

### ELECTRICAL AND ELECTRONICS ENGINEERING

## DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	HIGH VOLTAGE ENGINEERING
Course Code	:	AEE015
Program	:	B. Tech
Semester	:	VII
Branch	:	Electrical and Electronics Engineering
Section	:	Α
Academic Year	:	2019 -2020
Course Faculty	:	Mr. G.KRANTHI KUMAR, Assistant Professor

#### **COURSE OBJECTIVES:**

The c	ourse should enable the students to:
Ι	Summarize the types of insulation and breakdown process used for power system protection.
II	Design the networks for generation of high direct current voltage, high alternating current voltage and to measure the same.
III	Identify the causes for over voltages and explain the principals of insulation co-ordination in high voltage power systems.
IV	Measure the various electrical parameters of insulation used for power system equipment for their with stand.
v	Examine breakdown strength of insulation mediums for power system using type and routine test.

#### **DEFINITIONS AND TERMINOLOGY QUESTION BANK:**

S. No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code			
	UNIT - I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS								
1	Define External Faults.	The short circuit may occur in two or three phases of electrical power system. The level of fault current is always high enough	Remember	CO2	CLO2	CAEE015.2			
2	Define Lighting Strokes.	Lightning stroke is the direct discharge of an electrical charge between the atmosphere and the object of earth.	Remember	CO2	CLO2	CAEE015.2			
3	Define Switching over Voltages.	Switching over voltage caused by any switching operation, faults and CB opening and closing, one line tripping of a double cut line etc.	Understand	CO2	CLO2	CAEE015.2			
4	Define Temporary over	These are caused when some major load gets disconnected from the	Understand	CO2	CLO2	CAEE015.2			

S. No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
	Voltages.	long line under normal or steady state condition				
5	Define Switching Surge	Switching surges are the over current/overvoltage spikes that are experienced in the highly inductive circuits at the time of sudden interruption I.e. switching period.	Remember	CO1	CLO1	CAEE015.1
6	Describe Lightning Arrestor.	A lightning arrester 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.	Understand	CO3	CLO3	CAEE015.3
7	Describe Main Features of Lighting Arrestor.	Air terminal, Conductors, Ground termination Surge protection	Remember	CO3	CLO3	CAEE015.3
8	Define Ferranti Effect.	The Ferranti effect is an increase in voltage occurring at the receiving end of a long transmission line, above the voltage at the sending end.	Remember	CO1	CLO1	CAEE015.1
9	Define Earth Fault Factor.	An earth fault factor is defined as the ratio of the higher of the two sound phase voltages to the line-to- neutral voltage at the same point in the system with the fault removed	Remember	CO1	CLO1	CAEE015.1
10	Define Corona.	The phenomenon of ionization of surrounding air around the conductor due to which luminous glow with hissing noise is rise is known as the corona effect.	Remember	CO2	CLO2	CAEE015.2
11	Define Air Density Factor.	The corona loss in inversely proportional to air density factor, i.e., corona loss, increases with the decrease in density of air.	Remember	CO1	CLO1	CAEE015.1
12	Define Travelling Wave.	Travelling wave is a temporary wave that creates a disturbance and moves along the transmission line at a constant speed.	Remember	CO1	CLO1	CAEE015.1
13	Describe the Over voltage Protection	Overvoltage protection is the process of securing an electrical system from the possible damages that may be caused by overvoltage through the use of devices like arcing horns attached to transmission lines and Zener diodes for electronic circuits.	Understand	CO1	CL01	CAEE015.1
14	Describe the Characteristics of over voltage protection.	Be fast enough to respond to transient events that can damage the power supply and downstream components	Understand	CO2	CLO2	CAEE015.2
15	Describe the lightning over voltages.	Only a part of the total charge- several hundred coulombs-is released to earth by lightning; the rest is consumed in internal cloud discharges.	Understand	CO2	CLO2	CAEE015.2

