



MUTHAYAMMAL ENGINEERING COLLEGE
 (An Autonomous Institution)
 (Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)
 Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.




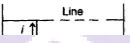
MUST KNOW CONCEPTS

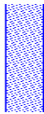
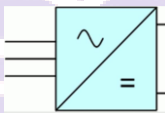

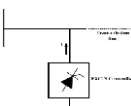

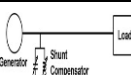
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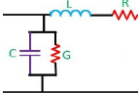

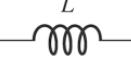
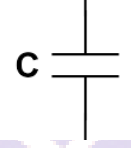
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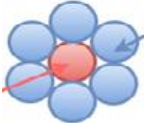
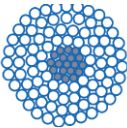
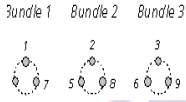
Course Code & Course Name : 19EEEC12 & Transmission and Distribution
Year/Sem : III/V

S.No.	Term	Notation (Symbol)	Concept / Definition / Meaning / Units / Equation / Expression	Units
UNIT 1 STRUCTURE OF POWER SYSTEM				
1.	Generation		Generation of electrical power through alternators/AC generators/Synchronous motors.	KV
2.	Transmission		Transmitting electrical power from generating station to the load centers.	-
3.	Distribution	-	Distributing electrical power from the substations to the consumer end.	-
4.	Distributor	-	It is a conductor from which tapping are taken for supply to consumers.	-
5.	Service mains	-	A small cable which connects the distributor and consumer.	-
6.	Feeder	-	It is a conductor which connects the substation to the area where power is to be distributed.	-
7.	Interconnectors	-	An electrical <i>interconnector</i> is a high power AC or DC connection, typically across national borders or between different electrical grids.	-
8.	Grid	-	Electrical grid or power grid is defined as the network which interconnects the generation, transmission and distribution unit. It supplies the electrical power from generating unit to the distribution unit.	-
9.	Microgrid	-	It is a small-scale power network that comprises generating units and consumers. Often including renewable power sources such as	-

			wind turbines solar panels, etc.	
10.	Bus Bar		A Busbar is a metallic strip or bar (typically copper, brass or aluminium). It is an electrical junction in which all the incoming and outgoing electrical current meets.	-
11.	Connected load	-	The connecting load is “the total electric power-consuming rating of all devices (as lamps or motors and other devices) connected to a distribution system”.	KW
12.	Maximum demand	-	It is the highest demand of load on the power station during a given period. The maximum of all the demands that have occurred during a given period is the maximum demand.	KW
13.	EHVAC	-	EHVAC stands for Extra High Voltage Alternating Current	KV
14.	UHV	-	Ultrahigh voltage. Voltage in excess of 800 kilovolts (kV) and is feasible over distances as far as 3,000 km and above.	KV
15.	Converter		An electrical device, comprising a rectifier and inverter, used to alter the voltage and frequency of incoming alternating current in an electrical system.	-
16.	HVDC		HVDC stands for high voltage direct current, a technology used to transmit electricity over long distances by overhead transmission lines. When the line length exceeds above 500km HVDC is advantageous.	-
17.	FACTS		A flexible alternating current transmission system (FACTS) is a system composed of static equipment used for the AC transmission of electrical energy.	-
18.	Series Compensation		It results in the improvement of the maximum power-transmission capacity of the line. It reduces the overall line reactance and voltage drop.	-
19.	Shunt Compensation		Shunt capacitors are used to increase the power-transfer capacity	-


