INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRICAL AND ELECTRONIC ENGINEERING

DEFINITIONS AND TERMINOLOGY

Course Name	:	**EHVAC Transmission**
Course Code	:	**AEE504**
Program	:	**B.Tech**
Semester	:	**VIII**
Branch	:	**EEE**
Section	:	**-**
Academic Year	:	**2019 - 2020**
Course Faculty	:	**Ms. P.Sravani, Assistant Professor**

COURSE OBJECTIVES:

The course should enable the students to:	
I	Illustrate basic concepts of extra high voltage AC transmission and understand the need for it.
II	Outline the line and ground reactive parameters and voltage gradients of conductors.
III	Describe effects of corona and methods of associated measurement.
IV	Associate the knowledge of electro static field theory and traveling wave theory.
V	Select voltage control methods for extra high voltage AC transmission system.

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
UNIT-I						
1	Define EHV Supply.	The voltages in the range of 300 kV to 765 kV are known as Extra High voltages.	Remember	CO 1	CLO 1	AEE504.01
2	Why highvoltage AC used inpower transmission lines instead of DC and/or higher current?	It was way easier and lots cheaper to install.	Understand	CO1	CLO1	AEE504.1

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
3	What is the necessity of EHV Transmission	EHVAC Transmission reduces Electrical Losses, Increase in TransmissionEfficiency,Improvement of Voltage Regulation and Reduction in Conductor Material Requirement.	Remember	CO1	CLO1	AEE504.1
4	List out the advantages and disadvantages of EHVAC Transmission	Advantages: 1) As current gets reduced, size and volume of conductor required also reduces for transmitting the same amount of power. 2) Voltage drop in line (3IR) reduces and hence voltage regulation of the line is improved. 3) Line losses ($3I^2R$) gets reduced which results in the increase in transmission line efficiency. Disadvantages: 1)Corona effect 2)Radio interference 3)Electrostatic effect	Understand	CO1	CLO2	AEE504.2
5	Define Power handling Capability of EHV AC Transmission lines.	The powerhandlingcapacity refers to the electrical power that can be supplied to the transmission lines without causing damage to them.	Remember	CO 1	CLO 3	AEE504.03
6	What is the mathematical representation of power hanling capability.	Power handling capability is given by $P = \frac{E_S E_r \sin\delta}{LX}$	Remember	CO1	CLO3	AEE504.3
7	What is the most effective parameter in power handling capability.	Length of the transmission line is the most effective parameter.	Understand	CO1	CLO3	AEE504.3
8	What are the parameters that affect current carrying capacity of a line.	1. Cross-sectional area of that conductor 2. Conductor Material 3. Surrounding temperature (Ambient temp.) of conductor used in EHV line 4. Age of the conductor	Understand	CO1	CLO3	AEE504.3

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
9	Define Bundle conductor.	A bundle conductor is a conductor made up of two or more sub-conductors and is used as one phase conductor.	Remember	CO 1	CLO 4	AEE504.04
10	What is Bundle Spacing?	The spacing between adjacent sub-conductors is called bundle spacing.	Understand	CO 1	CLO 4	AEE504.04
11	What is Bundle radius?	The radius of the pitch circle on which the sub-conductors are located is called bundled radius**.**	Remember	CO 1	CLO 4	AEE504.04
12	List out the advantages of bundled conductors.	1)Bundleconductors improves the voltage gradient. 2)Bundledconductor improves the transmission efficiency	Understand	CO1	CLO4	AEE504.4
13	Define Galloping	Conductor gallop is the high-amplitude, low-frequency oscillation of overhead power lines due to wind.	Remember	CO 1	CLO 4	AEE504.04
14	What is the cause for Aelion vibration	Aeolian vibration occurs in the vertical plane and **is** caused by alternating shedding of vortices on the leeward side of the cable.	Remember	CO1	CLO4	AEE504.4
15	What is the effect of temperature on resistor.	The change in resistance due to a change in temperature is normally quite small over a particular temperature range. ... The long term effect on a resistor of being subjected to high operating temperatures is that its resistance value will gradually	Understand	CO1	CLO1	AEE504.01
UNIT-II						
1	Define Inductance.	The property of a conductor by which a change in current flowing through it induces a voltage in both the conductor itself (self-inductance) and in any nearby conductors (mutual inductance). Measured in Henry (H).	Remember	CO 2	CLO 5	AEE504.5
2	Explain the phenomenon of line inductance.	Generally, electric power is transmitted through the transmission line with AC high voltage and current. High valued alternating current while flowing through the conductor sets up magnetic flux of high strength with alternating nature. This high valued alternating magnetic flux makes a linkage with other adjacent conductors	Understand	CO2	CLO5	AEE504.5

