SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF

ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK

VI SEMESTER

1905609 EHVAC TRANSMISSION

Regulation – 2019

Academic Year 2022–23 (Even)

Prepared by

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SUBJECT: 1905609 -EHVAC TRANSMISSIONS

SEM / YEAR: VI / III

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UNIT I - INTRODUCTION				
EHVAC transmission line trends and preliminary aspect - standard transmission voltages Estimation at line and ground parameters-Bundle conductors: Properties - Inductance and Capacitance of EHV lines – Positive, negative and zero sequence impedance – Line Parameters for Modes of Propagation..				
PART-A				
Q.No	**Questions**	**BT Level**	**Competence**	**COs**
1.	Summarize, some of the general applications used in High Voltages.	**2**	**Understand**	CO1
2.	What is the need of EHVAC Transmission?	**1**	**Remember**	CO1
3.	Mention maximum charge conditions for three phase EHVAC Lines.	**1**	**Remember**	CO1
4.	Evaluate the relationship between charge-potential in multi conductor lines.	**5**	**Evaluate**	CO1
5.	Illustrate the different problems involved in EHVAC Transmission.	**3**	**Apply**	CO1
6.	List the Advantages and Limitations of EHVAC Transmission.	**1**	**Remember**	CO1
7.	Express the different types of faults occur in power line.	**5**	**Evaluate**	CO1
8.	Sketch the block diagram of HVDC Transmission System.	**3**	**Apply**	CO1
9.	Express what happens when there is increase in capacitance values in transmission lines?	**5**	**Evaluate**	CO1
10.	What is the use of Ground wires?	**1**	**Remember**	CO1
11.	Illustrate the term Dielectric flux density in point charge.	**3**	**Apply**	CO1
12.	Mention the properties of Bundle conductors.	**1**	**Remember**	CO1

13.	Analyze sphere gap between two point charges when one as potential and other as zero potential.	**4**	**Analyze**	CO1
14.	List the advantages and disadvantages of bundle conductors.	**1**	**Remember**	CO1
15.	Summarize short notes on bundle conductor.	**2**	**Understand**	CO1
16.	List out properties of field of a point charge.	**1**	**Remember**	CO1
17.	Formulate the hollow conductors are used in over head transmission line? Give the advantages of bundle conductor.	**6**	**Create**	CO1
18.	Express the terms in EHAC Transmission (i) Conductor (ii) Insulator.	**5**	**Evaluate**	CO1
19.	List out the situations in which ground return effects the performance of the system.	**1**	**Remember**	CO1
20.	What is an Equi potential charge?	**3**	**Apply**	CO1
21.	Give ten levels of transmission voltages that are used in the world.	**1**	**Remember**	CO1
22.	Write short notes on wake induced oscillation.	2	**Understand**	CO1
23.	What is the effect of unsymmetrical spacing of conductors in a 3-phase transmission line?	4	**Analyze**	CO1
24	Calculate the GMR of a bundled conductor used for 765kV AC line with the following data: number of sub conductors in bundle N=4, Radius of sub conductor r=2.3cm, bundle radius R=34cm.	**5**	**Evaluate**	CO1
PART-B				
1	What is need of EHVAC Transmission? Summarize the disadvantages of the EHV AC Transmission System. (13)	**2**	**Understand**	CO1
2.	Compare EHV AC with HVDC Transmission. (13)	**4**	**Analyze**	CO1
3.	Illustrate the overvoltage in Electrical Power Systems (i) Causes for High voltages in power system-Lightning Phenomenon (ii) Charge Formation in clouds. (13)	**3**	**Apply**	CO1
4.	Derive the expression for the inductance of a circular conductor due to external flux for EHV Transmissions. (13)	**5**	**Evaluate**	CO1
5.	Evaluate the expression for inductance of multiconductor line which is used in EHVAC transmission. (13)	**5**	**Evaluate**	CO1
6.	State the factors which govern the capacitance	**1**	**Remember**	CO1

