers, Introduction to Availability based tariff (ABT), kVAh tariff (Descriptive treatment only).

UNIT 2

Chapter 2 : Major Electrical Equipment's in Power Station and Underground Cables 2-1 to 2-68

A) Major Electrical Equipments in Power Stations : Descriptive treatment of ratings of various equipment used in power station, special features, field of use of equipment like alternators, necessity of exciters, various excitation systems such as dc excitation, ac excitation and static excitation systems, power transformers, voltage regulators, bus-bars, current limiting reactors, circuit breakers, protective relays. Current transformers, potential transformers, lightning arresters, Earthing switches, isolators, Carrier current equipment's(P.L.C.C.), Control panels, battery rooms, metering and other control room equipment in generating stations.

B) Underground Cables : Construction of cables, Classification of cables, XLPE cables, Capacitance of single core and three core cable, Dielectric stresses in single core cable, Grading of cables, inter sheath grading, capacitance grading.

UNIT III

Chapter 3 : Mechanical Design of Overhead Lines and Insulators 3-1 to 3-37

A) Mechanical Design of Overhead Lines : Main components of overhead lines, various types of Line supports, Conductor spacing, Length of span, Calculation of sag for equal and unequal supports and effect of ice and wind loadings.

B) Overhead Line Insulators : Types of insulators, its construction and their applications such as Pin type, Suspension type, Strain type, Shackle type, Post insulators, bushings, Potential distribution over suspension insulators, string efficiency(Numerical on string efficiency and up to four discs only), Methods of improving string efficiency (Descriptive treatment only).

UNIT 4

Resistance of transmission line, skin effect and proximity effect, Factors responsible for production of these effects, Internal and external flux linkages of single conductor, Inductance of single phase two wire line, Necessity of transposition, Inductance of three phase line with symmetrical and unsymmetrical spacing with transposition, Concept of G.M.R and G.M.D, Inductance of bundled conductors.

UNIT 5

Electric potential at single charged conductor, Potential at conductor in a group of charged conductors, Capacitance of single phase line, Capacitance of single phase line with effect of earth's surface on electric field, Concept of G.M.R and G.M.D for capacitance calculations, need of transposition for capacitance calculations, Capacitance of three phase line with symmetrical and unsymmetrical spacing with transposition. Capacitance of single circuit and double circuit three phase line with symmetrical and unsymmetrical spacing considering transposition (without considering earth effect).

Classification of lines based on length and voltage levels such as short, medium and long lines. Performance of short transmission line with voltage current relationship and phasor diagram, Representation of medium lines as 'Nominal • ' and 'Nominal T' circuits using R, L and C parameters. Ferranti effect, Representation of 'T' and 'π' models of lines as two port networks, Evaluation and estimation of generalized circuit constants (ABCD) for short and medium lines, Estimation of efficiency and regulation of short and medium lines.

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