LECTURE NOTE ON GENERATION TRANSMISSION & DISTRIBUTION 4TH SEM ELECTRICAL ENGINEERING

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 U(c) dath pails? 9.01.2018 Generation of Electricity 8. . Conversion of energy from other sources found princarily in nature to electrical encougy is referred as generation of electricity Schemel 16/ Employ Coner station: . where the tailly of electorical energy is generated, that site is called as lever, Station. · xlepending upos the source of energy converte of soto electorical energy, tower station: ear be categoedsed madnly snto there types: Thebilities the 1. Thermal dever station (coal). 2. Hypor/Hydel Somer station (plater). 3. Nuclear Lewer station (Voianium). RIVER -10.01.18 FHERMAL POWER PLANT :: must be made to ph The arrangement of a thornal power plant is mainly classified into the following of categories, they are:

Coal Hondding Plant (CMP). - べんしょうりょん 2) Steam Genorationg Unit. 3: 8 fearos Turbine. 4. Alternatos. 5. Feed Majer Unit. 6 Condender Dulf. Schematic layouts. Chimny are stack. Bus-ban is privas lastatoris là privation de la privat Forced Dir Beheater, Economiter reprises to smooth flue gas. Steam Alter. > CHIP > Boiler Cealo super heats is valre. Husbone storage hatos Feed Water. Aump. Jach hlinding 3 sent Orh -Plant. storage Condenser cros. (1) alto (1) alto (1) (1) cooling dump. Tewer relean (Uscarlum). - RIVER-81.10.01 · A thermal Pomer: station is a panar stati In religh heat energy is converted - On al pomer. Delow to electric front any plater is heated, turns Tosto

1=01=18-Q. Maria HYORD POWER PLANTS. spins a éteans publine which d'alres as electrical generatore. After it passes through a twilding, the steam he condensed in a condenseit and recycled to where it was heated; this is known as a Rankine Lyde. . The gereatest variation in the design of thermal power stations is due to the different heat sources; forsil fuel dominates here, although nuclear heat energy and solar heat energy are also used. · Carefain thermal power stations are also designed to preduce heat energy for induspokal purposes, or disposed heating or desalination of water, in addition genereating electrical power. heat exchanges - motalled 32.30 master and tunetiony: · In ceal storage, bulk of coils are stored to supply the baller. · In Coal Handling Plast (CHP), coals of different sizes and shapes are courshed in small sizes to marease the efficiency.

· Boiler's by using method carl as a fuel, genesiates à lifet pressure, tempisiature steam Supercheater backeases the temperature of the steam to a very high value to fed it to the steam twebbne. steam twelsne extracts thermal energy ·A for pressurized steam and uses if to do mechanical mostly on a sofating output shaft. · Alternator le an electrical generiator that converts mechanical energy to electrical energy in the form of alternating. current As the alfernator produces a 3-\$ output, If he connected then to the bus-bases for the neccessary pranchiserion and aldefrib. - ution l'eystern. disalitation of A condenseve le a neafeur-cooled shell and tise heat eschangeve motalled on the exhaust stears from a steam twilline on theinal power stations. . Cooling tomer is the heat recepcition devace that reejects maste heat to the atmospheric through the waling of neater stream to a vower femperation

Ash handling Plant system is required to handle ash for its propere utilization on desposal. though Whitehald . Function of economiser fe to secores some of the heat from the heat carried away in the flue gases up the chimney and althize for healthy the feed mater to the beiles. · to secend of samphit fans are used to segulate propare combruetion and maximize efficiency of the fuel. 11-(6) domantages: I'm strong Tools not Lew fuel cost. · Heat production system & demple. Easy mechanism. dame heat could be reused. · Requisees small space why ange achieved 01 · Easy maintenance of power station. 5.50 0 0 000 alleaduantages." some side or put lash pollettice energy of Soluges production of CO2 ident estan Q. plant everall efficiency petrontas monor : Rabees sea neafer level -c: vakience Thermal enfines regulares huge amount & very lubrication of that

Carlina (carl) 11.01.18 0 FIY DRO POWER PLANTS. Achematic layout: Elect able. Head plater his ransmitsto Tower ese y voir. Con bo-Form 110461 Transformer 30 DAM. • (surge land. 12.15 301-00 Sluice Trash Ruck Twilline late G yen sato fen stock Forebay inlet PONE value. HOUSE alginie level lai caulo be 1221126 iea In hydro power plants, hydro electricity is 1 produced from hydropower. Most hydro-electric ponece non the comes potential energy of gammed mater of purbine and generia nafer -ng parvere estoacted from on the volume and on the He evence helpht between the source and fi neaters's

outflow. This height difference is called the head A large pipe (the penstock) delivere water from the suservoir to the twome. · lumped storage method produces electricit. in to supply high peak demande by moving native between successions at different denatrisone. . At times of low electoscity demand, the excess generation capacity is used to peop reater sotois the higher suservoise. . When the demand becomes greaters, mater is released back for the lower secenvoir through a twelsine. spinorg platup of Parets and Functiones sig of good - sind 12 · Hydroelectric power fippopeduced as neater passies through a dam and soto a selver below. The movie mater that passes through a dam, the move energy is preduced. Ogenera dans de built, an exclipicial man-ma de take follopented behind the gam. · Austuice hep as mater, channel, confortled sat fis phead by a gate. A sluice gate sentraditionally a wood or metal baseder selfeding in groover, that are set in the aldes of the reaferinay. It commonly

control mater levels and flow rates motions . and canals when a clusce gate I for lowered, mater may spill areas the top in which case the gate operales as a neise · A penstock & a cluice ou gate or intake spective that controls mature flow, or an enclosed pspe that delivery realere to hydro-twelsines and serverlage systems. ¢ · A surge fank le la standpipe our elonge deeservoirs at the dens stream to absorb sudden ilses of pricencio, as well as •{ to quickly prompde estoa matere dwelge a brief open la preservice net pro stant · The primary propose of the trash rack is to protect the equipmentality keeping. -fleating leaves and trash from entering the ticlones. Keevens anon alt twilling like reaction fuctories, Contractor prometer diffusere tube is installed at the evit of the website known as draft ittuber These draft these at the end of the - pucksine incuceases the preserve of the exiting fluted of the expense of the

· towere hause conself of Twilshe and Generator. when high preservice majore hits the twelsine blades, the publice sofates and sofates the generator accurative, which produces. electricity. . The produced electricity is then transmitted through transmission tomers. Clonantages 6. - 14 · Once a dam le conspucted, electricity can be produced at a constant rate. . If electricity is not needed, the shurce gates can be shut, stopping electricity gen--eration. The mater can be saved for use another time when electricity demand and mark Turks (M Is hep. . The Tayes formed behind the dam can used for foorigation purposes. be the atmesphere. · alor't pollute (total) 名0 HALANATHI 107-aloxo Water 1. States allead vantagee and mill · alams are expensive to build. · Flooding chances are nieve which causes the despication of natural environment

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plant fichency of a hydro power an advising 1.1 Stadie 12121 80-90 % Justofice and alies and alies 2.41 month modules Saf Grand Port We arrive 12.1.18 tude boulever 6 3.4 Nuclear Tener Plasts. Muntipot d nuclease · A poner plant where readicactive elements is converted into electrical energy is called Nuclear Power prante electronica a la la parteriore . The main parts of a Nuclear Plant areside 30 2 prigots tures and (1) Nuclear Keacton. ALC IN (1) Heat Jeschanger 11 ant relia 4211 (11) Steam -Twelsne. tailit (12) Alternatose: publica permit esta Schematic layeut. 1 pr Bougation meter Heat value steam Elechic Nuclear Contract of the Olternator Exchanger [7 Reactor Detory)feed fump Enhant phi-ment Col Metal. Condenger 350 2000 Circulating Circulating anida. 00 chancel and cooling stephus hit