	of the transmission line. (13)			
7.	Analyze the expression for Inductance values used in for EHV Transmission Lines. (13)	**4**	**Analyze**	CO1
8.	Explain the surface voltage gradient on conductors in EHVAC System. (13)	**2**	**Understand**	CO1
9.	Illustrate the Line capacitance calculations used in EHV Transmission Lines. (13)	**3**	**Apply**	CO1
10.	What are the properties of bundle conductor? Mention the advantages of bundle conductor. When possible to use for overhead lines. 13)	**1**	**Remember**	CO1
11.	Sketch and explain the positive, negative and zero sequence impedance. (13)	**3**	**Apply**	CO1
12.	Formulae resistance and inductance of Ground return conductors. (13)	**6**	**Analyze**	CO1
13.	Analyze with short notes and explain the different bundle conductors. (13)	**4**	**Analyze**	CO1
14.	Explain line parameters for the modes of propagation and calculate inductance values for three modes (i)Double (ii) Multi (iii) Bundled Conductors. (13)	5	**Evaluate**	CO1
15.	List at least ten important problems encountered in EHV transmission which may or may not be important at voltages of 220 kV and lower. (13)	4	**Analyze**	CO1
16.	A single-circuit 3-phase 50 Hz 400 kV line has a series reactance per phase of 0.327 ohm/km. Neglect line resistance. The line is 400 km long and the receiving- end load is 600 MW at 0.9 p.f. lag. The positive-sequence line capacitance is 7.27 nF/km. In the absence of any compensating equipment connected to ends of line, calculate the sending-end voltage. Work with and without considering line capacitance. The base quantities for calculation are 400 kV, 1000 MVA. (13)	2	**Understand**	CO1
17.	Explain in detail the line parameters for modes of propagation and derive necessary expressions. (13)	2	**Understand**	CO1
PART-C				
1.	Explain about EHVDC Transmission line trends and preliminary aspects. (15)	**5**	Evaluate	CO1

2.	Summarize the standard transmission voltage estimation at the line and ground parameters. (15)	**2**	**Understand**	CO1
3.	Illustrate the following terms (i) Properties of Bundle Conductors (7) (ii) Inductance and Capacitance for EHV Lines (8)	**3**	**Apply**	CO1
4.	A 3-phase 750 kV horizontal line has minimum height of 12 m, sag at mid span = 12 m. Phase spacing S = 15 m. Conductors are 4 × 0.035 m with bundle spacing of B = 0.4572m. Calculate per kilometer: a) The matrix of Maxwell's Potential coefficients for a un transposed configuration. b) The inductance and capacitance matrices for un transposed and transposed configurations. c) The zero-, positive-, and negative-sequence inductances and capacitances for transposed line. d) The ground-return resistance and inductance matrices at 750 Hz taking sr = 100 ohm-meter. (15)	**5**	**Evaluate**	CO1
5.	The configurations of some e.h.v. lines for 400 kV to 1200 kV are given. Calculate req for each. (a) 400 kV : N = 2, d = 2r = 3.18 cm, B = 45 cm (b) 750 kV : N = 4, d = 3.46 cm, B = 45 cm (c) 1000 kV : N = 6, d = 4.6 cm, B = 12 d (d) 1200 kV : N = 8, d = 4.6 cm, R = 0.6 m. (15)	**5**	**Evaluate**	CO1

UNIT II - ELECTROSTATIC FIELDS

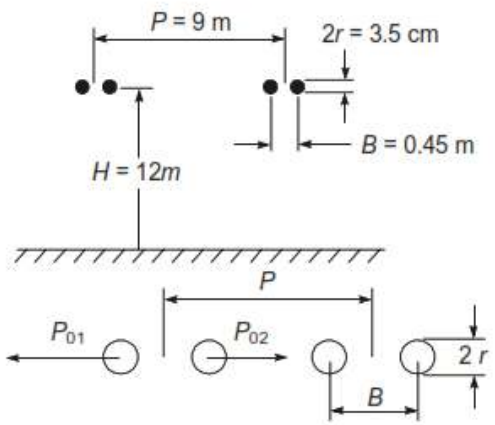
Electrostatic field and voltage gradients – Calculations of electrostatic field of AC lines – Effect of high electrostatic field on biological organisms and human beings – Surface voltage gradients and Maximum gradients of actual transmission lines – Voltage gradients on sub conductor.

