

SRM VALLIAMMAI ENGINEERING COLLEGE
(*An Autonomous Institution*)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK



II SEMESTER

ME-PSE

PPS302- EHVAC TRANSMISSION

Regulation – 2023

Academic Year 2024–25 (Even)

Prepared by

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SUBJECT: PPS302 -EHVAC TRANSMISSION

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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	4	Analyze	CO1

	one as potential and other as zero potential.			
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.	Draw the block diagram of HVDC Transmission System.	3	Apply	CO1
22.	How EHVAC is distinguished with HVDC Transmission System.	1	Remember	CO1
23.	Mention the different problems involved in EHVAC Transmission.	1	Remember	CO1
24.	List the Advantages and Limitations of EHVAC Transmission.	1	Remember	CO1
PART-B				
1	What is need of EHVAC Transmission?.Summarize the disadvantages of the EHV AC Transmission System. (16)	2	Understand	CO1
2.	Compare EHV AC with HVDC Transmission. (16)	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. (16)	3	Apply	CO1
4.	Derive the expression for the inductance of a circular conductor due to external flux for EHV Transmissions. (16)	5	Evaluate	CO1
5.	Evaluate the expression for inductance of multiconductor line which is used in EHVAC transmission. (16)	5	Evaluate	CO1
6.	State the factors which govern the capacitance of the transmission line. (16)	1	Remember	CO1
7.	Analyze the expression for Inductance values used in for EHV Transmission Lines. (16)	4	Analyze	CO1
8.	Explain the surface voltage gradient on conductors in EHVAC System. (16)	2	Understand	CO1
9.	Illustrate the Line capacitance calculations used in EHV Transmission Lines. (16)	3	Apply	CO1

10.	What are the properties of bundle conductor? Mention the advantages of bundle conductor. When possible to use for overhead lines. (16)	1	Remember	CO1
11.	Sketch and explain the positive, negative and zero sequence impedance. (16)	3	Apply	CO1
12.	Formulae resistance and inductance of Ground return conductors. (16)	6	Analyze	CO1
13.	Analyze with short notes and explain the different bundle conductors. (16)	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. (16)	5	Evaluate	CO1
15.	Explain about EHVDC Transmission line trends and preliminary aspects. (16)	5	Evaluate	CO1
16.	Summarize the standard transmission voltage estimation at the line and ground parameters. (16)	2	Understand	CO1
17.	Illustrate the following terms (i) Properties of Bundle Conductors (8) (ii) Inductance and Capacitance for EHV Lines (8)	3	Apply	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.	Analyze some of the applications of Electro static field.	4	Analyze	CO2
22.	Express the Coulomb's law. Give its applications.	2	Understand	CO2
23.	Mention the different properties of field charge.	1	Remember	CO2
24.	Define the term variable gradient. Give example for it.	1	Remember	CO2
PART-B				
1.	Summarize the following shock current (i) Primary Shock Current (ii) Secondary Shock Current. (16)	2	Understanding	CO2
2.	How electrostatic field effects on animals and biological organism. (16)	1	Remember	CO2
3.	Explain the voltage gradient distribution on six-conductor bundle and gradient on sub conductor. (16)	2	Understand	CO2
4.	Evaluate electrostatic field of double circuit 3-phase AC Line. (16)	5	Evaluate	CO2
5.	Discuss the effects of high electrostatic field of EHV Lines on plant life, vehicles and others. (16)	2	Understanding	CO2
6.	Evaluate electrostatic field using 6-phase AC Line. (16)	5	Evaluate	CO2
7.	Illustrate briefly explain electromagnetic interference of EHVAC Transmission. (16)	3	Apply	CO2
8.	Summarize the effects of the electrostatic induction on the unenergized circuit of a double circuit 3-phase AC Line. (16)	2	Understand	CO2
9.	Analyze the properties of (i) Field of a point charge (ii) surface gradient on the conductor bundle. (16)	4	Analyze	CO2
10.	Evaluate the procedure to calculate the electrostatic field of a single circuit 3-phase AC line how it is computed. (16)	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. (16)	2	Understand	CO2
12.	Summarize the term field of the sphere gap in EHVAC System. (16)	2	Understand	CO2
13.	Formulate the voltage gradient distribution on six conductor bundle and gradient sub conductor. (16)	6	Create	CO2
14.	Evaluate the expression for potential gradient at the surface of a conductor of 1-phase transmission line. (16)	5	Evaluate	CO2
15.	Summarize the effects of high electrostatic fields on biological organisms and Human beings. (16)	2	Understand	CO2