. A nuclear power plant or nuclear power station is a theormal prever plant in which the heat source is a nuclear secartor . As is typical is all conventional thermal pervere stations the heat is used to generate steam effor which drives a steam twelsine connected to an electric generatore. relitch produces relectorcity. · Nu clear power efactions are usually consider. -ed to be base lead stations since fuel is a small part of cost of production. The fierton in a nuclear reactor heats the reactor coolant. The coolant may be water or gas or even liquid metal depend. -ing on the type of seactor. This seactor coolant then goes to a steam generator. and heats materie to produce steam. The presweized steam is then usually fed to a multi-stage steam turbline. After the steam fuelsine has espanded and partially condensed the stears, the semi-- aning vapoure le condensed los à condense. -8. . The condenser its a heat exchanger which he connected to a secondary stole

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such as a refrere ore a cooling tomeor. The mater is then premped back into the steam generator and the syde begins again with a way the of lasting tauts and frenctionse. Ca 3 3 . The nuclear seacfor is the heaves of the station. In its central part, the reactor coole's heat is generated by controlled nuclear freekon. With this heat, a coolast is heated as it is premped through the reactore and thereby removes the energy from the reactor. These usually seely on unansum reaction. unansum to fuel the The purpose of the steam twelsine is to convert the heat contained in steam into mechanical energy. The engine house with the steam furthing is usually sprecturally separated from the main reactor buildly Alternatory converts mechanical power supply by the troubline to ac electrical. power. · A cooling legistern servicies hear from the seactor cove and transports if to

another area of the station, where the thermal energy can be harnessed to. preduce electricity or to do other useful north. · Condenseir is a large cross flow tube and shell heat exchanges that takes wet rapour, a mixture of liquid mater and steam at statute tion conditions, from the twelsinegenerator eshauet and condenses, back -4 1 if into subcooled liquid mater so can be pumped back to the reactor by the the condensate and feed water prumps. . The mater level in the steam generator and nuclear seacfore is compolled using the feedwater system. Advantages: Inf Dreduces the amount of energy generated from forsel fuels (coal and of). Der fuel offers more energy. 3 Cost of nuclear fuel is 20% of the cost The state of of energy generated LAND DETE ly continuous Glocquetion

Alladuantagese Jup · alifficulty to the management of nuclear limited life lovestment is high and in a second and · Thermal efficiency for about 33%. made of Regula maken and class station conditions from the finding 16.1.18 10 Var Palmag alleprebution layours Transmiticion and colori > Generating station. 3-4 reartan by (A)-2.1. Partilla ... - Karnas II Step-up Xr. all chail calan (11→132)kv TO CHARGE AND TO CO 803-Formary Trans mission. Rine pullont step-down x 8 (132→11)KY leadersales. 2.1 Receiving station Advantages: 120 generate Step-down x 1 Peduces the o (1-> 3.3. KV. touch fuels (ead Polmary displaution freel of the high Jus-station of nuclear field 1700 (Industria Stepibulion X parapa Hickory onsumer 3.3 KV -> 415, 220V decondary deeps bution. alomestic leads

17.118 ration sound prove presents Voltage Regulation of a transmission line's - The difference in searching and voltage and receiving end voltage expressed as a percentage of seccining end voltage is called as veltage regulation of a transmitus. -ion Mathematically, 1) Velfage seegulation = Vs-VR × 100 % where, Vs= sending end woltage. Vr = receiving end voltage. . The loweve the veltage regulation, the better is the transmitseton. Efficiency of a Transmission line, 5- sp $\eta = \frac{r_R}{P_s} \times 100 (1/2) + (1/2)$ where, n = efficter cy a= 10 - 2 + 1 PR = Receiving end powers Ps = sending end power. R = VEIR cospr. where, IR = lead ende curren Is = sending end entrent. $P_s = V_s T_s \cos \phi_s$. cos \$ R = receiving end power factor

cosq's = dending end power factor. Kelvine law en and in provide pil 1943 . It is used for calculation of most econo -mical size of a conductor. Kilvisosa pro C/ x a (area of crow-section) =) (1 = Pa (P= proportionality constant) = eq0 C. J. Siti G2 Judia 14 $C_2 \prec \perp$ =) C2 = Q (Q = Propositionality constant) --q(1), silve of the conquetor will mostly be economical prohenginations = 1 da 120 Antiger getter CIT Chit 62. att astrong Forfat 8. =) da (Pat 8), =0. da (Pat 8), =0. =) $\frac{d}{da}(fa) + \frac{d}{da}(a) = 0$ =) P+Q. da at = 0 ponships - pr. areatu => P+ (-Q,a2) == 0. pluison) = gt $f_{i} = \sqrt{\frac{1}{2}} + \frac{-8}{2} +$ 5 = V. T. cas \$5 Spring participation P. Wian

fulling the nature of a in eq(1), C1 = frages + plaques += 1 and and a star and the particular and = VP.VQ. = VPQ. 6 fulfing the value of (a' in eq(1), c2 = & and positive = p $= \frac{Q}{PQ} = \sqrt{PQ},$ relation the motion of $\left(\sqrt{\frac{Q}{P}}\right)$ is quarter As, CI=Cz, so area of cooss-section of the conductor will be not economical. lifetnesic formale) to - (10-310 m) XF Kingelian 19-01-18 Concera Loussed dialer copof of · lover loss occurs in a high voltage transmillesion line due to the phenemenon of coviena. This loss he sald to be cevena loss. According to 'Peek' corona loss may be given by the fellowing Empirical formula, Pe = 243.5 (=+25) + (V-Va) 2x10 5 yw/ym/phase 0

Nheare, le = Cosiena loss 06 f = supply frequency di n = radius of conductors crow-section N I = spacety before conductor (1) V = Phase voltage of conductors Vg = plisruptive initical voltage (3) 5= Refabric air density. (4) (5 · When the ratio of $\left(\frac{V}{V_{3}}\right)$ is greater 13 than 1.8, the above formula holds goes CI for the ratio $\left(\frac{v}{v_{g}}\right)$ les than 1.8 $(\operatorname{Referries formula}) \operatorname{Re} = \frac{21 \times 10^6 \times \mathrm{Fg} \times \mathrm{V}^2}{(\log \log 2)^2} \times \mathrm{F} \operatorname{KW}/\mathrm{Km/phase} (1)$ $(10 \operatorname{gr})^2 \times \mathrm{F} \operatorname{KW}/\mathrm{Km/phase} (1)$ $(10 \operatorname{gr})^2 \times \mathrm{F} \operatorname{KW}/\mathrm{Km/phase} (1)$ $(10 \operatorname{gr})^2 \times \mathrm{F} \operatorname{KW}/\mathrm{Km/phase} (1)$ F= a factor which depends epop 1 Money low been to other a high wellage All consure. This loss he said to be not proved as Accepting to Reck commenter wing be in its a sub-field to the field of the property of the property of