			and to Compensate for the reactive-voltage drop in the line.	
20.	Radial System		Radial distribution system is the cheapest to build, and is widely used in sparsely populated areas. It has only one power source for a group of customers.	-
21.	Ring main		Each distribution transformer is fed with two feeders but in different paths. The feeders in this system form a loop which starts from the substation bus-bars.	-
22.	Restriking voltage	-	It is the transient voltage appearing across the breaker contacts immediately after the opening of breaker contacts.	Volts
23.	DC Reactor		DC line reactor is used to limit AC component on DC. The current in line reactor is direct current with AC component.	Henry
24.	Flashover voltage	-	The voltage at which a current flashes from electrode to electrode or ground with the formation of a sustained arc.	Volts
25.	Load Shedding	-	The process of deliberately removing (either manually/automatically) of a preselected customer load demand to maintain integrity/outages of power system.	-
UNIT 2 TRANSMISSION LINE PARAMETERS				
26.	Outage	-	The period during which either the generating unit/transmission line is out of service	-
27.	Synchronization	-	It is the process in an AC system, where the matching of the speed, frequency, voltage, and phase sequence is matched with the EB mains.	-
28.	Blackout	-	A complete loss of power resulting from damage or equipment failure in a power station, power lines or other parts of the power system.	-
29.	Brownout	-	A dip in the voltage level of a power system, which can damage electrical equipment or cause it to under perform, eg, lights dim.	-

30.	Line Parameters		Resistance, inductance and capacitance are the transmission line parameters which are spread over the entire length of the conductor.	-
31.	Distributed constants	-	AC transmission line is a distributed constants R,L,C are uniformly distributed over the length of the conductor.	-
32.	Resistance		The resistance is an inherent property of any material, due to which it resists the flow of current. It takes electrical energy and dissipates in the form of heat.	Ohms
33.	Inductance		Inductance is the property by virtue of which an inductor stores energy in magnetic field during positive half cycle and gives away this energy during negative half cycle of single phase ac power supply.	Henry
34.	Capacitance		Capacitance is the property by virtue of which a capacitor stores energy in static electric field during positive half cycle and give away during negative half cycle of supply.	Farads
35.	Flux	ϕ	When current flows in the transmission lines, a magnetic flux is produced in the form of concentric circles surrounding the conductor.	Webers
36.	Copper loss	P_{cu}	Copper loss is the term often given to heat produced by electrical currents in the conductors due to the internal resistance of the inductance of transformer windings.	Watts
37.	Symmetrical spacing	-	The three phase line conductors spacing between the conductor is uniform throughout the length of the conductor.	metres
38.	Unsymmetrical spacing	-	When the distance between the three phase line conductors are not same i.e. they are not spaced equally from each other then it is said to have unsymmetrical spacing.	metres
39.	Transposition	-	<i>Transposition</i> is the periodic swapping of positions of the	-

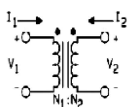
			conductors of a transmission line.	
40.	Stranded Conductors		Two or more conductor elements are coupled in parallel is called stranded conductors.	-
41.	ACSR Conductors		Aluminium conductor steel-reinforced cable (ACSR) is a type of high-capacity, high-strength stranded conductor typically used in overhead power lines.	-
42.	Bundled conductors		It is a conductor made up of two or more sub conductor and is used as one phase conductor. Here two or more stranded conductors are used per phase. It reduces the reactance in the transmission lines.	-
43.	Self GMD	D_s	It is the physical radius of a round solid conductor	-
44.	Mutual GMD	D_m	The distance between one conductor to another conductor or the difference between the largest and smallest distance is known as mutual GMD.	-
45.	Carona	Nil	It is a phenomenon which is accompanied by a violet glow, hissing noise production and production of ozone gas.	-
46.	Disruptive critical voltage	V_d	It is defined as the minimum phase to neutral voltage required for the Corona discharge to start.	Volts
47.	Visual critical voltage	V_v	It is the minimum phase-neutral voltage at which corona glow appears all along the line conductors. $V_v > V_d$	Volts
48.	Skin Effect	-	The tendency of alternating current to concentrate near the surface of the conductor.	-
49.	Proximity effect	-	The alternating magnetic flux in a conductor caused by the current flowing a neighboring conductor which gives rise to circulating current that cause an apparent increase in the resistance of a conductor.	-
50.	Inductive Interference	-	In normal practice communication lines runs along the same route as the user of electronic	-

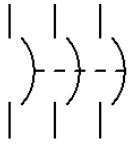
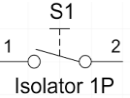