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		parallel to the main conductor. Flux linkage in a conductor happens internally and externally. Internally flux linkage is due to self-current and externally flux linkage due to external flux. Now the term inductance is closely related to the flux linkage, denoted by λ. Suppose a coil with N number of turn is linked by flux Φ due to current I, then, $Inductance\ L = \frac{Flux\ linkage}{current} = \frac{N\phi}{I}$				
3	How inductance governs power transmission capacity of a line.	Lesser the inductance, higher is the power transmission capacity.	Understand	CO2	CLO5	AEE504.5
4	Define Capacitance.	The ability of a body to store an electrical charge. Measured in Farads as the ratio of the electric charge of the object (Q, measured in Coulombs) to the voltage across the object (V, measured in Volts).	Remember	CO 2	CLO 6	AEE504.6
5	How line capacitance is formed.	Transmission line conductors constitute a capacitor between them. The conductors of the transmission line act as a parallel plate of the capacitor and the air is just like a dielectric medium between them.	Understand	CO2	CLO6	AEE504.6
6	What is the effect of capacitance on line current.	The capacitance of a line gives rise to the leading current between the conductors.	Understand	CO2	CLO6	AEE504.6
7	Which parameter effect capacitance.	Capacitance depends on the length of the conductor.	Understand	CO2	CLO6	AEE504.6
8	What are the transmission line parameters?	The transmission line has parameters such as resistance ,inductance, and shunt capacitance. These parameters are uniformly distributed along the line. Hence, it is also called the distributed parameter of the transmission line.	Remember	CO2	CLO7	AEE504.7
9	Define shunt capacitance of a transmission line	The capacitance of a transmission line is defined as the charge accumulated on two conductors for an applied voltage between the conductors	Remember	CO2	CLO7	AEE504.6
10	What is sphere gap.	A spark gap in which the electrode terminals are metal spheres.	Remember	CO 2	CLO 7	AEE504.7
11	Define propagation mode.	The manner in which signals travel from a transmitting station to a	Remember	CO2	CLO8	AEE504.8

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		receiving agent is known as mode of propagation,				
12	Define velocity of propagation?	Velocity of propagation is the speed of the transmitted signal as compared to the speed of light.	Remember	CO2	CLO8	AEE504.8
13	Define voltage gradient.	A voltage gradient is a difference in electrical potential across a distance or space	Remember	CO2	CLO9	AEE504.9
14	What is the use of Voltage gradient.	Voltage gradients are useful for surveying corrosion protection in submerged pipes.	Remember	CO 2	CLO 9	AEE504.9
15	Define electrostatic field.	A electrostatic field is a electric field	Remember	CO 2	CLO 9	AEE504.9
UNIT-III						
1	What do you mean by Corona?	**Corona** is a luminous, audible discharge that occurs when there is an excessive localized electric field gradient upon an object that causes the ionization and possible electrical breakdown of the air adjacent to this point.	Remember	CO 3	CLO 11	AEE504.11
2	Name the that affect Corona	Electrical factors : From the equation of corona loss it can be observed that it depends on the supply frequency. Line Voltage : The line voltage directly affects the corona and the corona loss Atmospheric conditions : The most important atmospheric factors are temperature and pressure.	Remember	CO 3	CLO 11	AEE504.11
3	What is the cause for Radio Interference.	The **radio interference** is caused by electro-magnetic waves in the frequency range of broad cast frequencies	Remember	CO 3	CLO 11	AEE504.11
4	What is Frequency Spectrum	Frequency spectrum of a signal is the range of frequencies contained by a signal.	Remember	CO 3	CLO 12	AEE504.12
5	What is ripple voltage?	The amount of AC voltage mixed with the rectifier's DC output is called 'ripple voltage'. In most cases, since "pure" DC is the desired goal, ripple voltage is undesirable.	Remember	CO 3	CLO 12	AEE504.12
6	Define Filter.	A filter is a circuit capable of passing (or amplifying) certain frequencies while attenuating	Remember	CO 3	CLO 12	AEE504.12