06.02-18 Design of Overchead Transmission liness Mycharts Secol Malo Components: 1) Conductors, 1 Bach 2) Supposits, "s) Insulatoos, Corors arms, 12 Jacksop (4) (5) Miscellaneous. do lour mil 7 1000 711 CONDUCTORS: .s.) [15] · Conqueting Material: Properelles: (aleziseable) 1)-High electrical conductivity; (1)-High tenesle apength in order to with -tang mechanical reforences. (II) - Low scort so withat it can be used for Ames of capper.) long éllefances. (1) - 10m specific growely so that weight pers unit volume is small proving strand Commonly used conductor materials.«-Asson long alconario programation opens- celo le Havi Jeninium conductor steel faintage Alleminicom c) steel- cosed d) Galvanical Steet. Cadniliem

(a) Copper. - High electrical conductivity - Greater tensile sprength 12/10/2014 1800 - Hard ofranen copper used. High current density Augusto. cross-sectional area regulised - Imaller , in Po High specific grantly 1100,00 cost of lies availability and april - Hly :290T 7 U 24034 (b) Aluminhum. - cheaper of light in weight, for small upan small conductivity of tensile spength (60% uttion or copper) of digiodic cross-sectional area of conductor larger Aluninium of tameter = 1.26 times of copper) ng ghe fances. - Higher tower with preater sag. - specific grantly. Joner than copper larger cross-adims stegutied. per planne - Not œustable for long allefance Transmillion 6 Aluninium Conductor steel Reinforced (ACSR) - Oluminium

. To mesease sprength of aluminium conductors scelesforced with a cove of galuanfeed () steel nelvee. · Abbrenhated as ACSR (Aluminium conductor steel sieinforced) por oppier Advantaged of cacer: has upone plustic and Allph mechanical spength can be utilized. by meing spans of larger lengths. . Tower of smaller height can be used. · A reduction in the no. of supports also include reduction in insulators and the shelp of lines outage due to flash over or faultings scaleced. · lovres are reduced due to larger allam. - eter of conductor. the digod's grilgalwarbed 18feel to pulidians 1993 · JJAIN · Very hep fensile sprength. Append and the support · long spans. · Runal areas. · Moseden poles. · Cheap. alog 1 · Poors conductivity me high resistance of so · Not mitable for transmitting large power

meror as long of exance. All while massion (e) Calquelum Copperas a die passopolis · Oddition of- 1% or 2% cadmium to copper · Increased female spength by 50% prore copper. conductively reduced by 15% below they of proce copper. Algrad = lasticular right · Economical for lines of-small coon-section due to high cost of cadmium. Line supports: on alt of milaupase A meper these in installing of minipulates spulling shall of lines outrage after to Alash · High mechanical spength to neither and lus weight of conductor light the meight best weight · light m · cheap in east. . Hotsepras to rote · Longer life linger grippins - torners apilo · Easy accessibility of heard equal for mainte -nance. My ods sixof lyed Types of line supports p spens · Wooden poles. Rutal areas · steel polos · Rec poles Reinforced Concrete poles) eap . · lattice seteet poinces and in standings

Wooden Peles. , shorter epan upto 50 m. · Leec cost of used for dispilation prospose. to suvial areas. n Ustra · fertichdes required , e.g., creasate asl. · pleed for velfage upto 20KV. · smaller life (20-25 years) · Less mechanical spength. That is Made of Sal or chlor woost. · Mederate even sectional area, Samot 10 1912 Steel Peles: 1 A TAND Sector and and · Gocater mechanical spenger. 10100-(s monent · lenger life, 3) Ongle Toner · larger spans. · Used for devisition proposed in either. Reinforces Concrete poles (RCC). 81-00-50 · Greater mechanical strength, grow DA6 · Longer life, meentral produces thereast all lenger epansibilitisticate alle sollar polon · Good auflook. · little maistenascep · Good Torenfaling propulles. restriction attendants who good asland

and the set of the set steef towears: · longer life in 107 star 0.093 votro 11 modenper repartital not taken 18 - teas - sail Apreater mechanical sprengtheres Davies . Long a clufance at hybringhase applied · Toner footings are usually provended by driving reals toto the east. This white -izes lightening troubles as each toner. acts as Myhtening conductored shall Types of Towers & Lowers to realized steel fales . Supervison Tener. locater mechanical spength Tower 2) Tension. larger life. 2) Ongle Tomer larger spans. 47. Englis al Towerson protection to be part Letteforce of concrete poles (RCC): 81.20.80 Agealer mechanical chenges - 4ml gal The stratght drefance between th poles gives the shortest defance. Therefore to minimise the length of conductor one may shetch conductor to make spalph 1 But we also losts after that the (amonly) conductors

are in safe tension in order to permit. safe tenesion in the conductors, they are not fully spetched but are allowed to have some dip: . Thus the difference in level paints of supports and lonest point on the conductor by called a sage se triber . The tention on the conductor depends on the fellowing factors. 1. Meight of the condictor major 2 wind effects. 3. Teertopeading gibes I would half agent is A. Temperature Variation hat inp the menunity . While cepentating Sag, these arters theo conditions: - Supports are at equal pround level. - Supports are at unequal ground level. Supposts are at equal ground leveli. AK 4/2-× 11Pms Loreford T Support a trigg the 31 1/2-> 17 imp ising. Trepation Wrinkers Side cst. -X

· Kefer fequre in which 'o' is the lower point of the conductor spacing. · L= length of span in meters. · W= height of the conductor per unit les · l= lension on the conductor. · consider any point p' on the conductor where co-ordinate are incloand of. There are two forces acting on the portion OP ::, 2 (1,51) I wherefit of the postion op acting downweek at a disfance 1/2 from ongin 0.1 2. Targential tension T' acting at points lamperation -Voldeliten . Taking the mements of the about point '0', , we have . - dupposts arex xix that yestimed level. Aupports are at unaquered there draggues · Here, it is the ligg at point Therefore (SI will be say at point B ! Rogput : substitute y=sland re= 1/2 by equation mapimien se to have S= 4(4/2)= $S_{1} = \frac{WL}{8T}$ ٤) - (moters

Supports at unequal Love K S2 1: 1000 day (12) pr = . He position of lowest points '0' of conductor which is not exactly at centre of destance l'éco (1) per graba . . There fare, 're,' se the distance of support at loner level from lowert point '0'. 'n' is the distance of support at high level from () lowest proint o'. · L'is spon length = 4,+ 22 . Le différence bet? two supposeds to g $\frac{1}{2} = \left(\frac{3}{2} - \frac{5}{1} \right)$ (1 M.) · If w' so the neight per Dunit length of conductors, then. Saf, SI = Writ Sag, S2 = $\frac{W n_2^2}{2T}$