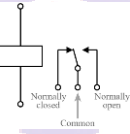
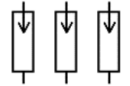

			communication system. The transmission line transmits power at relatively higher voltage.	
UNIT 3 MODELLING AND PERFORMANCE OF TRANSMISSION LINES				
51.	ABCD Constants	-	A, B, C and D are the constants also known as the transmission parameters. It is also used for determining the performance of input, output voltage and current of the transmission network.	-
52.	Transmission Efficiency	η	The power obtained at the receiving end to the sending end power of the transmission line is generally called transmission efficiency.	%
53.	Voltage regulation	V_R	When a transmission line is carrying current, there is voltage drop in the line due to resistance and inductance of the line.	%
54.	Short line		When length of an overhead line is upto 50 Km and the line voltage is comparatively low ≤ 20 KV.	Kms
55.	Medium line	-	When length of an overhead line is about 50 – 150 Km and the line voltage is comparatively low ≥ 20 KV ≤ 100 KV.	Kms
56.	Long line	-	When length of an overhead line more than 150 Km and the line Voltage is comparatively greater than 100 KV.	Kms
57.	Susceptance	B	Susceptance is the reciprocal of a pure reactance, X and is given the symbol B.	Siemens
58.	Conductance	G	Conductance is defined as the reciprocal of resistance. SI unit of conductance	Mho
59.	Admittance	Y	$Y=(1/Z)$ where $Z = R+jX_L$	Siemens
60.	Charging Current		When the voltage is applied across the sending end of the transmission line, current starts flowing between the conductors and the capacitance formed in between two conductors charges.	Amps
61.	Real Power	P	Real power is the actual power consumed by the equipment to do	Watts

			useful work. In a single phase system, the true power, $P = VI \cos \Phi$ Watts.	
62.	Reactive Power	$Q = VI \sin \Phi$ (var)	Reactive power is produced either by generators or capacitors. Reactive power is required to maintain the voltage to deliver active power (watts) through transmission lines.	VAR
63.	Stability	-	The ability of the system to return to synchronism after having undergone some disturbance due to switching on and off of load or due to line transience.	-
64.	Compensation	-	The management of reactive power to improve the performance of alternating-current (ac) power systems. To keep voltage within tolerable limit and to improve power factor, transmission line compensation is done.	-
65.	Attenuation constant	α	It determines the sinusoidal amplitude/phase of the signal along a transmission line, at a constant time.	Nepers/meter
66.	Phase constant	ϕ	The phase of the signal along a transmission line, at a constant time. The phase constant tells how much a signal is shifted along the x-axis.	radians/mete
67.	Characteristic Impedance	Z_0	Characteristic impedance or surge impedance (usually written Z_0) of a uniform transmission line is the ratio of the amplitudes of voltage and current of a single wave propagating along the line.	ohms
68.	Ferranti effect	-	Under light load conditions the voltage at the receiving end of the transmission line is greater than the sending end is known as Ferranti effect.	-
69.	Automatic Voltage Regulators	AVR	AVR is a electronic device for automatically maintaining generator output terminal voltage at a set value under varying load and operating temperature.	Volts
70.	Autotransformer Tap Changing	-	It is used to adjust the performance of transformers. Adjusting the tap	Volts