PART-A

Q.No	Questions	BT Level	Competence	COs
1.	What is the concept of electrostatic field in the case of EHVAC Transmission?	**1**	**Remember**	CO2
2.	Analyze some of the applications of Electro static field.	**4**	**Analyze**	CO2

3.	Express the Coulomb's law. Give its applications.	**2**	**Understand**	CO2
4.	Illustrate the properties of field line charge.	**3**	**Apply**	CO2
5.	Analyze the term potential gradient? Write the expression for potential gradients in different forms.	**4**	**Analyze**	CO2
6.	List out the properties of a potential function.	**1**	**Remember**	CO2
7.	Illustrate the laws of electrostatics.	**3**	**Apply**	CO2
8.	Write short notes on electric potential.	**1**	**Remember**	CO2
9.	Explain the concept of electrostatic field in case of EHVAC System.	**2**	**Understand**	CO2
10.	List the different properties of field charge.	**1**	**Remember**	CO2
11.	What is meant by variable gradient?	**1**	**Remember**	CO2
12.	Evaluate the expression for the potential relations for multi conductor.	**5**	**Evaluate**	CO2
13.	Illustrate how the electro static field effects on the animals' beings?	**3**	**Apply**	CO2
14.	Express the terms (i) Conductors (ii) Insulators.	**1**	**Remember**	CO2
15.	Explain the surface voltage gradient on two conductor bundle.	**2**	**Understand**	CO2
16.	Analyze the effect of resistance of conductor in EHV Lines.	**4**	**Analyze**	CO2
17.	Describe the difference between primary shock current and secondary shock current.	**2**	**Understand**	CO2
18.	Evaluate the expression for surge impedance of a single-phase overhead line.	**5**	**Evaluate**	CO2
19.	How voltage gradient is minimized in bundle conductors?	**1**	**Remember**	CO2
20.	Explain the surface voltage gradient on single conductor.	**2**	**Understand**	CO2
21.	List out the application rules which are to be followed while using the meters for the measurement of electrostatic fields.	**2**	**Understand**	CO2
22.	Give the classification of shock currents?	**1**	**Remember**	CO2
23.	Give brief about surface voltage gradient on conductors.	**1**	**Remember**	CO2
24	What are charge potential relations for multi-conductors?	**2**	**Understand**	CO2
	PART-B			
1.	Summarize the following shock current (i) Primary Shock Current (ii) Secondary Shock Current. (13)	**2**	**Understand**	CO2
2.	How electrostatic field effects on animals and biological organism. (13)	**1**	**Remember**	CO2
3.	Explain the voltage gradient distribution on six-conductor bundle and gradient on sub	**2**	**Understand**	CO2

	conductor. (13)			
4.	Evaluate electrostatic field of double circuit 3-phase AC Line. (13)	**5**	**Evaluate**	CO2
5.	Discuss the effects of high electrostatic field of EHV Lines on plant life, vehicles and others. (13)	**2**	**Understand**	CO2
6.	Evaluate electrostatic field using 6-phase AC Line. (13)	**5**	**Evaluate**	CO2
7.	Illustrate briefly explain electromagnetic interference of EHVAC Transmission. (13)	**3**	**Apply**	CO2
8.	Summarize the effects of the electrostatic induction on the unenergized circuit of a double circuit 3-phase AC Line. (13)	**2**	**Understand**	CO2
9.	Analyze the properties of (i) Field of a point charge (ii) surface gradient on the conductor bundle. (13)	**4**	**Analyze**	CO2
10.	Evaluate the procedure to calculate the electrostatic field of a single circuit 3-phase AC line how it is computed. (13)	**5**	**Evaluate**	CO2
11.	Explain the following surface voltage gradient on conductor (i) Single Conductor (ii) Two Conductor Bundle (iii) N-Conductor Bundle in EHVAC system. (13)	**2**	**Understand**	CO2
12.	Summarize the term field of the sphere gap in EHVAC System. (13)	**2**	**Understand**	CO2
13.	Formulate the voltage gradient distribution on six conductor bundle and gradient sub conductor. (13)	**6**	**Create**	CO2
14.	Evaluate the expression for potential gradient at the surface of a conductor of 1-phase transmission line. (13)	**5**	**Evaluate**	CO2
15.	A 1150 KV, Δ line has conductors at heights 26m and 44m with 24m spacing conductor on circle of 1.2m diameter. At 1200 KV, calculate the electrostatic field at ground level at distances from the line centre d =0, 13, 26 m. (13)	**5**	**Evaluate**	CO2
16.	Explain how does the electric field at ground level influence tower design? (13)	**4**	**Analyze**	CO2
17.	The dimensions of a ± 400 kV dc line are shown in Figure.	**5**	**Evaluate**	CO2