 $S_2 - S_j = \frac{W}{2T} \left[u_2^2 - v_j^2 \right]$ $S_2 - S_1 = \frac{1}{2T} \left[\eta_2 + \chi_1 \right] \left[\chi_2 - \chi_1 \right] = h$ · If $\gamma_2 + \gamma_1 = l$. (1) 5, 7 $\chi_2 - \chi_1 = \frac{2 T h}{h l l}$ · Subpacting eq (11) from (1) Mp+H, = l $-\frac{\eta_2 - \eta_1}{\omega_1} = \frac{2\tau L}{\omega L}$ $\frac{2\eta_1}{\omega_1} = \frac{1 - 2\tau L}{\omega L}$ $\frac{2\eta_1}{\omega_1} = \frac{1 - 2\tau L}{\omega L}$ Odding eq (1) and (1), motorly to entropy harddans ystatight for the of the states and another lover loved from <u>WL2</u>--- (Reinfur 0); T + the althorne <u>WL</u> with the high lovel dr2 = lto2TH: 09 -13mol (14) mas Neme eq (3) and (1) values of x pand 22 can be found out. Further s2 and s, for the easily calculated. (12-52) if it unductors, then section and a part

in age is call will contain or of 9.02.18 S: A 132 KV parsmission line has the following plata: you sog itigen it L'= 260 m Glover Vibinate spength = 3100 kg. (n 021 = 1 dafety factor = 2 capculate the height above prevend at which the conductor should be supposted. Grocend cleanance required is 10 m. 161 (0.1) 8 212 W= 680 kg/km =) 1000 m = 680 kg. 100 m = <u>680</u> =0.688 l 260 m = 0.68 × 260 176.8 0.68 +76-8 × (260) - 3.-8 × 3100 1550 the en HI LAND abros it provers offiniate theigh 23100 to lenson = safety factor. Horying which force acts on the conductor The height above ground herel at which the conductor should be supposed kg, (3.707+10) m = 13.707 m

I a foarsulestoor line has a span of 150 m mosking under tension 2000 kg If the weight per metre length of condicts, is 2.48 kg. Then find out the say. A. Ghen, L= 150 m is an T= 2000 kgulled ett is work isterior w= 2:48 kg rotive Carance suguised in 10 m $\&ag = \frac{WL^2}{8T} = \frac{2.48 \times (150)^2}{8 \times 2000} = 3.4875 m$ 1000 m= 680 Kg. 10 mall g22.0 020 = 00 -26010 0001 Effect and what loadings fce The weight per unit length of the coordingtor he changed when mind blows at a certain force on the conductor and crowlice accumulater around the conductor of the cond · Wind force acts on the conductor The helph above ground level at while the condustry should be supported (m for. 81) = (m (01) - For 8

20.02.18 the second second second second Effect of lee and i hered laadings. The above formulae for say are force only mishill air and at norma Aemporatione when the conductor is acted by its weight only dowerer 4 in practice, a conductor may have see ceiting and shundtoneously subjected to reind pressure. The welght of see acts vertically of ononwards, i.e. the conductor. TI same direction as the neight 57 force due to the wind arridged to act hopzon fally, i.e., of sight angle 1 to the projected subface of The conductor. Hence, the total force the conductor & the rector sum of horizontal and vertical forces as ishown in the following figure 8 the and filled land and Ice loading/Ice wahing when a stranger when wind 90' 1- 1- 0) 495 no anot c 10-12 st (b). war M') force acts on the conductor conductor sult metal a-16 syra

lotal weight of conductor per unit length 1 late = ((w+w)2-1(w-)2.) where weigh of conductor per cent lenge PN J E conductor material dereity xvolume and the state 12 interforeper init stengt. hi adag W: = neight of see per unit lough. = dereity of see x volume of see pr . obverg for enit length ... induceronal DE density of leex The (dt2t)-a [x] to alger is denily of the × At(d+t), possible a land with force personit length is table to and 11. Ja signered pressure per unit idred ette me anot X projected areal per unit personal to length for alt is not provered genelle) alt of wind men x (dir20x)] 2 chight effect of Ice and Wind loading. - the neight per unit length of the condu-- ctor is changed when nearly blows at-a certain force on the conductor and ice accumulate a round the conductor. " herd force acts on the conductor to charge the conductor self weight per comit length horizontally in the direction

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air flow. 2236T/310204 leading ack on the conductor the conductor cell- weight por change leight vertically spannard. Considering reind fine and ice both at a time, the conductor. ilead both at a time, the conductor will have a secultant neight per whit length. • The secultant neight will excate an angle with the ice leading downword direction Henrick specify. escupeo, n' is the neight of the cond -uctor per unit length, Will the melght of ice per anit length. Lesuit as a seed . Wit= density of ree X. Volum of sice per anith 12 get length. wepenson 18pc , shoeld heredater aber ablog to of ice y Ty [(d+20) a-d2] × 1 . det = density of ice × mt (alt) with manageness ("Ww is the force of wind per unit length Ww = wind pressure per venif area & projecte area per wife length. = wind presnaex [d+2t XI] so, the topal neight of the conductor per unit length &. $W_{t} = \sqrt{(W + W_{i})^{2} + (W_{w})^{2}} dh = \frac{W_{w}}{W + W_{i}}$

INSULATORS \$. Transmuterios line boundators are deniced use to contain, separate or support- electrical cond - ctors's on high voltage etectricity supply ? reprodes Transmission benjators come in veryous shapes and types; including individual og are made of polymens, glass and posecelas, each with different derenties, tenerile strengths and performing properties in adverse condi while length , will a it with the There are deread type of hundatory netor per r 19 23 the most icon gov used are for but - tor. 1x["+-" (JS+K)] - Y is the dele insule I'm type, 2) Surgension type, the (dit) the x and to plional = 3) Egg avoistay types is wort all all A chackle stypes you are and his = whi Strata type. the state may ask : wind pressnacx [df2FXI] the total weight of the conductor per AND = Broof Jands Filing + Court -it- Level - 1t-

22.02.18 Call real a Calman (a C ormance lines ransin icerion Crempication of na SP Transmituson liness the length of the parenting Sepending repon line, :10 dhuided into thore types, Trauminion line, <50 km, <20 KV C ",>50,2 150 km 20 KV-100 KV Meolum ų Long 1) > 150 Km greater than wether 11 27.02.18 Short Transmission line & 10 = 90 Noro, Equivalent Circuits 38 = 23+ 3 A (. (JIT- AP 12) MR + Madinale + Is there? haprais!!! 2 00 inductances IX COL 10 op curest = Ie=Ie Vs; EXOXXIX2V IR = deceiving VR 12curra X must No= forendry find Remembertor of Ve - sieceling factor Tomy -Velt

2:02-15 Calculation 5--auf poner sieceins p er lagging o for 1000 as coepe and reference vector the phasor allagram for a short Ľ, drauit as feel equinalent -nted by flg-2. can mouste 2010 vitrom fig-2, we 11 VI 001 003= 082+ BC2 21.20.6 Leal ODTNOB - VRION ØR+ Now, QB = BC = BETEC = VRSinPR for allow for all on the -IA V2 = (Ve coster IR) + (Vestape +IXe :) Vi = (VR cos dR +IR)2 + (VR son OR + IXL)2 volk Vs-VR Velfage Regulation = Scsivience felivered = VRXIX COS OR Kong dendate Vs×I×cos ds sV Monerations = ITR (4) (sh gore or Efficience 27) = Comer delivered 15 pris privisione of forset perget V. 641210 with is

en clama delineared 7100 %. 1 alogo martin D lover, Power Sallieband Ve I cas de 100 % J2R+ Vr Internet 06.03.18 Calculation of approprimate value of Vs. Manthe Marsh (thatar degram for Short Til A ros ? the above of grue , for \$s-\$x very less, 0 0,0 = 0F. 10 CATAG +GF. 0.2 = Vs = VR + IRcospR + IXedippe. For single phase =) A dhost 3 phase parimention like with an Impedance 6+ J8 -2 per phase has Vs & Ve of 120 KV & 110 KV suspecticly. They pansmission line has some and load at 0.9 p.f (lag). determine