S. No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		UNIT - II				
1	Define Dielectric	Dielectric breakdown is when	Remember	CO4	CLO4	CAEE015.4
	Breakdown.	current flows through an electrical insulator when the voltage applied across it exceeds the breakdown voltage				
2	Define Thermal break down	It occurs due to heat dissipation in the sample due to current flowing through defective parts of the sample which in turn further increase the ionic defect concentration leading to subsequent increase in the conductivity and then failure.	Understand	CO4	CLO4	CAEE015.4
3	Define Electro Chemical Breakdown.	This occurs due to transport of conducting material due to the presence of local electrochemical current paths or defect into the interior of the dielectric leading to overall increase in the sample conductivity and then failure.	Understand	CO5	CLO5	CAEE015.5
4	Describe Electromechanic al Breakdown.	When solid dielectrics are subjected to high electric fields, failure occurs due to electrostatic compressive forces which can exceed the mechanical compressive strength.	Understand	CO5	CLO5	CAEE015.5
5	Define Intrinsic Break Down.	When voltages are applied only for short durations of the order of 8to 10s the dielectric strength of a solid dielectric increases very rapidly to an upper limit called the intrinsic electric strength.	Remember	CO6	CLO6	CAEE015.6
6	Describe the phenomenon occur in gaseous Dielectric	When the applied voltage is low, small currents flow between the electrodes and the insulation retains its electrical properties	Understand	CO4	CLO4	CAEE015.4
7	Define spark breakdown.	The break down in a gas, called spark breakdown is the transition of a non-sustaining discharge into self sustaining discharge.	Remember	CO4	CLO4	CAEE015.4
8	Define electronegative gases.	Electronegative gases are the gases that have affinity towards electrons. When electron comes into contact with these gas molecules, the gas molecule attracts the electrons and becomes negative ion	Understand	CO4	CLO4	CAEE015.4
9	Describe pure liquids dielectrics	Pure liquids are those which are chemically pure and do not contain any other impurity even in traces of 1 in 109, and are structurally simple	Remember	CO <sub>5</sub>	CLO5	CAEE015.5
10	Define breakdown voltage	The maximum voltage that can be applied on the insulation at the moment of breakdown is called as breakdown voltage	Remember	CO4	CLO4	CAEE015.4

S. No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
11	Define Townsend's first ionization co- efficient.	Townsends Primary ionization coefficient $\alpha$ is defined as the average number of ionizing collision made by the free electron per centimeter travel in the direction of applied electric field.	Remember	CO5	CLO5	CAEE015.5
12	Define Townsend's second ionization co- efficient.	The Townsend's secondary ionization coefficients defined as the net number of secondary electrons produced per incident positive ion, photon, excited particle or metastable particle.	Remember	CO5	CLO5	CAEE015.5
13	Define time lag.	The time difference between the application of a voltage sufficient to cause breakdown and the occurrence of breakdown itself is called the time lag.	Remember	CO6	CLO6	CAEE015.6
14	Define vacuum discharge	Electrons get multiplied due to the various ionization processes and an electron avalanche is formed. In high vacuum, even if the electrodes are separated by a few centimeters, an electron crosses the gap without encountering any collisions.	Understand	CO6	CLO6	CAEE015.6
15	Describe composite Dielectric.	Composite dielectrics are the different insulating materials in parallel or in series with each other, such as air or SF6 gas in parallel with solid insulation	Understand	CO5	CLO5	CAEE015.5
		UNIT – III				
1	GENER	ATION OF HIGH VOLTAGES	AND HIGI	H CUR	RENTS	CAEE015.7
1	coil.	high frequency resonant transformer, which is a doubly tuned resonant circuit.	Remember	07	CL07	CAEE015.7
2	Describe Voltage Multiplier Circuit.	Multiplier circuit is a circuit to generate very high d.c voltages from single supply transformers by extending the simple voltage doubler circuits	Understand	CO7	CLO7	CAEE015.7
3	Describe the wave front and wave tail times controlled in impulse generator circuits	For a given impulse generator, the generator capacitance C1 and load capacitance C2 will be fixed depending on the design of the generator and the test object. Hence, the desired wave shape is obtained by controlling R1 and R2.	Understand	CO7	CLO7	CAEE015.7
4	Define Peak Value.	The maximum positive deviation of the output with respect to its desired value is known as peak value.	Remember	CO9	CLO9	CAEE015.9
5	Define Voltage dividers	Voltage dividers of either damped capacitor or resistor type and an oscilloscope with recording arrangement are provided for measurement of the voltages across the test object.	Remember	CO8	CLO8	CAEE015.8