			changes the voltage of the transformer's input or output can be increased nor decreased.	
71.	Current Transformers	CT	A current transformer is an instrument transformer, used along with measuring or protective devices. It is used to measure the current in a transmission line.	Amps
72.	Tap-Changing transformers		Secondary of the transformer is provided with no. of tappings. By varying the no. of turns in the secondary of the transformer the supply voltage can be increased nor decreased.	-
73.	Synchronous Condenser	-	The voltage at the receiving end of the transmission line can be controlled by installing a synchronous motor, which is called as synchronous condenser.	-
74.	Current Limiting Reactors		It is an inductive coil having a large inductive reactances in comparison to their resistance and is used for limiting short circuit currents during fault conditions.	Henry
75.	Power Factor	$\text{Cos}\phi$	The Cosine of the angle between voltage and current is called power factor.	-
UNIT 4 INSULATORS AND CABLES				
76.	Insulators	-	The insulators provide necessary insulation between line conductor and supports and prevent leakage current from conductors to earth.	-
77.	Dielectrics	-	Dielectric materials are electrically non-conducting materials such as glass, porcelain, mica, rubber, wood and paper. Dielectric materials are insulators which conduct when subjected to an external electric field.	-
78.	Grading	-	The process of achieving uniform electrostatic stress in the dielectric of cables is known as grading of cables.	-
79.	Dielectric Stress	-	In a pure insulating material, the maximum electric field that the material can withstand under ideal conditions without breaking is called dielectric stress.	-

80.	String	-	It is a series unit of insulators found on the overhead transmission lines.	-
81.	String efficiency	-	The ratio of voltage across the whole string to the product of number of discs and the voltage across the disc nearest to the conductor is known as string efficiency.	-
82.	Flashover	-	An arc flash is the light and heat produced when high voltage electric discharge occurs over or around an insulator, or sparking between two or more adjacent conductors.	-
83.	Grading	-	The process of equalizing the stress in the dielectric of the cable	-
84.	Capacitance Grading	-	It is the process of using various layers of dielectrics with each dielectric having their own permittivity. The permittivity values should be in decreasing order from the surface of the conductor to the sheath of a cable.	-
85.	Belted Cables	-	In such cables, each conductor is insulated using paper impregnated with a suitable dielectric. The gaps between the conductors and the insulating paper belt are filled with a fibrous dielectric material such as Jute.	-
86.	Sheath in a cables	-	The sheath does not allow the moisture to enter and protects the cable from all external influences like chemical or electrochemical attack fire	-
87.	Segmental conductors	-	The stranded wires which are compacted by the rollers to minimize the air spaces between the individual wires are called segmented conductors .Here the conductor size is reduced for a given conductance.	-
88.	Properties of insulating materials	-	It should have high insulation resistance ,high dielectric strength ,good mechanical properties ,non-hygroscopic, capable of being operated at high temperatures ,low thermal resistance and low power factor.	-

89.	Commonly used power cables	-	Impregnated paper, Polyvinyl chloride and polyeth	-
90.	Underground transmission	-	Transmission line have more initial cost	-
91.	Service Mains	-	Cable or conductor which connects the distributor to the consumer terminals	-
92.	Low tension	-	Cables are meant for use up to 1 kV	-
93.	Extra high tension cable	-	Operating voltage of Extra high tension cable is upto 66KV	-
94.	Suspension Insulator	-	Used in High voltage transmission lines	-
95.	Porcelain	-	Transmission line insulators are made of Porcelain	-
96.	Use of strain type insulators	-	Strain type insulators is made where the conductors are Dead End, Road Crossing & Intermediate anchor towers	-
97.	Pin type insulators	-	Pin type insulators are generally not used for voltages beyond 33 kV	-
98.	Direct laying	-	The cable is laid over the sand-belt after that cable is covered with another layer of sand.	-
99.	Strain Insulators	-	When there is a dead end of the line or there is corner or sharp curve, the line is subjected to greater tension	-
100.	Cracking Of Insulator	-	Unequal expansion and contraction of porcelain, steel and cement are the chief cause of cracking of insulator.	-
UNIT 5 MECHANICAL DESIGN OF LINES AND GROUNDING				
101.	Sag	S	The distance between the supports and the lowest point 'O' of the conductor is called sag.	in meters
102.	Tension	T	If the tension of the conductor is increased beyond the limit, it may get broken, and the power transmission of the system get erupts.	in Kg
103.	Substation	SS	Substations are the junction in the power system network which links the transmission lines and distribution feeders through bus bars.	-
104.	Transformer		It transfers power from one circuit to other without change in supply frequency. They are either step-up/down, normally in generating	-