-the total power of sending and power factors Delyhen ofata 2 A Los Jud cas \$ = . 9.9. x $V_{s} = \frac{120}{V_{3}} k_{s} V$ VR= 110 KV. Pop= VeIconde =? 11-200 cos \$5 = ? R=62 W la alar Xil 8 200 10 11 miletush · als $d_{R} = \sqrt{1 - \cos \beta_{e}^{2}} = \sqrt{1 - \cos^{2} \beta_{e}} = 0.43$ Vs= Ve + IR cospr +11 × Losin fr. r) $T = \frac{V_s - V_e}{R \cos \phi_e + \sin \phi_e x_e} = \frac{120}{\sqrt{3}} - \frac{110}{\sqrt{3}}$ $= \frac{V_s - V_e}{R \cos \phi_e + \sin \phi_e x_e} = \frac{120}{\sqrt{3}} - \frac{110}{\sqrt{3}}$.70= 30 = 0.65 A. • (10) $V_R I \cos q_R = \frac{110}{\sqrt{3}} \times 0.65 \times 0.9 =$ Ve= Ve+IRcaste+Ixedmar for aboli phan 17 11'm allar sphere provision like reils an Ingestance 6+ J8 20 per plane has V & V & 12.0 KV & 110 KV mergéchéeler. The parameter be be the score accord

07.03.18 Medlum TLS. armance 9 methods: . There are 3 () END CONDENSER, METHON NOMINAL T METHOD. U) (III) NOMINAL T METHOD. ENKO CONJENSER METHODS-Ns (Equivalent Clef daprou In the above figure, Vs= dendling end veltage V_R = Receiving end veltage. R= loop Scentsfance X = loop inductive reactance. Is = Sending endoge current. IR = deceiving end a current, Ie = in capacitor. current C= capacifance. S. Ang the cos qr = Riceining end power factor (lagg) cosos = sending end power factors

Phasoa draprom for Eris condenser Method Ve. Int 250 3343 IsXI 20102 YR . Is IS. I AN I WADD 1 19 14 abrene figure, LANT THE HE MALL AND A Vs=Vr+Iz $\vec{I}_{s} = \vec{I}_{t} + \vec{I}_{r}$ $\vec{T}_c = -\mathbf{J} \, \boldsymbol{\Omega} \vec{c} \vec{V}_R$ IR. = IR <- OR. = IR (cos \$R - Josh \$R $Z = R + J X_1$ V. R = V-VR × 100 % (per phase 10/P × 150 .1. elency (n) Harshin goots Pole times. . software thank + 1 beers VRIR CORPR X100 / (peur phane (VATROSPRT ISR $\sim \gamma_{\rm P} \gamma_{\rm s}$ g Alera 2. mg 201061. Apatha.

- METHON & NomINAL (\mathbf{i}) equila 1/2 X1/2. JR. R/2 X1/2 V. Vie R= voltage across eapacitose 'C'. Is Phasar diapron T-Methodssof Nomina 2 001111 Is7/2 Is1/2. Vs [x1/2. In 1/2 From figure, V_{R} = V_{R} + $I_{R}(\underline{\Xi})$ + $I_{S}(\underline{\Xi})$, V_{R} + $\underline{\Xi}(I_{R}+I_{s})$ $I_{e} = I_{R} - \varphi_{R} = I_{R} \cos \varphi_{R}$ $I_{s} = \overline{I_{R}} + \overline{I_{c}}$ $\vec{I}_{c} = -T \ \ \ \ \vec{V}_{i} = \vec{V}_{c} + \vec{I}_{c} \times \vec{Z}$ $L = 2^{0-2} s^{1}$ = $\frac{V_s - V_R}{V_R}$ x100 % (per phase) (1) Effichency (M) = Rolp × 100 . The I Lower = Is Lower = I + I + I - 2 = VRJRCOSOR 2) x 100 1/1 $=(I_s^2+I_R^2)$

1 Birthing 08.03.18 allapran clet Method 8. ominal 7 Ven the relieve acres Xi Rational 11. 1C2. Ic, Lorgi Vs 00 12 Jac Equivalent clef Ilapoan. Phanan Method & d'apram of T Nomin Vs Net IL Xt. JZ VR. Hevre, $T_s = T_L + F_{c_1}$ Ic2+IR+IC again, IR = IR (-OR = Ir (cos pr - Join pr) Ic1 = JWG VS. ODIX 2 RAG Icz = JW - VRI (deapy (7 Vs = Vet ILR +JIX + I)= VR+JC (57 Z=RTJX, 121 wi

Voltage level Classifications. 13.03.18 · 0-300 KV > High Veltap (HV) . 300-765 KV -> Extra Hlen Nolfage (EHN). . 765 KVC -> VItra High voltage (WHV) Need for EHV Transmissions. . With the increase in transmission voltage, for deame amount of power to be pananified custent to the fine decreases which reduces I'k' fonce. This will lead to medean to fransmirion efficiency. and at he formend . With decrease in panentierion current, size of conductor requised reduces newch decrease the volume of conductor. . The transmission capacity is proportional to square of operating neltager. Thus the parsnir capacity of the increases with baveare for veltage. · Mith increase in level of pransmission no allas ou voltage, the me fallation cost of the pransmiler monge Unersper km decreases. . The number of erauits and the lash Tower Alans can requisement for transmission decreases with the use of higher prossistion veltages

Problems fourlied to EHV-AC Transmitutor · Corona loss of reader soferifierence occurs. Highly minifated line supports requised lead - ig to hepher cal. · Erection difficulties occurs. . Insulation needs. with Mars and Analy e cost of transformers, smitch gear equipm -sts of protective equipments incircases passivition line veltage. Incoreage In . The Eriv Lines generates elignostatic effects. and electromagnetic fields which are hamitul to human being of HValc Transmissions · Barrie principle: > The basic principle of HVQC parsenteroy is to succify the as poner to a nottage level of around 200 KV (both polarity) and to pansmit pomer over a two cable or a pole line to a converter aperating in inverter mode; converter operating . Thus power is fed to other ac system made in eith Your How disection here increased of the month will also here and and the maintaint

basic steps all ? Convert AC into ac prectifier) Transmit DC. · +) - - - - convert Dic into Ac (Inverter) Hull links can be broadly classified into. · Monopolare links. 1 10(87) 3 ~ L · Biprolare Verker. borles. . Homopolar 211 ne si Menoporale Links: . It was one conductor. . The seturn path is proud or water. . Use of this system is mainly considerations. cost metallic septin may be used earth restsfinity is too truph. . This configuration type is the first towards a bipolar linker

Bipolar Unles It uses two conductor, one prest hive and the other negative. · Each ferminal has two converters nated neltage connected in dester alc stde. HO. + 1014. . The Junctions between the converting ground. an Anoman · Eurrents in the two poles are equal and there is no ground ervient. 1514019 · If one pole he trafated due to fault, the other pole can operate with ground and every half the rated Load for more using overlead capabilities of its woreerfer line). Adiro Land AC: dorwgh mail enjeten 123 34 matarde

Howopolar lintese Associate part bage in . It has two or more conductor all have the same polarily menally republica . Since the carowa effect for OC panendatos there is less for negatile polarity, homopolar Using is usually operated with regaline. polonity. . The school path for such a system for through procend. holend wantages & a number of applications, HVOC is more effective than Ac painsmission. Beamples include; Undersea cables, where high capacifance causes additional AC lower (e.g. 250 km Baltic Cable between sneeden and Germany). · Long power transmission without intermediate tage, for example, in sende areas tener frances stabilization between unsynchronizet