	 Calculate (a) the charge coefficient 02/ eQ π for each bundle, (b) the maximum and minimum surface gradient on the conductors by (i) omitting the charges of the second pole and image conductors, (ii) considering the charge of the second pole but omitting the charge of the image conductors, (c) the average maximum surface voltage gradient of the bundle under case b (ii). (13)			
	PART-C			
1.	Summarize the effects of high electrostatic fields on biological organisms and Human beings. (15)	**2**	**Understand**	CO2
2.	Evaluate the expression to calculate electrostatic field of a single circuit 3-phase AC line is computed. (15)	**5**	**Evaluate**	CO2
3.	Create the surface voltage gradient and maximum gradients of actual transmission line. (15)	**6**	**Create**	CO2
4.	Illustrate the concept of voltage gradients of sub conductors. (15)	**3**	**Apply**	CO2
5.	A transmission line is 300 Km long and open at the far end. The attenuation of surge is 0.9 over one length of travel at light velocity. It is energized by: i) A step of 1000KV and ii) A sine wave of 325 kV peak when the wave is passing through its peak. Calculate and plot the open end voltage up to 20 m sec. (15)	**5**	**Evaluate**	CO2
UNIT III - POWER CONTROL				
Electrostatic induction in un energized lines – Measurement of field and voltage gradients for three phase single and double circuit lines – Un energized lines. Power				

Frequency Voltage control and overvoltage in EHV lines: No load voltage – Charging currents at power frequency-Voltage control – Shunt and Series compensation – Static VAR compensation.				
PART-A				
Q.No	**Questions**	**BT Level**	**Competence**	**COs**
1	Evaluate the electrostatic field of double circuit 3-phase AC Line.	**5**	**Evaluate**	CO3
2	Discuss the effect of high electrostatic field on humans.	**2**	**Understand**	CO3
3	Calculate plain the surface voltage gradient on single conductor.	**3**	**Apply**	CO3
4	Write short notes on power frequency charge of conductors.	**1**	**Remember**	CO3
5	Illustrate the concept of electrostatic field in the case of EHV AC Transmission?	**3**	**Apply**	CO3
6	List out the situations in which ground return current effect the performance of the system.	**1**	**Remember**	CO3
7	How the voltage gradient is minimized in bundle conductor ?	**1**	**Remember**	CO3
8	Analyze the use of power circle diagram?	**4**	**Analyze**	CO3
9	Differentiate Primary shock current and secondary shock current.	**4**	**Analyze**	CO3
10	Mention the various voltage control methods for EHV AC Transmission.	**1**	**Remember**	CO3
11	Summarize the need of voltage control in power system?	**2**	**Understand**	CO3
12	Mention the merits and demerits of series compensator.	**1**	**Remember**	CO3
13	Illustrate the main objective of shunt compensation?	**3**	**Apply**	CO3
14	Mention the merits and demerits of shunt compensator.	**1**	**Remember**	CO3
15	Define the term static variable generator. Classify the different static variable generators.	**4**	**Analyze**	CO3
16	Summarize the uses of shunt capacitors?	**2**	**Understand**	CO3
17	What are the merits of shunt compensation?	**1**	**Remember**	CO3
18	What is meant by synchronous condenser? Mention the applications of it.	**1**	**Remember**	CO3
19	Illustrate the term charging current? How can it be calculated? What is its effect?	**3**	**Apply**	CO3
20	Mention the applications of static VAR System or Compensator.	**1**	**Remember**	CO3
21	For a 400 kV 400 km line, 50% of the line-charging MVAR is to be compensated by connecting shunt reactors. Calculate the approximate MVAR required in these	**5**	**Evaluate**	CO3