6  Define transient  It is an oscillatory wave or frequency ranging for few Hundred hertz to few kilohertz.  Remember  CO11  CLO11  CAEE015.11    7  Describe  It is defined as the total time of the wave during which the current is cycle converters at least 10% of its peak value.  Remember  CO9  CLO9  CAEE015.9    8  Define  Input of the first transformer unit cascaded is supplied from avoltage regulator. The primary winding is supplied from a motor generator or from a voltage regulator. The response to raise from 10 to 90%, of to 100% of the final value at the very first instance.  CO9  CLO9  CAEE015.9    10  Define tail times  Fall time is the time to reach 50% of impulse wave, peak value of 50 µs. Fall time for the a.c. maximum voltage. When higher d.c. voltages are needed, a voltage doubler directifier doubler directifier doubler directifier doubler directifier doubler directifier directifier directifier directifier doubler directifier directifier doubler directifier directifier directifier doubler directifier directifier doubler directifier directifier doubler directifier directifier doubler directifier doubler directifier directifier doubler directifier doubler directifier dir	S. No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
voltage.  damped oscillatory wave of frequency ranging for few Hundred hertz to few kilohertz.  Image of the second se	6	Define transient	It is an oscillatory wave or a	Remember	CO11	CLO11	CAEE015.11
Interpretation  Interpretation  Interpretation  Interpretation  Interpretation    7  Describe  In is defined as the total time of the wave during which the current is cyclo converters at least 10% of its peak value.  Remember  CO9  CL09  CAEE015.9    8  Define  Input of the first transformer unit cascaded is supplied from a motor generator or from a voltage regulator. The primary winding is supplied from a source.  Understand  CO8  CL08  CAEE015.9    9  Define the fromt tris the time required for the tree prior to 10 00% or 0 to 100% of the final value at the very first instance.  Remember  CO9  CL09  CAEE015.9    10  Define tail times  Fall time is the time to reach 50% or 1000% of fingulse wave of 1.  Remember  CO9  CL09  CAEE015.7    11  Describe voltage dot full wave and half wave exciting a cascaded voltage and a voltage doubler or cascaded voltage and curvers of higher voltages are needed, a voltage doubler or cascaded voltage and curvers to many supplyandisolatingtransform crs.lispossiblotogenerateveryhigh d.c.voltages from higher voltages are conditions with both positive and every c		voltage.	damped oscillatory wave of				
Indired heriz to few kiloheriz.  Image    7  Describe  Iti selfined as the total time of the super service converters at least 10% of its peak value.  CO9  CLO9  CAEE015.9    8  Define  Input of the first transformer unit is supplied from a motor generator transformer. or from a voltage regulator. The primary winding is supplied from a source.  Understand  CO8  CLO8  CAEE015.9    9  Define the front  It is the time required for the response to raise from 10 to 90% of the final value at the very first instance.  Remember  CO9  CLO9  CAEE015.9    10  Define the front  It is the time required for the response to raise from 10 to 90% of the final value at the very first instance.  Remember  CO9  CLO9  CAEE015.9    11  Describe voltage  Both full wave and half wave for a voltage wave of 1.  Understand  CO7  CLO7  CAEE015.7    12  Describe voltage  Gaseaded voltage multiplier circuits produce a d.  understand  CO7  CLO7  CAEE015.7    12  Describe voltage  Cascaded voltage multiplier circuits are used.  Understand  CO7  CLO7  CAEE015.17    13  Describe the Expulsion gap.  Expulsion gap. consistof a spark gap together with an are quenching d			frequency ranging for few				
7  Describe  It is defined as the total time of the Remember CO9  CL09  CAEE015.9    8  Define  Input of the first transformer unit cascaded is supplied from a motor generator or from a voltage regulator. The primary winding is supplied from a source.  Understand  CO8  CL09  CAEE015.9    9  Define the front  It is the time required for the response to raise from 10 to 90% wave  Remember  CO9  CL09  CAEE015.9    10  Define tail times  Fall time is the time to reach 50% of impulse wave, per k value of 50 us. Fall time for standard impulse wave of 1.  Remember  CO9  CL09  CAEE015.9    11  Describe voltage  Both full wave and half wave recifier circuits produce a d.c. voltage less than the a.c. maximum voltage. Sten higher d.c. voltages are needed, a voltage doubler or cascaded rectifier doubler circuits are used.  CO7  CL07  CAEE015.7    12  Describe voltage  Excaded voltage multiplier circuits are used.  Understand CO14  CO14  CL04  CAEE015.14    13  Describe the supple voltage doubler circuits.  Expulsion gap is a device which expulsion gap is a device which expulsion gap is a device which expulsion gap. conditions with both positive and every covaltages.  CO13  CL013			Hundred hertz to few kilohertz.				
blocked mode  wave during which the current is cycle converters at least 10% of the peak value.  Image: Converters at least 10% of the peak value.    8  Define  Input of the first transformer unit is supplied from a notor generator pransformer.  Understand  CO8  CL08  CAEE015.8    9  Define the front  It is the time required for the time of impulse wave  Remember  CO9  CL09  CAEE015.9    10  Define tail times  Fall time is from 10 to 90% or 0 to 100% of the final value at the very first instance.  Remember  CO9  CL09  CAEE015.9    11  Describe voltage doubler Circuit.  Fall time is ne the time to reach 50% or lobuber circuits produce a d.c. voltage less than the a.c. maximum voltage. When higher doubler circuits are used.  Understand  CO7  CL07  CAEE015.7    12  Describe voltage doubler circuits are used.  Understand  CO7  CL07  CAEE015.7    13  Describe the Expulsion gap.  Expulsion gap is a device which exite expulsion gap is a device which exite expulsion gap.  Understand  CO14  CL04  CAEE015.13    14  Describe the expulsion gap.  Expulsion gap is a device which exite explicited value under dry voltage test.  The perpose of the impulse test specified value under dry voltage test.  CO13  C	7	Describe	It is defined as the total time of the	Remember	CO9	CLO9	CAEE015.9
cyclo converters  at least 10% of its peak value.		blocked mode	wave during which the current is				
8  Define  Input of the first transformer unit transformer.  Input of the first transformer unit supplied from a motor generator or from a voltage regulator. The primary winding is supplied from a source.  CLO8  CLO8  CAEE015.8    9  Define the first transformer unit time of impulse wave  Is is the time required for the twe yer first instance.  Remember  CO9  CLO9  CAEE015.9    10  Define tail times  Fall time is the time to reach 50% or 0 to 100% of the final value at the very first instance.  Remember  CO9  CLO9  CAEE015.9    11  Describe voltage  Both full wave and half wave doubler Circuit.  Understand  CO7  CLO7  CAEE015.7    12  Describe voltage Multiplier  Corcuits for higher voltages are cumbersome and require too manysupplyndisolatingtransform ers. lispossibletogenerateveryhigh d.c. voltages form single supply transformers by extending the simple voltage doubler circuits.  Understand  CO1  CLO14  CAEE015.14    13  Describe the Expulsion gap.  This test is of a spark gap together with an are quenching device when the gaps break over due to over voltages.  CO13  CLO14  CAEE015.13    14  Describe The Expulsion gap.  The purpose of the impulse tests is to determine the ability of the sinualtion of the transformers to withstand  CO13  CLO13  CAE		cyclo converters	at least 10% of its peak value.				