Ac disforbution explans. · Connecting a semate generating plant to the dutoflaution gold. · heducing line cost;) fewer undectors; 2) this -er conductors since HVOC does not suffer from the obligin effect. . Facilitate poner pansmission between differen countries that use Ac at different voltages and an frequencies. · synchronize the preduced by senemable energy envices. alliaduastages jui . The disadvantage of Hvec are in conversion switching and confort. • Expense inverters with limited overland capacity. · Hugher lower in state inverters at smaller pansudurion disfances. . The cost of the meeters may not be offset by regultions in line means phickion cast anofichange line loss per and . High voltage de ciracit breations are difficult to build because some mechani must be included in the corcuit current to zero torce otherma

and contact wear would be too arcing preat to allow relieste smitchings 171211 15.03.18 date. In Dor Fach Jugars Power Factors veltage pharos and cierent pharor all below, then, seprecented as to torely b. A I. S. S. M. 2 1 part 1.13 1) cosa = power factor (11) $\sqrt{10} M_{\odot} \sim 1$ 0 = phase adple between (11) →V 14 cos & = power factor (lead) cos d2 = power factor (lagg) High marker 16.03.18 Into retraining 8-3420-9 Cuveres & carry purch lands in a man loads on a power station is a day is called as lea Narious Times curves. to the first X Jola Dala And a local division of the local division o pla 1.11 1212 10 8 C. a. M. a.p. 6 -4 The internation of and internation 6 8, 10, 12 14 16 18 120, 122 24 57 101 1 41 nisolnephy Hours XXX XX We toned I was a K (

20.03.18 TARIFFIC departs that so would all The money rate at which decloical energy se supplied to a consumer. re called as tweiff. the spiriture Types of calculations: · May be calculated by 3 different methods. (1) Flat-Rate Tariff (II). Block-Rate Tariff. (m) Two-Paret Tare off. 101 (1) Flat Rate Tweiffs. · In this method, two different calculations are done. case for total energy consumed by light fan laad. on light leads. can nother for total power commenced heavy power leads, i.e., metors, etc. - If north the per wit amount of case. bothers the total "bill amount of XX (Jofal no. of into fin case I 'y'T has the per unit amount of care-II the total will amount of care I, = yx (total no. of units, in case I) - stand ha Total amounts of energy bill including bot cases = (x × cas-I total UNITS) + (x case-I total UNI

, One limitation of this method is that, it two energymeters for experiate cases loads-(1) Block Rate Tarif's method, UNITS consumed and , b. this duided into BLOCKS' having individual bill rates . For example: - If- 1st BLOUG= First 50 UNITS, 2nd BLOUG= second 100 UNITS, .If Block-I = x rate per UNIT \$ BLOCK-I = y sate per UNIT, then. Total energy continued = \$(50×24) + (100×y) (11) - Two Part Tareff 8. . It consists of two pareties is Constant cost upon Maximum KVA deman charges for the month, e.g. Rs 100 per KVA most demand. 2> KNH charges, e.g. Rs. 0. 50 per KNH connined. · Two separate neture are metalled in cuetomes prenties (1) KVA man Demand factor meters (11) KWH meters . M. OLY B = MING The math drawback in this type of tariff is that if the consumer was electricity sparingly (etanomical) and say for most of the period he is out of station, unneces station, unnecesshe will have to pay - arily The. fored chalges.

consumer has fever bullos of 60 W. menning for 8 hrea day, 2 125 W each menning 10 hrs a day, one - I HP running 2 hrs adday. motor of it note for 1st 150 UNITS & RS = 3.40. len & after that per UNIT rate is R3 4.10. Th find out total will for July 20-17 wing black rate methical. dar x + 1 and 11 1 1 1 1 Ø Dere K . 1. 40-1. · · · · · · Total P) Poter \$ Individual Quantity total time Sl. No Manne -WH in kwh EOW 4 8 Hrs 1920 Bulbs 1 1.92 2 10 Hrs 2500fans 125 W 2 2.5 746 W 100 001 2 Mrs. 1492. 1.492 Motor 3 " Construct rant upon alianimum King domain change ofal toto fame consumed in 1 day \$100 = 5.912 KWH. Total UNITS consumed in July-17= 5.912×3) instatoo UNITSolfs. 40; then statoge 1011 (11/1) Ky (1) - 340 - 340 - 10 X (1) (1) "After 100 UNITS - RS 4.10., then. Meters . 1 183.272 -100 = 83,272 UNITS CLAN IT =) \$3.272×4.10= 341.4152 path -HILD sparingly (elemenical) and easy for · Totel Bill = 340 + 341.4152 60000 Rs 681. 427. al HARA · reglats

extendend factore = Marshmurs load . The merson ofenand of a poner stations is equal to the maps load on the station considered in a firen period. · Load factor = MWH generated in a given privad Mayor spenard × Hours of operation in a A W iven provided. = Dreveage lemand or load allow More demand or load. monthe Mon of units generaled meropult No. of Units which could have been and With have generated ... when () Reals NWXHrs. 2000 ant · direventy factor = quen of individeal continents man Map^m lead on the station. Plant Capacity factor= <u>MWHo Broduced</u> CB 200 = MWH & Preduced 100 (2000) Mwho could be preduced non 20122 0-103 perol costs has its inside the find alt my platte ing infallion a

27.03.18 UNDERGROOMD COUBLES · Underground caller are used in low veltage, high voltage and usta high E voltage nystems for supplying power to bus bers and laads. · castes have the following advantages as compared to the onehead lines. (1.) Cable pronounision are not subjected to thunderstorms, lightning and other service Weather conditions Deduces accidents caused by localeing of the conductors, will have () It's use does not sport the beach of the cities. @ Required for undoor connection. ant Carp General Confriction of UCS-O Cares castes have genrally one as more of spranded copper or alundate. conductors: allel our the mentations

Q-Inentations The different mentations used for inculation of conductors are pages, PVC, Vulcanseig milder, etc. (3) metallic sheaths A metallic sheats is provided over the inelation to prevent the entry of maistures in to the inenfalting naferial. The metalle sheath. wonally of lead or lead alley. D. Bedding (inner sheath &- Quer the metallic. scheat comes a layer of bedding which converte of paper tape compounded with a Fibrous makevel. Also cometimes Jute strands top also used for bedding. - when THO Atmounings - It is proneded to accord mechan nocal way to the cable and it conerests of one or two layers of galvanised a layer of fibrous matrial is again prouded which is similare to that of bedding (Volge called as serving 20000000

120 Conductor lead at Bedding. servino CABLE CLASSIFICATIONS velt · Claurfrication Based upon Castes. (BUND OCC OLT Calli = Non" 1000 V (1KV) stes = Mason 11 KV. OH OSuper Tegsion Calles = Majon 33 kV 2000 DEHT Call EG GV. Marom @Exites super voltze calles = 132KV or More Classification ... Bally upon construction of . caste. Belfed (up to 11 kv) 2. SCREENER (from 22KV to 66 KV) 3 - PRESSURE (beyond &G W)

Cable Constoriction 26 201 , serving waven IKV bead check 140 Dr T-tape Inpreprieted Paper. Stranged copp- condering DEt commer of one circular core of timed shanded copper (er alunihium) innfated lagers of impegnated paper in all Q The importion is wrounded by alead sheat which prevents the entry of We the inner parties. 3. In order to protect the lead shead from convision, on overall serving compounded fibrois maturel (jute, etc) proubded : 21.49.20 MATTRE MOTURIATES 90 123 - 200 to Bar fall to l'evere aprelation in medication along care le - provide gridget portforcipe

mp-12 SABLE Maxom 11 KV Conductory. faper belt eadsheath (Serving The cones are insulated from each other by layers of impregnated paper. Another tayer of impregnated paper tap, called paper belt is wound round the prouped. montated cares. The gap between the insulated cares & filled with fibrons mentating material (fate, etc) so as to five circular crousection to the cable super word population 06.04.18 CH-06 DISTRIBUTION SYSTEM Detverbutions-· Penar prefibrition in mederes day can be clausified basing upon:-