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		other frequencies. Thus, a filter can extract important frequencies from signals that also contain undesirable or irrelevant frequencies.				
7	State the relation between corona and frequency	There exists a direct relationship between corona and frequency	Understand	CO3	CLO13	AEE504.13
8	What is the predominate hormonic component in corona	Third hormonic component is the predominant component in corona	Understand	CO3	CLO13	AEE504.13
9	What is the effect of bundled conductors	Bundled conductors reduces the electric stress on the conductor	Understand	CO3	CLO13	AEE504.13
10	On factor does corona majorly depend on	Corona majorly depends on diameter of the conductor	Remember	CO3	CLO14	AEE504.14
11	What type of weather effects corona	Humid weather effects corona	Understand	CO3	CLO14	AEE504.14
12	For what purpose hollow conductors are used	They reduce corona	Understand	CO3	CLO14	AEE504.14
13	What is travelling wave	Travelling wave is a temporary wave that creates a disturbance and moves along the transmission line at a constant speed.	Understand	CO3	CLO15	AEE504.15
14	Define excitation function	The relationship between the energy of an electron and its ability to excite an atom to a particular excited state	Understand	CO3	CLO15	AEE504.15
15	What is propogation mode	The manner in which radio signals travel from a transmitting antenna to a receiving antenna,	Understand	CO3	CLO15	AEE504.15
UNIT IV						
1	what is the effect of electrostaic fied on humans.	**Electric fields** can **affect** a body in three different ways: weak currents can be induced in the body, **electric** charges can build up on the surface of your skin and hair, and the body's voltage can increase	Remember	CO 4	CLO 16	AEE504.16
2	Define Traveling wave .	**Travellingwave** on **transmissi online** isthevoltageorcurrent **wa ves** which propagate from the source end to the load end during the transient condition	Remember	CO 4	CLO 16	AEE504.16
3	What are the reflection and	**Reflection** involves a change in direction of waves when they bounce off a	Understand	CO 4	CLO 16	AEE504.16

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	refraction .	barrier; **refraction** of waves involves a change in the direction of waves as they pass from one medium to another; and diffraction involves a change in direction of waves as they pass through an opening or around a barrier in their path.				
4	What are the different sources of excitatation .	The three types of flow-induced excitation that are analyzed in compressor systems are acoustic-induced vibration (AIV), flow-induced pulsation (FIP or flow-induced excitation), and flow-induced turbulence (FIT).	Remember	CO 4	CLO 17	AEE504.17
5	Define Inductance.	The property of a conductor by which a change in current flowing through it induces a voltage in both the conductor itself (self-inductance) and in any nearby conductors (mutual inductance). Measured in Henry (H).	Remember	CO 4	CLO 17	AEE504.17
6	Explain the phenomenon of line inductance.	Generally, electric power is transmitted through the transmission line with AC high voltage and current. High valued alternating current while flowing through the conductor sets up magnetic flux of high strength with alternating nature. This high valued alternating magnetic flux makes a linkage with other adjacent conductors parallel to the main conductor. Flux linkage in a conductor happens internally and externally. Internally flux linkage is due to self-current and externally flux linkage due to external flux. Now the term inductance is closely related to the flux linkage, denoted by λ. Suppose a coil with N number of turn is linked by flux Φ due to current I, then, $Inductance\ L = \frac{Flux\ linkage}{current} = \frac{N\phi}{I}$	Understand	CO4	CLO17	AEE504.17
7	What is Frequency Spectrum	Frequency spectrum of a signal is the range of frequencies contained by a signal.	Remember	CO 4	CLO 18	AEE504.18
8	What is ripple voltage?	The amount of AC voltage mixed with the rectifier's DC output is called 'ripple voltage'. In most cases, since "pure" DC is the	Remember	CO 4	CLO 18	AEE504.18