22	For the 400-kV and 750-kV lines, calculate the surge-impedance loading, SIL.	**5**	**Evaluate**	CO3
23	For a 400 kV line, l = 1 mH/km and c = 11.1 nF/km, and Es = 400 kV from the source, line-line, r.m.s. Calculate the charging MVAR for line lengths varying from 100 km to 1000 km. Neglect resistance.	**5**	**Evaluate**	CO3
24	Give the remedy for Countering Induction Generator Effect.	**1**	**Remember**	CO3
	PART-B			
1	Explain Electro static Induction in unenergized lines for EHVAC Systems. (13)	**2**	**Understand**	CO3
2	Evaluate the power circle diagram and its use in voltage control. (13)	**5**	**Evaluate**	CO3
3	Discuss the effects of electrostatic induction on unenergized circuit of double circuit in the 3-phase A.C Line. (13)	**2**	**Understand**	CO3
4	Write short notes on power frequency charge of conductors. (13)	**1**	**Remember**	CO3
5	Explain power frequency-Voltage control method in EHVAC Lines. (13)	**2**	**Understand**	CO3
6	Illustrate the concept of no-load voltage conditions for overvoltage EHVAC Systems. (13)	**3**	**Apply**	CO3
7	Summarize the short notes on charging conditions for overvoltage EHVAC Systems. (13)	**2**	**Understand**	CO3
8	Analyze the following Static VAR Compensator (i)Thyrisor Controlled Reactor (TCR) for Fixed Angle Control (ii)Thyristor Controlled Transformer (TCT). (13)	**4**	**Analyze**	CO3
9	Illustrate the following schemes for the Static VAR Compensator (i)TSC-TCR Scheme (ii) Saturated Reactor (SR) Scheme. (13)	**2**	**Apply**	CO3
10	Differentiate series and shunt compensator. (13)	**4**	**Analyze**	CO3
11	Illustrate the series capacitor compensation at line centre. (13)	**3**	**Apply**	CO3
12	Explain the phenomena concept of the sub synchronous resonance. (13)	**2**	**Understand**	CO3
13	Compare series and shunt compensators for EHVAC Transmission. (13)	**4**	**Analyze**	CO3
14	Explain the voltage control using synchronous condenser. (13)	**2**	**Understand**	CO3
15	Derive equations for the voltage and current at any point on a transmission line in terms of the	**5**	**Evaluate**	CO3

	voltage at entrance to the line. (13)			
16	A very long line has series capacitance amounting to 50% of the series reactance. Calculate the natural electrical frequency. (13)	**5**	**Evaluate**	CO3
17	List the dangers resulting from series capacitor compensation on long lines, and the remedies taken to counteract them. (13)	**2**	**Understand**	CO3
	PART-C			
1.	Illustrate the Electrostatic induction on unenergized circuit of a double circuit 3-phase AC Lines (i) Electromagnetic Interference (ii) Shock Current. (15)	3	**Apply**	CO3
2.	Explain power frequency-Voltage control method for (i) No load Voltage (ii) Charging current at power frequency in EHVAC Lines. (15)	**5**	**Evaluate**	CO3
3	Summarize the various static VAR Compensators for reactive power control in EHV systems. (15)	**2**	**Understand**	CO3
4	Create the circuit Shunt and Series Compensator on the transmission line. Mention its limitations of them. (15)	**6**	**Create**	CO3
5	A 750 kV line has the distributed line constants r = 0.025 ohm/km, l = 0.9 mH/km, and c = 12.3 nF/km. At 50 Hz, calculate the following if the line is 600 km in length. (a) A, B, C, D constants. (b) The charging current and MVAR at a receiving end voltage of 750 kV, line-line, on no load. (c) The coordinates of the centre of the receiving end power-circle diagram. (d) The surge-impedance loading. (15)	**5**	**Evaluate**	CO3