			stations step-up is used and in substations step-down is used.	
105.	Distribution Transformer	-	It is used to regulate the supply of power to residential premises, factories.	-
106.	Circuit Breaker		A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by excess current from an overload or short circuit.	-
107.	Isolators		Whenever maintenance work is to be carried out on an equipment in a substation, it is disconnected from supply from the isolators. It is off load device and is operated manually.	-
108.	Busbars		Busbars are used within electrical installations for distributing power from a supply point to a number of output circuits. i.e it is connected by a incoming and outgoing circuits. It is made up of ACSR conductor.	-
109.	Relays		Relays are switches that open and close circuits electromechanically or electronically. When a fault occurs the relay senses the fault and gives command signal to the circuit breaker.	-
110.	Lightning Arrestor		Lightning Arrestor is a device used on electrical power systems and telecommunications systems to protect the insulation and conductors of the system from the damaging effects of lightning.	-
111.	Grid	-	An electric grid is a network of synchronized power providers and consumers that are connected by transmission and distribution lines and operated by one or more control centers.	-
112.	Grounding		Ground is a source for unwanted currents and also as a return path for main current. It is used for the protection of equipment.	-
113.	Catenary	-	A conductor, due to sag between two supports, takes the form of catenary	-
114.	Neutral grounding	-	Connecting the neutral or star point	-

			of any electrical equipment(generator ,transformer etc) to earth.	
115.	Coefficient of earthing	-	(highest rms voltage of healthy line to earth)/(line to line rms voltage) *100 to the power frequency	-
116.	Vibration Damping	-	Dampers are used to damp or reduce the frequency of oscillation of the vibrating components of the machine by absorbing a part of energy evolved during vibration.	-
117.	Stringing chart	-	For use in the field work of stringing the conductors, temperature-sag and temperature tension charts are plotted for the given conductor and loading conditions. Such curves are called stringing charts	-
118.	Sag template	-	As per I.E. Rules, required to be maintained between the line conductor to ground, telephone lines, buildings, streets, navigable canals, power lines, or any other object coming under or near the line.	-
119.	Span	-	Span is the distance between two intermediate supports for a structure	-
120.	Tower spotting	-	Used to scale the distance from the conductor to the ground and to adjust structure locations and heights to (1) provide proper clearance to the ground; (2) equalize spans; and (3) grade the line.	-
121.	AIS	-	Air Insulated Switchgear substation	-
122.	GIS	-	Gas insulated substation	-
123.	Earthing	-	It serves the dual purpose of protecting the power conductors from lightening strokes and of conducting fault currents away to ground	-
124.	Neutral	-	Neutral is a circuit conductor that normally completes the circuit back to the source.	-
125.	Methods of Neutral Grounding	-	(i) Solid or effective grounding (ii) Resistance grounding (iii) Reactance grounding (iv) Peterson-coil grounding	-

Placement Questions	
126.	Tell me a little about yourself.
127.	What are your biggest weaknesses?
128.	What are your biggest strengths?
129.	Where do you see yourself in five years?
130.	Out of all the other candidates, why should we hire you?
131.	How did you learn about the opening?
132.	Why do you want <i>this</i> job?
133.	What do you consider to be your biggest professional achievement?
134.	Describe your dream job
135.	Why do you want to leave your current job?
136.	What kind of work environment do you like best?
137.	Tell me the toughest decision you had to make in the last 6 months
138.	What is your leadership style?
139.	Tell me about a time you disagreed with a decision. What did you do?
140.	Tell me how you think other people would describe you.
141.	What can we expect from you in your first three months?
142.	What do you like to do outside of work?
143.	What was your salary in your last job?
144.	What questions do you have for me?
145.	What is your greatest professional achievement?
146.	Can you explain why you changed career paths?
147.	How do you deal with pressure or stressful situations?
148.	What do you like to do outside of work?
149.	Are you willing to relocate?
150.	What is your biggest regret and why?

Faculty Team Prepared

1. Ms.V.Deepika AP/EEE
2. Mrs.M.Selvakumari, AP/EEE

Signatures

HoD