1) Nature of current. 2) connection Scheme. " According to Nature of Current may be divided into: of AC deepibution 1/2 DC dreptaution (2) According to Connection scheme, dinged may be soto: Radial > Ring-main 5 > Infericonnected F ing - Mang 10000 calend. anon feeder A,B, C, D' are P. Q. K. S are loop 5 0000 30 6336-00) to other Dis on Mid · 16710 420 863 38 C

(12) 1 INSULATORS PPIN TYPE 2) duspendion Type 3) Shackle Type - in her I have raide the 4) ochain Type. is a not the 5) atay or Egg type: Shappy Stra de zixable Properetters. · High mechanical repenpts in ordere to withdrand conductor load, reind load, etc. · High electrical restitance of Ineulator mat erhal in order to avoid lealgage currents, to easth. · High selative permitti with of mendator material to order that affelectic spength . Is high. . The insulator material schould be nonporous, free from improvettes and weather otherewser the perine thingy will be lowered. . High ratio of puncture seprength to flash aver.

Groove for conductor -sheds a dan kasa Sta dialogeog adding of the darks And Hall July 1 & Galvanised about with the populated printing with the the name suggests, the pho type ANS in sulator to decived to the way-over on the pole. I . romat-(2) There is a groore on the uppere end of the insulator for housing the conductor. (3) The conductor passes through this proone and is bound by the annealed wisce of the dame | material. as as the conductor. (a) As type insulators are used for transmission and dispossibution of electric power at vallages upto 33 KV. reteluent riseleter (5) For pin type insulators, the malue of safely le about 10. faitor duspension type Insulat 50 Y DAY BOD greater to a stan. In order aubjected to Line conductor

These stype of insulators are used for high veltages (> 33 KV). They consist of a number of porcelato day connected in realles by metal links in the form of a subsinge i 3 The conductor he suspended at the body end of this string reliefe the other end of the selving le decured to the crow-aring of the tower (2) The number of dress present depends report not railding of the working veltage. advantage 6 h questo estra republices salis 1) There are cheaper that pho-type merulators Q Each dree usually suprisents , 11 KV. Blyreater flestolity is established rakt all Atrah Types may sideals for miduality for Estrain Insulator . V& 58 ow -Omining in the set of the condition of when - Pole said when a hard ------AXXXXXXXX Then there is dead end of the line at there is comer or schoolp were, the land Le subjectéd to greater tension. In order to relieve the line, of exceptive ten soon,

operla in out ators are need.) It constat of an accembly o suspension typ B The place are used is the revelical plane. When the tension in lines is enceedingly high, as at leng over spans, two or move storges are used in parallel. 10 War Jamman Jonat shadele Types. - Bolt me E shackle Insulator 4.00 (R. al-shap tole-1) These frequently used for low distribution are lines. D These we either used in a horizontal or in a veubleal position. 3) They can be directly fixed to the pole with a belt or to the croy-arm. insiders and the cost of their creekion. in earliest that bring over east the voi: constant, constant cast the propertiend to area of nour-gration is of the root 2000 although at mate my dealt have stroggesed to With of Derothorpoor plurage have looped intrations all to allies being to alle

KELVIN'S LAWS IMP-2 . This law is related by Lord Kelvin in 1881 · Kelwin's law states that, "the most economic - cal area of conductor to that for why the total annual cost of transmillesion line le minimum". . The total annual cost of a trasmitistog line can be drulded, breadly into two. parts & annual c (1) Annual charge on capital outlay. (1) Annual cost of energy wasted by the conductor. conductor. Annual charge on capital outlays .22.10 . This is the capital cast of complete Installation of a panemicsion line. · In case of reveneed system, it will be the capital cast of conductors, supports and insulators and the cost of their erection. . For an overhead line, mulator east is constant, conductor cast is proportional to the area of crow-section and the coet " of supports and their erection is partly constant and partly proportional to the area of evers section of the conductor

So, annual charge on an preschead pranentation line can be ispressed ere: Annual charge = P, +P2a - eq0. where, P1 \$P2 are constants. a = area of x-section of conductor in m². Annual cost of energy wasteds. . This is the amount of eart fart meenly n the conductor due to I2R lever. · Assuming current to be constant, do, energy left In the conductor is propositional to resterarie. · As senterfance is investely propositional to the area of X-rection, so the energy last In the conductor he inversely preportional to the area of scoors - section. Annieal cost of energy nasted = $\frac{t_3}{a} = eq(1)$ rehere, 13 by a constant insurger I' talat. · Total annual coef(C) = (Pitha) + 13 = Pithat P3 eq (1) =) This time gassing tedge poto account of machine · Total cost will be minimum , I, it prode 100 perturation and deprecipition and be apprecipited. · platanino =) of the hand a the hand as a relation 0.11 inside despised Bartiquel's state att rot linne welling Polime stol wrant. (alla)a 1 a) B 0+ 12

nots no aquado tannos do 1 - 00 -2.0 01.03 15q2- and salk of s =) Open 2 - 13 + 1 - 1912 - Land Ba = 11. Pguno are si h ft. arate Variable part of annual charge = Annual cost of (or capital outlay energy reasted. Graphical representation and of traction primes + 12+ 13 250 10 0 10 M 100 10485 8 Of ings source in the langtonal aver it a for the and 211the conductor of how 101 landtragons · Solar? ale ster sto of Anneal cert of pringy marted = 13 - call · Point P' represents the most economical area of cross-section (1,1) = (3)too lourne lotoT Elmitationes + 0 2+,9 . This law doesn't take into account -cal spength, coronamiour, eped lies too lote · Interest and depreciation can't be defermined accurately. rneined may be too The conductor size def small for the stafe castying of meccurally what Energy loss expinated willof be accurate actual la

Advantages of HVQC areve HVAC Tranenderloop 5 oIt regulses only two conductors as compain ed to three for a.c. praneniscion. OThere he no inductance, capacitance, phase ollep pacement and durge problems for die fransmission. Due to the absence of inductance, the voltage grop in a die parenterion line te leu than line for the dame load and sending the ac end veltage. DA de poursulusion line has better voltage reputation thangc. no skin uffect in a de system. (5). There is Therefore enforce comme cechion of the line Horsot condition where it bred. Rup is @ For the came mosterne veltage, the potential stores on the hisulation te les in care of de system than that in ac system. DA de line requises less haufatton than a.c line. BUD AND Of de line has lever infeverence with an to ac . Than creuits communication for clecelpany wear count alt entres clean & safe mathed and for from optimist 4. Directory of 1 an and wanter to the unanst-nin/4 War 2 1440

Vaciona methods of UG cable lyings. These are three main methods of lay' renderground caloles:-24 54.02 the profision of the state of the sector of the 2. John - in system, & long pour for him 3- Solid system: la sousile site at SARECT LAYINGS and mobilishing of a mi Brut and Trench altrot and Conciete co offer wallage superinter altress SAND BED 16 01 21 10 01 11131242 I with ATTACAS (11/1/2) side as a solars . A trench is dug and is covered with alonger of fine sand to prevent the cable from molstive from ground. 21001313 · Con wrete, cover is proveded to protect the the cable foors mechanical injury. Advantagess. and ten costly method. . IF is a celimple · Best conditione for developping heat general in the cables · clean & safe method and free from oly twebances. Ileadvartages6 he resur Main-fenance cost