UNIT IV - CORONA EFFECTS AND RADIO INTERFERENCE				
Corona in EHV lines – Corona loss formulae-Charge voltage diagram- Attenuation of traveling waves due to Corona – Audio noise due to Corona, its generation, characteristic and limits. Measurements of audio noise radio interference due to Corona - properties of radio noise – Frequency spectrum of RI fields – Measurements of RI and RIV-Reduction of corona.				
PART-A				
Q.No	**Questions**	**BT Level**	**Competence**	**COs**
1.	What is meant by corona?	**1**	**Remember**	CO4
2.	Summarize the different factors affecting	**2**	**Understand**	CO4

	corona loss.			
3.	What are the effects of corona on transmission line ?	**1**	**Remember**	CO4
4.	Explain the term corona loss. List the methods of reducing corona.	**2**	**Understand**	CO4
5.	Give the expression for power loss due to corona.	**1**	**Remember**	CO4
6.	Illustrate the term audible noise. Draw the block diagram of audible noise measuring circuit.	**3**	**Apply**	CO4
7.	Sketch the charge-voltage diagram of corona.	**3**	**Apply**	CO4
8.	Mention the different methods for reducing corona loss.	**1**	**Remember**	CO4
9.	Express the limits for the audible noise(AN)?	**5**	**Evaluate**	CO4
10.	List the various factors for generating audible noise.	**1**	**Remember**	CO4
11.	Sketch the characteristic of audible noise (AN) and list the devices used for measuring AN.	**3**	**Apply**	CO4
12.	Analyze the different devices used for the measurement Radio Interference.	**4**	**Analyze**	CO4
13.	Illustrate the diagram of frequency spectrum of Radio Interference field.	**3**	**Apply**	CO4
14.	Write short notes on Radio Interference (RI) excitation function.	**1**	**Remember**	CO4
15.	List the properties of Radio Noise.	**1**	**Remember**	CO4
16.	Analyze the different types of corona discharge?	**4**	**Analyze**	CO4
17.	Illustrate Radio Influence excitation energy function formulae.	**3**	**Apply**	CO4
18.	Mention the different Methods for reducing corona effect.	**1**	**Remember**	CO4
19.	Create the block diagram of radio noise meter with suitable block diagram.	**6**	**Create**	CO4
20.	Sketch the block diagram of Radio Influence Meter (RIM) with suitable block diagram.	**3**	**Apply**	CO4
21.	What is power loss and audible noise?	**1**	**Remember**	CO4
22.	Explain Corona and give the corona loss formulae.	**2**	**Understand**	CO4
23.	Explain charge and voltage diagram	**1**	**Remember**	CO4
24.	Explain the relation between 1-Phase and 3-phase AN levels.	**2**	**Understand**	CO4
	PART-B			
1.	What is meant by corona? Discuss the factors affecting corona loss. (13)	**1**	**Remember**	CO4
2.	Explain the following terms for the Corona (i) Corona loss in the DC Transmission (ii) Methods for reducing corona effect. (13)	**2**	**Understand**	CO4