cascaded  is supplied from a motor generator    assure:  a source.    9  Define the front time of impulse  It is the time required for the response to raise from 10 to 90%, of to 100% of the final value at the very first instance.  Remember  C09  CL09  CAEE015.9    10  Define tail times  Fall time is the time to reach 50% of impulse wave.  Remember  C09  CL09  CAEE015.9    11  Describe voltage  Boh full wave and half wave doubler Circuit.  C07  CL07  CAEE015.7    12  Describe voltage  Boh full wave and half wave doubler circuits produce a d.c.  Understand  C07  CL07  CAEE015.7    12  Describe voltage  Cascaded voltage sare needed, a voltage doubler or cascade routing resonse and require too manysupplyandisolatingtransform ers.lispossibletogenerateveryhigh d.c. voltages for single supply transformers by extending the simple voltage.  C014  CL014  CAEE015.14    13  Describe the Expulsion gap, voltage test.  Expulsion gap is a device which consists of a spark gap together which extinguishes the current arc which arc optice of the impulse testing of transformers.  C013  CL013  CAEE015.13    <	8	Define	Input of the first transformer unit	Understand	CO8	CLO8	CAEE015.8
transformer.  or from a voitage regulator. The asource.    9  Define the front time of impulse expenses to raise from 10 to 90%, or 0 to 100% of the final value at the very first instance.  Remember  CO9  CL09  CAEE015.9    10  Define tail times fall time is the time to reach 50% of impulse wave expense value of 50 μ s. Fall time for standard impulse wave of 1.  Remember  CO9  CL09  CAEE015.9    11  Describe voltage  Both full wave and half wave dubler circuits produce a d.c. voltage are needed, a voltage doubler circuits are used.  Understand  CO7  CL07  CAEE015.7    12  Describe voltage  Both full wave an half wave dubler circuits are used.  Understand  CO7  CL07  CAEE015.7    12  Describe voltage  Cascaded voltage multiplier circuits are used.  Understand  CO7  CL07  CAEE015.7    13  Describe the expression gars is a device which expression gars is a device which the transformer sey extending the single voltage doubler circuits.  Understand  CO14  CL014  CAEE015.14    14  Describe the exinguishes the current are when the gaps break over due to over voltages.  The purpose of the impulse tests is to determine the ability of the insulation of the transformers to withstand require to light voltage of the impulse tests is to determine the ability of the insulation of the tra		cascaded	is supplied from a motor generator				
9  Define the front time of impulse wave  It is the time required for the response to raise from 10 to 90% or 0 to 100% of the final value at the very first instance.  Remember  CO9  CLO9  CAEE015.9    10  Define tail times fall time is the time to reach 50% of impulse wave of impulse wave to dupler Circuit.  Remember  CO9  CLO9  CAEE015.9    11  Describe voltage doubler Circuit.  Both full wave and half wave rectifier circuits produce a d.e. voltage rest han the a.c. maximum voltage. When higher d.e. voltage are needed, a voltage doubler or cascaded rectifier doubler circuits are used.  Understand  CO7  CLO7  CAEE015.7    12  Describe voltage Circuit.  Cascaded Voltage multiplier circuits for higher voltages are circuits for higher voltage supply transformers by extending the simple voltage doubler circuits.  Understand  CO7  CLO7  CAEE015.7    13  Describe the Expulsion gap.  Expulsion gap is a device which consists of a spark gap together which a arc quenching device which extinguishes the current arc when the gaps break over due to over voltages.  Understand  CO14  CLO14  CAEE015.13    14  Describe Impulse  This test is done by applying the insulation of the transformers to withstand the transformers to voltage  CO18  CLO13<		transformer.	or from a voltage regulator. The				
9  Define the front time of impulse wave  It is the time required for the response to raise from 10 to 90%, or 0 to 100% of the final value at the very first instance.  Remember  CO9  CLO9  CAEE015.9    10  Define tail times of impulse wave, of impulse wave of 50 µ s. Fall time for standard impulse wave of 1.  Remember  CO9  CLO9  CAEE015.9    11  Describe voltage doubler circuits produce a d.c. voltage less than the a.c. maximum voltage. When higher d.c. voltages are needed, a voltage doubler or cascaded rectifier doubler circuits are used.  Understand  CO7  CLO7  CAEE015.7    12  Describe voltage circuits are used.  Cascaded voltage multiplier circuits are used.  Understand  CO7  CLO7  CAEE015.7    12  Describe voltage consists of a sark gat pogether with an are quenching device which exinguishes the current are when the gaps break over due to over voltages.  Understand  CO7  CLO14  CAEE015.14    13  Describe the Expulsion gap.  Expulsion gap is a device which with exinguishes the current are when the gaps break over due to over voltages.  Understand  CO13  CLO14  CAEE015.13    14  Describe the Impulse wates of the impulse tests is to determine the ability of the insulation of the transformers to when the gaps break over due to over voltages due to lightning, etc.  Remember  CO13  CLO13 </td <td></td> <td></td> <td>primary winding is supplied from</td> <td></td> <td></td> <td></td> <td></td>			primary winding is supplied from				
9  Define the from the function of the required to the wave of to 100% of the final value at the very first instance.  Remember  CO9  CL09  CAEE015.9    10  Define tail times  Fall time is the time to reach 50% of impulse wave of 1.  Remember  CO9  CL09  CAEE015.9    11  Describe voltage doubler Circuit.  Both full wave and half wave rectifier circuits produce a d.c. voltage stan the a.c. maximum voltage. When higher d.c. voltage stan the a.c. maximum voltage. When higher d.c. voltage stan the a.c. maximum voltage. When higher d.c. voltage stan the arc. maximum voltage. Standard impulse value of 0.  Understand  CO7  CL07  CAEE015.7    12  Describe voltage  Cascaded voltage multiplier circuits are used.  Understand  CO7  CL07  CAEE015.7    13  Describe the Expulsion gap.  Expulsion gap is a device which exinguishes the current arc when the gaps break over due to over voltages.  Understand  CO14  CL014  CAEE015.13    14  Describe the gaps break over due to over voltage specified value under dry voltage test.  Specified value under dry conditions with both positive and negative polarities of the wave.  CO13  CL013  CAEE015.13    15  Define Impulse tis to determine the ability of the insulation of the transformers to withstand the transient voltages divel for the measurement of fast rising voltages and pulses  <	0	Define the front	a source.	Damaanahaa	COO	CLOO	CAEE015 0
Inite of impulse  response to faste from 10 to 90%    wave  of to 100% of the final value at the very first instance.  Remember  CO9  CLO9  CAEE015.9    10  Describe voltage  Both full wave and half wave doubler Circuit.  Inderstand  CO7  CLO7  CAEE015.7    11  Describe voltage  Both full wave and half wave rectifier circuits produce a d.c. voltage less than the a.c. maximum voltage. When higher d.c. voltages are needed, a voltage doubler circuits are used.  Understand  CO7  CLO7  CAEE015.7    12  Describe voltage  Cascaded voltage multiplier circuits for higher voltages are circuit.  Cuderstand  CO7  CLO7  CAEE015.7    12  Describe voltage  Cascaded voltage multiplier circuits the voltage foubler circuits.  Understand  CO7  CLO7  CAEE015.7    13  Describe the Expulsion gap.  Expulsion gap is a device which consists of a spark gap together with an arc quenching device which e xtinguishes the current arc when the gaps break over due to over voltages.  Understand  CO13  CLO13  CAEE015.13    14  Describe Impulse withstand voltage test.  The purpose of the impulse tests is to determine the ability of the insulation of the transformers to withstand the transformers to withstand the transient voltages due to lightning, etc.  CO13	9	time of impulse	It is the time required for the	Remember	09	CL09	CAEE015.9