Localisation of fault is difficult 3110 (ID used to conjusted areas where Cannot be expendence and monventent. A peavation 3 MAW-IN EYSTEMS. and with edquixers.Ma 10 113 CONCRETE COVERING enalt sulanon Required ballily Warracht war of glazed stone cast ison or concepte , ducte or are lad in the ground with manhales at duifable positions along the cable noute. advantages & can be made, without opening the , Kepairs Induction motor contributer ground. cost Main fenance chances of faults due 10 apene · témer protection provided mechanical total cuscat the aystern. - Alla ppl 2227 alle ad vantages 8. "chitical cost eschipp pritared lainferford " · Unfavourable conditions for d'ispation of heat. lainter epilope delige at low pit 081h 0 · algochaquians motors pototos contactorias

SOLID SYSTEMS or poughe du . In this method, cables are land in open priper In the earth along the cable route. Trenghs are of cart ison stillars in which After the cable is lado in position, the bough - Eng le filled mith a bituminant or asphali -1c compound and corrected ored. allead nantapess · Expensive than direct laying: · Réquises skilled labour and favourable mather Poor heat d'au pation facility." his wo additable post on along the cable soute. also-potrontale. Causes 10f Lower Factor (cosp) & arings · Induction motor contributes lagging p.f. of the station. sub-stations have lagging pof Decause they draw magnetising current which. causes the total current to lag behind the veltape. · Industrial heating fivenaces have very low's · Arc lamps which opeveate at low p.f. · dynchronneus motors, retary convecteus may work

at leading p.f. Methods of Proporement of pof (cosp) 1. By the use of Capacitors's They are connected to parallel with the. supply malow and take current leading by 90° form the mains which neupalizes the reactive lagging compenent of the load current. Bouscally the reduces the phase difference between the neltage and envient: and 2. With the help of a synchronous Condenseurs It is also known as synchronous motor and he the only motor which can also be worked at leading p.F. . For inductive leads, these are connected forwards load deale and to orear-excited. . This maller it behave like a capacitor. · It drames the lagging current from the or supplies reaching ponete. supply 3. Phase advancesis " 2 100000 anoses . This is an ac excitere mainly AN ARAD Improve pet of induction motor. King . It imporares the pif by providing the

ampere twens to produce required exciting flus at selip frequency. 3. alfatio VAR Sources (SVS) 8 . These are thyristor compolled abunt capacitors and shunt reactors. They provede step les dynamie p.F correction. and have 1. a. a. a. 1. 1. 3. Barrially -this heduces the phase different Methods of reducing Corona Effects 1. BY INCREASING CONDUCTOR SIZES. By thes, the veltage at which covena occurs is raised and hence course effet are constativably reduced. one of the reasons that ACCR . This hs which have a larger everconductors sectional area are used in transmission lines 2. BY INCREASING CONDUCTOR PACINGS which By doing this, the veltage at coviena occurs is raised and hence conona effects can be eliminated. 0.22.2.13 Spacing can't be increased too much othermise the cost of supports may inches

3. By USING GORONA RINESS 2 Milesing . It is electrically connected to the high veltage conductor, encircling the points where coviona discharge may occure. . The sing dispibules the charge across a whater area due to its semooth round shape: control to be applied for consciency trans 1 mp=8 a hast firstin for anth category INFORMATIONS CONVEYED FROM A LOAD CURVES · Load dweation civere defermines the load variation during different houses of the day. . It indicates the peak load which determines the max demand on the perfor station. · The area under the load curve gives the total energy generaled in the period under consideration. . The area under the covere divided by the total number of hours gives the lead. . The ratio of the area under the load evere of the total area of the sectanple marshich it be contained gives the Manuel July a load factor. 1, cast of material equipment 0 ristantis with

Objectives of Tareittes Imp-14 1. Equal déspibution of costs s shalla. The most proportant objective le the fairly equal dispibution of the cost of energy supply to different classes of users. · Charges to be applied for consumption should be justification for each category of the const in Maga Lordinos 2. Recorecy of capital investments T motolyeu · Recovery of the cost inculied to all elements of power system, i.e., Generation, Transmission of alis providention. of Energy it 3. Recovery of running costs It constans stars · Recovery of the cost incurred in operation anainstenance and supply of equipment of miscelleneous cost & . Recovery Recovery of cost proverted in miscelleneous dervices such as laced forctor. cart of metering equipment 2. Billing cost of the collection.

RING-MAIN QUISTRIBUTION SYSTEMS Jup-U alistication alistication Loads in meall and water - Sugaran 1803 hasted as each The asystem har hip buy a gradient the two facters. formany allstributor Bub Feeder minu 5 0 Shun Ring !! loads Wintericain H Q mm elspibetion 2 20TOAR LAND, Chatrassformer BURNIL ci gras alteributs leads 2 ratent PARNO 12 Is the ratio of the maximum com system, the primaries of o trassformers form a loop al be INNO 3 . The loop ercuit starts from the sub-stbut bars, make a loop through the -ation area to be deoned and returns to the subsetationstrations of It is applied as The above there shows the single time dapsam of tring main system for ac -ok pibution where substation supplieds to the closed feeder LMNOPORS. . The mel's to but or survere tapped from different points; M, O. and & of the feedere through distribution transformeres.

MARKE MOTORIA THE MI Odvantages: These are les velfage fluctuations consumeris ferminals. . The system is wery beliable as each d'appebutor le fed lisa two feeders. . In the event of fault on any section of the feeder the continuity of stupply is mainfained. and which were DEMAND FACTOR AND LOAD FACTORS individe 1mp-13 2 12 0.01 Demand Factors. . It is the ratio of the massimum como: -dest demand of a system to the total connected load of the psystem. Alenand Tanton - Maximum genandal alemand Factor = Total load connected and heturns to the · It is expressed as a perecentage los in a 2. rations all above stights should · Ito benjalways, les than 1. to morphile · It changes form the to time derdict it . The lower the demand factor, the less system capacity requised to serve the connected stoad. 19 & pas 0, 14, 210'09 threeingto aftertabulition throng travectus.

load factores into providence informed the It is the ratio of the actual load of equipment to full load of equipment. , Load factor = Actual load noising and to at Full load supplying Another formula's for load factor. Load factor = MWH generated in a given period May May demond & Hrs of operation in given peoulod where and the provide Areirage demand or lead Mass openand or lead elle is much more of units generated with. No. of units which could have been generated . It is always less than 1. . It is used for determining the oracall cost peux unit generated. . For almost const loads, the load factor is clade to centry. "Mas" demand of an installation is the mayor rate of condumption expressed by aniperes, BN or KVA. It doesn't melude the levels of current

floreing under oreveload or shout circuit conditions. lif of Diversely Factors It is the ratio of the sum of the individual major demands of the various osub circuit of a system to the man demand of the whole system. allreversity factor= Sum of Individual mars" demand. had no provide special of the system. · It be always greater than 1. · Greater the direventy factor lever is the cost of generation of power. It is always less than 1. & seed for apprinting the excitable pear unit provated. clear to unkly. sille at white lateral and to be another the al pression the middle and the alor Happiles to shall alter spectral fractions m Oly, alth