3.	Summarize the charge-voltage diagram and corona loss. (13)	**2**	**Understand**	CO4
4.	Illustrate the factors affecting corona loss. Explain the advantages and disadvantages of corona. (13)	**3**	**Apply**	CO4
5.	Explain the attenuation of travelling waves due to corona. (13)	**2**	**Understand**	CO4
6.	Illustrate the various corona loss formulae for power loss. (13)	**3**	**Apply**	CO4
7.	Explain the generation and characteristics of audible noise. (13)	**2**	**Apply**	CO4
8.	Define audible noise and sketch the block diagram of audible nose measuring unit. Draw the charge-voltage diagram of corona. (13)	**3**	**Apply**	CO4
9.	Explain the generation and measurement of audio noise due to corona in EHV Lines for (i) Microphones (ii) Weighting Networks. (13)	**2**	**Understand**	CO4
10.	Explain briefly generation of corona pulses in a transmission lines. (13)	**5**	**Evaluate**	CO4
11.	Analyze the quantities on which the audible noise level depends for the extra high voltage A.C Lines or Overhead transmission lines. (13)	**4**	**Analyze**	CO4
12.	Sketch the Block diagram for (i) Radio Noise Meter (ii) Radio Influence Voltage (RIV). (13)	**3**	**Apply**	CO4
13.	Write short note on radio interference due to corona. Explain the limits for radio interface fields that occur in EHVAC Transmission lines. (13)	**1**	**Remember**	CO4
14.	Discuss the frequency spectrum of radio interference field in EHVAC Transmission lines. (13)	**2**	**Understand**	CO4
15.	A voltage with magnitude of 500 KV crest is incident on conductor whose corona inception voltage is 100 KV crest and capacitance C= 10 nF/Km. After a lapse of 130 μsec, the measured amplitude is 120 KV. Calculate α and Ks. (13)	**5**	**Evaluate**	CO3
16.	Calculate and plot the field factor for the 3-modes of propagation for a line with H=15 m, S=12 m as the distance from the line center is varied from 0 to 3H. (13)	**5**	**Evaluate**	CO3
17.	Explain the lateral profile of RI and modes of propagation in EHV lines. (13)	**2**	**Understand**	CO3
PART-C				
1.	Illustrate short notes on charge-voltage relationship and derive expression for corona power loss. (15)	**3**	**Apply**	CO4

2.	Evaluate the generation and measurement of audio noise due to corona in EHV Lines for (i) Microphones (ii) Weighting Networks (iii) Octave band. (15)	**5**	**Evaluate**	CO4
3.	Summarize the following terms in corona (i) Audible noise generation characteristics (ii) Methods for reduce corona loss (iii)Block diagram of Audible noise measurement. (15)	**2**	**Understand**	CO4
4.	Illustrate the following terms affects in EHVAC Transmission lines (i) Frequency spectrum of radio interference field (ii) Radio Interference Field. (15)	**3**	**Apply**	CO4
5.	(i) Explain the generation and characteristics of audible noise. The AN level of one phase of a 3-phase transmission line at a point is 70 dB. (8) (ii) Calculate: a) The SPL in pascals b) If a second source of noise contributes 65 dB at the same location, calculate the combined AN level due to the two sources. (7)	**5**	**Evaluate**	CO3

UNIT V-STEADY STATE AND TRANSIENT LIMITS				
Design of EHV lines based on steady state and transient limits - EHV abilities and their characteristics-Introduction six phase transmission – UHV.				
PART-A				
Q.No	**Questions**	**BT Level**	**Competence**	**COs**
1.	Explain the transient state of EHV AC Lines?	**2**	**Remember**	CO5
2.	Mention some case study for transient condition for EHV AC Lines.	**1**	**Remember**	CO5
3.	Summarize the concept of steady state of EHV AC Lines?	**2**	**Understand**	CO5
4.	Mention some case study for steady state condition for EHV AC Lines.	**1**	**Remember**	CO5
5.	Explain the following transients (i) External Transient (ii) Internal Transient.	**2**	**Understand**	CO5
6.	Illustrate the necessary of transient limit in EHV Transmission system?	**3**	**Apply**	CO5
7.	Illustrate the necessary of steady state limit in EHV Transmission system?	**3**	**Apply**	CO5
8.	Mention the necessary of UHV System.	**1**	**Remember**	CO5
9.	What are the special features of UHV compare with EHV?	**4**	**Analyze**	CO5