wave  Of 0100 100 s of merinal value at the very first instance.  Remember  COP  CLOP  CAEE015.9    10  Define tail times of impulse wave, of impulse wave, at and ard impulse wave of 1.  Remember  COP  CLOP  CAEE015.9    11  Describe voltage doubler Circuit.  Both full wave and half wave rectifier circuits produce a d.c. voltage less than the a.c. maximum voltage. When higher d.c. voltages are needed, a voltage doubler or cascaded rectifier doubler circuits are used.  Understand  CO7  CLO7  CAEE015.7    12  Describe voltage Circuit.  Cascaded voltage multiplier circuits for higher voltages are cumbersome and require too manysupplyandisolatingtransform ers. Lispossibletogenerateveryhigh d.c. voltages from single supply transformers by extending the simple voltage doubler circuits.  Understand  CO14  CLO14  CAEE015.14    13  Describe the Expulsion gap.  Expulsion gap is a device which consists of a spark gap together witch extinguishes the current arc when the gaps becak over due to over voltage test.  Understand  CO13  CLO13  CAEE015.13    14  Describe the Impulse withstand voltage test.  This test is done by applying the standard impulse voltage of the impulse voltage of the wave.  Remember  CO13  CLO13  CAEE015.13    15  Define Impulse testing of transformers.  The purpose of the impulse tests is to de		time of impulse	response to faise from 10 to 90%				
10    Define tail times    Fall time is the time to reach 50% of impulse wave. standard impulse wave of 1.    Remember    CO9    CL09    CAEE015.9      11    Describe voltage doubler Circuit.    Boh full wave and half wave of the circuits produce a d.c. voltage less than the a.c. maximum voltage. When higher d.c. voltages are needed, a voltage doubler circuits are used.    Understand    CO7    CL07    CAEE015.7      12    Describe voltage Multiplier    Cascaded voltage multiplier circuits for higher voltages are cumbersome and require too manysupplyandisolatingtransform ers. Itispossibletogenerateveryhigh d.c. voltages from single supply transformers by extending the simple voltage doubler circuits.    Understand    CO1    CL014    CAEE015.7      13    Describe the Expulsion gap.    Expulsion gap is a device which when the gaps break over due to over voltages.    Understand    CO14    CL014    CAEE015.14      14    Describe Impulse withstand negative polarities of the wave.    This test is done by applying the voltage test.    Understand    CO13    CL013    CAEE015.13      15    Define Impulse testing of transformers.    The purpose of the impulse tests is to determine the ability of the ansulation of the transformers to withstand the transient voltages due to lightning, etc.    Remember    CO3    CL013    CAEE015.13		wave	or 0 to 100% of the final value at				
10  Define time indices if and rule is the of the set	10	Define tail times	Fall time is the time to reach 50%	Remember	C00		CAEE015.9
11  Describe voltage doubler Circuit.  Both full wave and half wave rectifier circuits produce a d.c. voltage less than the a.c. maximum voltage. When higher d.c. voltage set needed, a voltage doubler or cascaded rectifier doubler circuits are used.  Understand  CO7  CLO7  CAEE015.7    12  Describe voltage Multiplier  Cascaded voltage multiplier circuits for higher voltages are cumbersome and require too manysupplyandisolating than simple voltage doubler circuits.  Understand  CO7  CLO7  CAEE015.7    13  Describe the Expulsion gap.  Expulsion gap is a betwee which wich extinguishes the current arc when the gaps break over due to over voltages.  Understand  CO14  CLO14  CAEE015.14    14  Describe Impulse  This test is done by applying the standard impulse voltage of withstand voltage test.  This test is done by applying the is to determine the ability of the insulation of the transformers to withstand the transient voltages due to lightning, etc.  CO13  CLO13  CAEE015.13    15  Define capacitance voltage due to lightning, etc.  The uprose of the impulse tests rising voltages and pulses is to determine the ability of the insulation of the transformers to withstand the transient voltages due to lightning, etc.  Remember  CO13  CLO13  CAEE015.13    1  Define capacitance voltage  Capacitance voltage dividers are ideal for the measurement of fast rising voltages and pulses  Remembe	10	of impulse wave	neak value of 50 µ s. Fall time for	Kemember	009	CLO	CALLO13.9
11  Describe voltage  Both full wave and half wave rectifier circuits produce a d.c. voltage less than the a.c. maximum voltage. When higher d.c. voltages are needed, a voltage doubler or cascaded rectifier doubler circuits are used.  Understand  CO7  CLO7  CAEE015.7    12  Describe voltage Multiplier  Cascaded voltage multiplier circuits for higher voltages are circuits for higher voltages are circuits for higher voltages are simple voltage from single supply transformers by extending the simple voltage doubler circuits.  Understand  CO7  CLO7  CAEE015.7    13  Describe the Expulsion gap.  Expulsion gap is a device which consists of a spark gap together with an arc quenching device which ettinguishes the current arc when the gaps break over due to over voltages.  Understand  CO14  CLO14  CAEE015.14    14  Describe the Impulse withstand voltage test.  This test is done by applying the standard impulse voltage of specified value under dry conditions with both positive and negative polarities of the wave.  CO13  CLO13  CAEE015.13    15  Define Impulse testing of transformers.  The purpose of the impulse tests is to determine the ability of the insulation of the transformers to withstand the transient voltages  Remember  CO13  CLO13  CAEE015.13    1  Define capacitance voltage  Capacitance voltage dividers art ideal for the measurement of fast rising voltages and pulses  Remember  <		or impulse wave.	standard impulse wave of 1				
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MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS    1  Define  Capacitance voltage dividers are ideal for the measurement of fast voltage  Remember  CO8  CLO8  CAEE015.8    2  Describe Field  The electrostatic or capacitive Controlled  Image of the distribution of a shield or Voltage  Understand  CO8  CLO8  CAEE015.8			UNIT – IV			DDD	
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capacitance  ideal for the measurement of fast    voltage  rising voltages and pulses    Dividers.  Image: Controlled    2  Describe Field    Controlled  field distribution of a shield or    Voltage  guard ring placed over a resistive		Define	Capacitance voltage dividers are	Remember	008	CL08	CAEE015.8
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Controlled field distribution of a shield or Voltage guard ring placed over a resistive	2	Dividers.	The electrostatic or conscitive	Understan J	CO		
Voltage guard ring placed over a resistive	2	Controlled	field distribution of a shield or	Understand	008	CLU8	CAEEUIJ.0
		Voltage	guard ring placed over a resistive				