16.	Evaluate the expression to calculate electrostatic field of a single circuit 3-phase AC line is computed. (16)	5	Evaluate	CO2
17.	Illustrate the concept of voltage gradients of sub conductors. (16)	3	Apply	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	Discuss the effect of high electrostatic field on humans.	2	Understand	CO3
22	Calculate plain the surface voltage gradient on single conductor.	3	Apply	CO3
23	Illustrate the main objective of shunt compensation?	3	Apply	CO3
24	What is meant by power circle diagram ?	1	Remember	CO3

PART-B				
1	Explain Electro static Induction in unenergized lines for EHVAC Systems. (16)	2	Understand	CO3
2	Evaluate the power circle diagram and its use in voltage control. (16)	5	Evaluate	CO3
3	Discuss the effects of electrostatic induction on unenergized circuit of double circuit in the 3-phase A.C Line. (16)	2	Understand	CO3
4	Write short notes on power frequency charge of conductors. (16)	1	Remember	CO3
5	Explain power frequency-Voltage control method in EHVAC Lines. (16)	2	Understand	CO3
6	Illustrate the concept of no load voltage conditions for overvoltage EHVAC Systems. (16)	3	Apply	CO3
7	Summarize the short notes on charging conditions for overvoltage EHVAC Systems. (16)	2	Understand	CO3
8	Analyze the following Static VAR Compensator (i)Thyrisor Controlled Reactor(TCR) for Fixed Angle Control (ii)Thyristor Controlled Transformer(TCT). (16)	4	Analyze	CO3
9	Illustrate the following schemes for the Static VAR Compensator (i)TSC-TCR Scheme (ii) Saturated Reactor(SR) Scheme. (16)	2	3 Apply	CO3
10	Differentiate series and shunt compensator. (16)	4	Analyze	CO3
11	Illustrate the series capacitor compensation at line centre. (16)	3	Apply	CO3
12	Explain the phenomena concept of the subsynchronous resonance. (16)	2	Understand	CO3
13	Compare series and shunt compensators for EHVAC Transmission. (16)	4	Analyze	CO3
14	Explain the voltage control using synchronous condenser. (16)	2	Understand	CO3
15.	Illustrate the Electrostatic induction on unenergized circuit of a double circuit 3-phase AC Lines (i) Electro magnetic Interference (ii) Shock Current. (16)	3	Apply	CO3
16.	Explain power frequency-Voltage control method for (i) No load Voltage (ii) Charging current at power frequency in EHVAC Lines. (16)	5	Evaluate	CO3
17.	Summarize the various static VAR Compensators for reactive power control in EHV systems. (16)	2	Understand	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 corona loss.	2	Understand	CO4
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	Understanding	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.	Mention the different factors affecting corona loss.	1	Remember	CO4
22.	Illustrate the effects of corona on transmission line ?	3	Apply	CO4
23.	Mention the different devices used for the measurement Radio Interference.	1	Remember	CO4
24.	Draw the block diagram of Radio Influence Meter (RIM) and mention the main elements of it.	3	Apply	CO4
PART-B				
1.	What is meant by corona? Discuss the factors affecting corona loss. (16)	1	Remember	CO4
2.	Explain the following terms for the Corona (i) Corona loss in the DC Transmission (ii) Methods for reducing corona effect. (16)	2	Understand	CO4
3.	Summarize the charge-voltage diagram and corona loss. (16)	2	Understand	CO4
4.	Illustrate the factors affecting corona loss. Explain the advantages and disadvantages of corona. (16)	3	Apply	CO4
5.	Explain the attenuation of travelling waves due to corona. (16)	2	Understand	CO4
6.	Illustrate the various corona loss formulae for power loss. (16)	3	Apply	CO4
7.	Explain the generation and characteristics of audible	2	Apply	CO4

