SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF

ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK

VII SEMESTER

1905707–POWER SYSTEMS TRANSIENTS

Regulation – 2019

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SUBJECT : 1905707 – POWER SYSTEMS TRANSIENTS

SEM / YEAR: VII SEM/4th YEAR EEE

UNIT I -INTRODUCTION AND SURVEY

Review and importance of the study of transients - Review of RLC transients with DC Excitation causes for transients. RL circuit transient with sine wave excitation -double frequency transients - basic transforms of the RLC circuit transients. Different types of power system transients - effect of transients on power systems – role of the study of transients in system planning.

PART –A

Q.No	Questions	BT Level	Competence	Course Outcome
1	Define Power system transient.	**BTL 1**	**Remember**	CO1
2	Draw the double frequency transient with an example.	**BTL 1**	**Remember**	CO1
3	List the causes of transients on power system.	**BTL 1**	**Remember**	CO1
4	Discuss about the voltage surge?	**BTL 2**	**Understand**	CO1
5	Name any two effects of transients in power system.	**BTL 1**	**Remember**	CO1
6	Identify the effects of lightning?	**BTL 1**	**Remember**	CO1
7	Classify the types of power system transient?	**BTL 1**	**Remember**	CO1
8	Give example for internal sources for transients	**BTL 2**	**Understand**	CO1
9	Give example for external sources for transients.	**BTL 2**	**Understand**	CO1
10	Give the relation between time constant of parallel and series circuit.	**BTL 2**	**Understand**	CO1
11	Highlight the effects of lightning transients?	**BTL 2**	**Understand**	CO1
12	Write down the importance of transient study in power system planning	**BTL 3**	**Apply**	CO1
13	Classify transients based on its frequency.	**BTL 2**	**Understand**	CO1
14	Outline the concept of word “surge”?	**BTL 3**	**Apply**	CO1
15	Express the lightning and switching impulse standard	**BTL 3**	**Apply**	CO1
16	Outline the concept you understand from the word“transient”?	**BTL 5**	**Evaluate**	CO1

Q.No	Questions	BT Level	Competence	Course Outcome
17	Draw the transient response waves for RL and RC.	**BTL 4**	**Analyze**	CO1
18	What are the effects of Transients in power systems	**BTL 4**	**Analyze**	CO1
19	Distinguish between critically damped, underdamped and over damped in a case of RLC Series circuit.	**BTL 4**	**Analyze**	CO1
20	Define transient due to electro mechanical phenomena.	**BTL 3**	**Apply**	CO1
21	How transients causes intermittent interruptions?	**BTL 4**	**Analyze**	CO1
22	Give single frequency recovery voltage transients.	**BTL 4**	**Analyze**	CO1
23	How load rejection overvoltages occur?	**BTL 4**	**Analyze**	CO1
24	Enumerate the influence of a transient on electronic equipment.	**BTL 6**	**Create**	CO1
	PART – B			
1	i)Analyze the sources and effects of transients on power systems? (7) ii)Categorize the internal causes for transients. (6)	**BTL 1**	**Remember**	CO1
2	Discuss the significance of transient studies in power system planning. (13)	**BTL 1**	**Remember**	CO1
3	Briefly explain about double frequency transients. (13)	**BTL 6**	**Create**	CO1
4	Discuss the various types of power system transients. (13)	**BTL 2**	**Understand**	CO1
5	Define Transient. Describe in detail about it is importance. (13)	**BTL 2**	**Understand**	CO1
6	Explore the classifications of power system transients? (13)	**BTL 5**	**Evaluate**	CO1
7	Explain briefly about various source of Transients on power systems. (13)	**BTL 3**	**Apply**	CO1
8	Demonstrate with neat diagrams about the types of power system transients. (13)	**BTL 2**	**Understand**	CO1
9	Examine the sources of transients? Also explain how transients affect the power systems. (13)	**BTL 4**	**Analyze**	CO1
10	Write a short note on voltage surge. (13)	**BTL 1**	**Remember**	CO1
11	Briefly explain the importance of study of transients in planning. (13)	**BTL 4**	**Analyze**	CO1
12	Briefly explain about lightning transients. (13)	**BTL 4**	**Analyze**	CO1
13	Explain the switching transient of RL circuit with sine wave excitation. (13)	**BTL 3**	**Apply**	CO1
14	Explain the switching transient of RL circuit with sine wave excitation. (13)	**BTL 3**	**Apply**	CO1