S. No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
	Dividers.	divider to enforce a uniform field in the neighborhood and along the divider may be adopted for high voltage measurements				
3	Describe Hall Effect for DC measurements	If an electric current flow through metal plate located in a magnetic field perpendicular to it, Lorentz forces will deflect the electrons in the metal structure in a direction normal to the direction normal to the direction of both the current and the magnetic field.	Understand	CO8	CLO8	CAEE015.8
4	Define Current Transformers.	Measurement of high frequency currents such as fault currents in power systems, switching current transients and impulse currents during impulse testing of transformers can be measured using current transformers with an air core or a ferrite core.	Understand	C015	CLO15	CAEE015.15
5	Define Rogowski Coils.	If a coil is placed surrounding a current carrying conductor, the voltage signal induced in the coil is vi(t)=MdI(t)/dt where M is the mutual inductance between the conductor and the coil, and I(t) is the current flowing in the conductor flowing in the conductor.	Understand	CO15	CLO15	CAEE015.15
6	Define Pure Capacitance Dividers.	A pure capacitance divider for high voltage measurements and its electrical equivalent network without stray elements	Remember	CO8	CLO8	CAEE015.8
7	Define potential Dividers.	Potential or voltage dividers for high-voltage impulse measurements ,high frequency ac measurements or for fast rising transient voltage frequency ac measurements, or for fast rising transient voltage measurements are usually either resistive or capacitive or mixed element type.	Remember	CO8	CLO8	CAEE015.8
8	Define Spark Gaps.	A uniform field spark gap will always have a spark over voltage with in a known to leranceunder constant atmospheric conditions. Hence a spark gap can be used for measurement of the peak value of the voltage	Remember	CO8	CLO8	CAEE015.8
9	Describe High Voltage Measurement.	High voltages can be measured in a variety of ways. Direct measurement of high voltages is possible up to about 200 kV, and several forms of voltmeters have been devised which can be connected directly across the test circuit.	Understand	CO8	CLO8	CAEE015.8