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		desired goal, ripple voltage is undesirable.				
9	Define Filter.	A filter is a circuit capable of passing (or amplifying) certain frequencies while attenuating other frequencies. Thus, a filter can extract important frequencies from signals that also contain undesirable or irrelevant frequencies.	Remember	CO 4	CLO 18	AEE504.18
10	What is Bundle radius?	The radius of the pitch circle on which the sub-conductors are located is called bundled radius**.**	Remember	CO 4	CLO 19	AEE504.19
11	List out the advantages of bundled conductors.	1)Bundleconductors improves the voltage gradient. 2)Bundledconductor improves the transmission efficiency	Understand	CO4	CLO19	AEE504.19
12	Define Galloping	Conductor gallop is the high-amplitude, low-frequency oscillation of overhead power lines due to wind.	Remember	CO 4	CLO 20	AEE504.20
13	What is the cause for Aelion vibration	Aeolian vibration occurs in the vertical plane and **is** caused by alternating shedding of vortices on the leeward side of the cable.	Remember	CO4	CLO20	AEE504.20
14	What is the effect of temperature on resistor.	The change in resistance due to a change in temperature is normally quite small over a particular temperature range. ... The long term effect on a resistor of being subjected to high operating temperatures is that its resistance value will gradually	Understand	CO4	CLO20	AEE504.20
15	Define electrostatic field.	A electrostatic field is a electric field	Remember	CO 4	CLO20	AEE504.20
		UNIT V				
1	What is power circle diagram	The circle diagram is the graphical representation of the performance of the electrical machine drawn in terms of the locus of the machine's input voltage and current.	Remember	CO 5	CLO 21	AEE504.021
2	What is Static VAR compensator	A static VAR compensator is a parallel combination of controlled reactor and fixed shunt capacitor .	Remember	CO 5	CLO 21	AEE504.021

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3	Define Bundle conductor.	A bundle conductor is a conductor made up of two or more sub-conductors and is used as one phase conductor.	Remember	CO 1	CLO 21	AEE504.021
4	What is Bundle Spacing?	The spacing between adjacent sub-conductors is called bundle spacing.	Understand	CO 1	CLO 21	AEE504.21
5	What is Bundle radius?	The radius of the pitch circle on which the sub-conductors are located is called bundled radius**.**	Remember	CO 1	CLO 21	AEE504.21
6	List out the advantages of bundled conductors.	1)Bundleconductors improves the voltage gradient. 2)Bundledconductor improves the transmission efficiency	Understand	CO1	CLO 21	AEE504.21
7	Define Galloping	Conductor gallop is the high-amplitude, low-frequency oscillation of overhead power lines due to wind.	Remember	CO 1	CLO22	AEE504.22
8	What is the cause for Aelion vibration	Aeolian vibration occurs in the vertical plane and **is** caused by alternating shedding of vortices on the leeward side of the cable.	Remember	CO5	CLO22	AEE504.22
9	What are the different sources of excitatation .	The three types of flow-induced excitation that are analyzed in compressor systems are acoustic-induced vibration (AIV), flow-induced pulsation (FIP or flow-induced excitation), and flow-induced turbulence (FIT).	Remember	CO 5	CLO 22	AEE504.022
10	Define Inductance.	The property of a conductor by which a change in current flowing through it induces a voltage in both the conductor itself (self-inductance) and in any nearby conductors (mutual inductance). Measured in Henry (H).	Remember	CO 5	CLO 22	AEE504.22
11	Explain the phenomenon of line inductance.	Generally, electric power is transmitted through the transmission line with AC high voltage and current. High valued alternating current while flowing through the conductor sets up magnetic flux of high strength with alternating nature. This high valued alternating magnetic flux makes a linkage with other adjacent conductors parallel to the main conductor. Flux linkage in a conductor happens internally and externally. Internally flux linkage is due to self-current and externally flux linkage due to	Understand	CO5	CLO22	AEE504.5

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		external flux. Now the term inductance is closely related to the flux linkage, denoted by λ. Suppose a coil with N number of turn is linked by flux Φ due to current I, then, $Inductance\ L = \frac{Flux\ linkage}{current} = \frac{N\phi}{I}$				
12	What is Frequency Spectrum	Frequency spectrum of a signal is the range of frequencies contained by a signal.	Remember	CO 5	CLO 23	AEE504.23
13	What is ripple voltage?	The amount of AC voltage mixed with the rectifier's DC output is called 'ripple voltage'. In most cases, since "pure" DC is the desired goal, ripple voltage is undesirable.	Remember	CO 5	CLO 23	AEE504.23
14	Define Filter.	A filter is a circuit capable of passing (or amplifying) certain frequencies while attenuating other frequencies. Thus, a filter can extract important frequencies from signals that also contain undesirable or irrelevant frequencies.	Remember	CO 5	CLO 23	AEE504.23
15	What is static VAR compensation	A **static VAR compensator** is a set of electrical devices for providing fast-acting reactive power on high-voltage electricity transmission networks.	Remember	CO5	CLO 23	AEE504.23

Signature of the Faculty **HOD,EEE**