	noise. (16)			
8.	Define audible noise and Sketch the block diagram of audible noise measuring unit. Draw the charge-voltage diagram of corona. (16)	3	Apply	CO4
9.	Explain the generation and measurement of audio noise due to corona in EHV Lines for (i) Microphones (ii) Weighting Networks. (16)	2	Understand	CO4
10	Explain briefly generation of corona pulses in a transmission lines. (16)	5	Evaluate	CO4
11	Analyze the quantities on which the audible noise level depends for the extra high voltage A.C Lines or Over head transmission lines. (16)	4	Analyze	CO4
12	Sketch the Block diagram for (i) Radio Noise Meter (ii) Radio Influence Voltage(RIV). (16)	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. (16)	1	Remember	CO4
14	Discuss the frequency spectrum of radio interference field in EHVAC Transmission lines. (16)	2	Understand	CO4
15	Evaluate the generation and measurement of audio noise due to corona in EHV Lines for (i) Microphones (ii) Weighting Networks (iii) Octave band. (16)	5	Evaluate	CO4
16	Summarize the following terms in corona (i) Audible noise generation characteristics (ii) Methods for reduce corona loss (iii)Block diagram of Audible noise measurement. (16)	2	Understand	CO4
17	Illustrate the following terms affects in EHVAC Transmission lines (i) Frequency spectrum of radio interference field (ii) Radio Interference Field. (16)	3	Apply	CO4

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	4	Analyze	CO5

	EHV ?			
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	Draw basic block diagram of the UHV.	3	Apply	CO5
22	Mention some case study for transient condition for EHV AC Lines.	1	Remember	CO5
23	Illustrate the necessary of steady state limit in EHV Transmission system ?	3	Apply	CO5
24	Mention the six phase transmission is necessary for EHV AC System?	1	Remember	CO5
PART-B				
1.	What is meant transient limit in EHV AC Transmission system? Explain with a suitable example. (16)	2	Understand	CO5
2.	What is steady state limit in EHV AC Transmission system? Explain with a suitable example. (16)	2	Understand	CO5
3.	Illustrate the necessary of transient limit in EHV AC Transmission system. (16)	3	Apply	CO5
4.	Illustrate the necessary of steady state limit in EHV AC Transmission system. (16)	3	Apply	CO5
5.	Analyze the concept of transient in EHV AC Transmission Line with suitable example. (16)	4	Analyze	CO5
6.	Analyze the concept of steady state in EHV AC Transmission Line with suitable example. (16)	4	Analyze	CO5
7.	Summarize the following terms in EHV Systems (i) Capabilities (ii) Characteristics. (16)	2	Understand	CO5
8.	What is meant by six phase transmission? Mention the necessary of six phase transmission and explain it. (16)	1	Remember	CO5
9.	Explain the concept of six phase transmission with suitable example. (16)	2	Understand	CO5
10.	Explain the concept of Transient Torque Problem in EHV AC Transmission Line. (16)	2	Understand	CO5
11.	Compare the EHV System with UHV System. (16)	4	Analyze	CO5
12.	What is meant by UHV Transmission System? With neat sketch explain the above scheme. (16)	3	Apply	CO5
13.	Summarize the Ultra High Voltage (UHV) AC Transmission. (16)	2	Understand	CO5
14.	Evaluate the concept of the current and future trends of Ultra High Voltage (UHV) AC Transmission. (16)	5	Evaluate	CO5

15.	Explain the concept of Extra High Voltage (EHV) Capability for AC Line transmission with suitable example. (16)	2	Understand	CO5
16	Illustrate the schematic diagram for six phase transmission and also evaluate expression. (16)	3	Apply	CO5
17.	Create the diagram for Ultra High Voltage (UHV) AC Transient concept with suitable example. (16)	6	Create	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