S. No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
10	Describe	One of the direct methods of	Understand	CO16	CLO16	CAEE015.16
	Electrostatic	measuring high voltages is by				
	Voltmeters.	means of electro-static				
		voltmeters. For voltages above				
		10 kV, generally the attracted				
		disc type of electrostatic				
11	Describe	Voltmeter 1s used.	I In danatan d	CO16	CL 016	CAEE015 16
11	Describe	In this method, a high resistance	Understand	010	CLUIO	CAEE015.10
	notential divider	across the high-voltage winding				
	method	and a definite fraction of the total				
	methou.	voltage is measured by means of a				
		low voltage voltmeter.				
12	Describe Series	In the series resistance method a	Understand	CO16	CLO16	CAEE015.16
	resistance	high series resistance (specially				
	method of	designed to withstand high				
12	Describe hell	voltage) and resistance of 20k/v.	I In danatan d	CO17	CI 017	CAEE015 17
15	voltage and hall	In electric current flows through a	Understand	017	CLOI7	CAEE015.17
	coefficient	field perpendicular to it. Lorenz				
	coefficient.	forces will deflect the electrons in				
		the metal structure in a direction				
		normal to the direction of both				
		the current and the magnetic				
		field.				
14	Define CVT.	CVT meant for capacitive voltage	Remember	CO17	CLO17	CAEE015.17
		transformer. It is used for				
		measurement, relaying				
		applications and sometimes for				
15	Describe the	The insulator is broken and	Understand	CO12	CI 012	CAEE015 12
15	porosity test on	immersed in a 0.5 % alcohol	Understand	015	CLOIS	CALLOIJ.15
	insulators.	solution under a pressure of				
		13800 kN/sq.m for 24 hours. The				
		broken insulator is taken out and				
		further broken.				
		UNIT – V				
1	HIGH VO	LIAGE TESTING AND INSUL	ATION CO	JOKD		
1	divortor	It is a non-linear resistor in series	Remember	C015	CLOIS	CAEE015.15
	diverter.	terminals in the substations				
2	Define creeping	It is the shortest distance on the	Remember	CO14	CLO14	CAEE015 14
_	distance.	contour of the external surface of		0011	02011	
		the insulator unit.				
3	Define	The voltage which has to be	Remember	CO13	CLO13	CAEE015.13
	withstand	applied to a test object under				
	voltage.	specified conditions in a withstand				
	<b>D</b> "	test is called the withstand voltage	<b>TT T T T T T T T</b>	<b>GO1</b>	GT 0.1 #	
4	Describe an	It is a disconnect or a mechanical	Understand	CO15	CLO15	CAEE015.15
	isolator.	switching device, which provides				
		distance in accordance with				
		special requirements				
5	Define partial	An electrical discharge that only	Remember	CO10	CLO10	CAEE015.10
	discharge.	partially bridges the dielectric				
	0	between the conductors.				
6	Define a circuit	It is a switch, which	Remember	CO14	CLO14	CAEE015.14
	breaker.	automatically interrupts the				
		circuit when a critical current				