10	Mention the capability of EHV.	**1**	**Remember**	CO5
11	Express the characteristics of EHV.	**5**	**Evaluate**	CO5
12	Write the configuration of the Electro static field for the 6-phase line.	**1**	**Remember**	CO5
13	Evaluate the expression for six phase transmission.	**5**	**Evaluate**	CO5
14	Summarize the concept of six phase transmission?	**2**	**Understand**	CO5
15	Illustrate six phase transmission is necessary for EHV AC System?	**3**	**Apply**	CO5
16	List the parameters of UHV Lines.	**1**	**Remember**	CO5
17	Write the voltage range for UHV and EHVAC transmission.	**1**	**Remember**	CO5
18	What is meant by UHV? Sketch the block diagram of UHV.	**3**	**Apply**	CO5
19	Illustrate the advantages and disadvantages of UHV?	**3**	**Apply**	CO5
20	Mention some applications of UHV.	**1**	**Remember**	CO5
21	Give power circle diagram and its use	**1**	**Remember**	CO5
22	Discuss the voltage control using synchronous condensers.	**2**	**Understand**	CO5
23	What are compensated lines?	**1**	**Remember**	CO5
24	Write about the cascade connection of shunt and series compensation.	**2**	**Understand**	CO5
	PART-B			
1.	What is meant transient limit in EHV AC Transmission system? Explain with a suitable example. (13)	**2**	**Understand**	CO5
2.	What is steady state limit in EHV AC Transmission system? Explain with a suitable example. (13)	**2**	**Understand**	CO5
3.	Illustrate the necessary of transient limit in EHV AC Transmission system. (13)	**3**	**Apply**	CO5
4.	Illustrate the necessary of steady state limit in EHV AC Transmission system. (13)	**3**	**Apply**	CO5
5.	Analyze the concept of transient in EHV AC Transmission Line with suitable example. (13)	**4**	**Analyze**	CO5
6.	Analyze the concept of steady state in EHV AC Transmission Line with suitable example. (13)	**4**	**Analyze**	CO5
7.	Summarize the following terms in EHV Systems (i) Capabilities (ii) Characteristics. (13)	**2**	**Understand**	CO5
8.	What is meant by six phase transmission? Mention the necessary of six phase transmission and explain it. (13)	**1**	**Remember**	CO5
9.	Explain the concept of six phase transmission	**2**	**Understand**	CO5

	with suitable example. (13)			
10.	Explain the concept of Transient Torque Problem in EHV AC Transmission Line. (13)	**2**	**Understand**	CO5
11.	Compare the EHV System with UHV System. (13)	**4**	**Analyze**	CO5
12.	What is meant by UHV Transmission System? With neat sketch explain the above scheme. (13)	**3**	**Apply**	CO5
13.	Summarize the Ultra High Voltage (UHV) AC Transmission. (13)	**2**	**Understand**	CO5
14.	Evaluate the concept of the current and future trends of Ultra High Voltage (UHV) AC Transmission. (13)	**5**	**Evaluate**	CO5
15.	What is the reason for the existence of SSSR in the steady state and transient? (13)	**2**	**Understand**	CO5
16.	Explain the voltage control using synchronous condensers. (13)	**2**	**Understand**	CO5
17.	Define compensation and explain Cascade connection of components of shunt series compensation with generalized equations and chain rule? (13)	**3**	**Apply**	CO5
PART-C				
1.	Analyze EHV Lines for Design the factors for (i) Steady state (ii) Transient Limits of operation. (15)	**4**	**Analyze**	CO5
2.	Explain the concept of Extra High Voltage (EHV) Capability for AC Line transmission with suitable example. (15)	**2**	**Understand**	CO5
3	Illustrate the schematic diagram for six phase transmission and also evaluate expression. (15)	**3**	**Apply**	CO5
4	Create the diagram for Ultra High Voltage (UHV) AC Transient concept with suitable example. (15)	**6**	**Create**	CO5
5	What is the purpose and significance of power circle diagram and its uses and also explain in detail the receiving end circle diagram for calculating reactive compensation for voltage control buses? (15)	**3**	**Apply**	CO5

Course Outcomes:

COs	**Course Outcome**
CO1	Ability to understand the principles and types of EHVAC system
CO2	Ability to analyze the electrostatic field of AC lines
CO3	Ability to study about the compensation
CO4	Ability to study about the corona in E.H.V. lines
CO5	Ability to analyze the steady state and transient limits