S. No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		overvoltage rating is exceeded.				
7	Define 50% flashover.	It is the voltage, which has the 50 % flashover when applied to test object.	Remember	CO15	CLO15	CAEE015.15
8	Define 100 % flash over.	The voltage that causes a flashover at each of its application under specified conditions when applied to test objects as specified.	Remember	CO15	CLO15	CAEE015.15
9	Disruptive discharge voltage.	This is defined as the voltage which produces the loss of dielectric strength of insulation. It is that voltage at which the electrical stress in the insulation causes a failure, which includes the collapse of voltage and passage of current.	Understand	CO15	CLO15	CAEE015.15
10	Define safety margin as applied to insulation coordination.	The Safety margin is defined by selecting the risk of failure, the statistical safety factor and by firing the withstand level of any equipment or apparatus corresponding to 90% or 95% of the withstand voltage.	Remember	CO11	CLO11	CAEE015.11
11	Define BIL.	It is defined as the minimum insulation impulse withstands voltage of any power equipment or apparatus.	Remember	CO17	CLO17	CAEE015.17
12	Describe the type and routine test.	The type test is conducted on the sample to test the quality of the material with which the component is made. Routine test is conducted on the equipment or component periodically to check the deterioration in the quality during operation.	Understand	CO13	CLO13	CAEE015.13
13	Describe the significance of power factor test.	High voltage Schering bridge is used to perform dielectric power factor test on the cable sample. The power factor is measured for different values of voltages eg 0.5,1,1.5,2 times of rated operating voltages	Understand	CO13	CLO13	CAEE015.13
14	Describe impulse with- stand voltage test.	This test is done by applying standard impulse voltage of specified value under dry conditions with both positive and negative polarities of the wave. If five consecutive waves do not cause a flashover or puncture, the insulator is deemed to have passed the test	Understand	CO13	CLO13	CAEE015.13
15	Define lightning impulse voltage.	The system disturbances occur due to natural lightning can be represented by three different basic wave shapes. If a lightning impulse voltage travels some distance along the transmission line before it reaches to a insulator its wave	Understand	CO9	CLO19	CAEE015.19

S. No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		shaped approaches to full wave, and this wave is referred as 1.2/50				
		wave.				

# Signature of the Faculty

## Signature of HOD