Q.No	Questions	BT Level	Competence	Course Outcome
15	Describe the detail the characteristics of power system transients. (13)	**BTL 3**	**Apply**	CO1
16	Explain the operating characteristics of double frequency transients with example. (13)	**BTL 3**	**Apply**	CO1
17	Explain in detail the basic transforms of the RLC parallel circuit transients. (13)	**BTL 4**	**Analyze**	CO1
	PART C			
1	Briefly explain the importance of study of transients in power system planning for the future expention. (15)	**BTL 5**	**Evaluate**	CO1
2	Explain the various mitigation methods depend mostly on the cause of the overvoltage. (15)	**BTL 6**	**Create**	CO1
3	Briefly discuss about double frequency transients and draw waveforms neatly. (15)	**BTL 6**	**Create**	CO1
4	Obtain the transient current component i(t) for RLC circuit with sine wave excitation. (15)	**BTL 5**	**Evaluate**	CO1
5	Discuss the various types of power system transients. (15)	**BTL 6**	**Create**	CO1

UNIT II - SWITCHING TRANSIENTS

Over voltages due to switching transients - resistance switching and the equivalent circuit for interrupting the resistor current - load switching and equivalent circuit - waveforms for transient voltage across the load and the switch - normal and abnormal switching transients. Current suppression - current chopping - effective equivalent circuit. Capacitance switching - effect of source regulation - capacitance switching with a restrike, with multiple restrikes. Illustration for multiple restriking transients - Ferro resonance.

PART –A

Q.No	Questions	BT Level	Competence	Course Outcome
1	Distinguish between lightning surges and switching surges	**BTL 1**	**Remember**	CO2
2	Draw the equivalent circuit of resistance switching	**BTL 1**	**Remember**	CO2
3	Define load switching	**BTL 2**	**Understand**	CO2
4	Discuss about abnormal switching transients?	**BTL 2**	**Understand**	CO2
5	Discuss about resistance switching?	**BTL 1**	**Remember**	CO2
6	Recognize temporary over voltages?	**BTL 1**	**Remember**	CO2

Q.No	Questions	BT Level	Competence	Course Outcome
7	Outline the need for resistance switching?	**BTL 2**	**Understand**	CO2
8	Explore the concept of abnormal switching transients	**BTL 6**	**Create**	CO2
9	Demonstrate how load switching leads to transient	**BTL 4**	**Analyze**	CO2
10	Define switching transients	**BTL 1**	**Remember**	CO2
11	Differentiate normal and abnormal switching transients	**BTL 5**	**Evaluate**	CO2
12	Discuss the objectives of capacitance switching and associated capacitor switching transients.	**BTL 3**	**Apply**	CO2
13	Discuss the following TRV, RRRV?	**BTL 2**	**Understand**	CO2
14	Sketch the voltage and current waveforms during capacitance switching with the restrike at peak voltage	**BTL 3**	**Apply**	CO2
15	Define switching surges.	**BTL 3**	**Apply**	CO2
16	Interpret reason for occurrence of restriking when Circuit breaker contacts open during the fault.	**BTL 3**	**Apply**	CO2
17	Show the objectives of switching a capacitor banks.	**BTL 4**	**Analyze**	CO2
18	Interpret the effect of atmospheric conditions on	**BTL 5**	**Evaluate**	CO2
19	Discuss about current chopping in AC system	**BTL 2**	**Understande**	CO2
20	Explain how the ferro resonance causes overvoltage.	**BTL 3**	**Apply**	CO2
21	Describe the term reignition.	**BTL 4**	**Analyze**	CO2
22	Explain the effect of unloaded high voltage transmission lines.	**BTL 5**	**Evaluate**	CO2
23	Discuss the quasi periodic mode of ferro resonance.	**BTL 2**	**Understande**	CO2
24	Define Ferro resonance?	**BTL 1**	**Remember**	CO2
	PART – B			
1	Examine the phenomenon in switching transient. (13)	**BTL 3**	**Apply**	CO2
2	i) With neat diagram explain the concept of load switching. (7) ii) With suitable example explain the concept of ferro resonance. (6)	**BTL 1**	**Remember**	CO2
3	Explain load switching with equivalent circuit. (13)	**BTL 1**	**Remember**	CO2
4	Differentiate between normal and abnormal switching transients in load switching. (13)	**BTL 3**	**Apply**	CO2

Q.No	Questions	BT Level	Competence	Course Outcome
5	Discuss the control of transient over voltages in powersystem. (13)	**BTL 4**	**Analyze**	CO2
6	i) Analyze in detail the resistance switching with suitable diagram. (7) ii) With neat sketch explain the concept of Current Chopping. (6)	**BTL 5**	**Evaluate**	CO2
7	Discuss the switching in both normal and abnormal conditions with neat sketches. (13)	**BTL 1**	**Remember**	CO2
8	Discuss about current suppression? (13)	**BTL 6**	**Create**	CO2
9	What is meant by current suppression? Explain the transients due to switching of an unloaded transformer with relevant wave forms. (13)	**BTL 2**	**Understand**	CO2
10	Write short note on (i) Ferro resonance (ii) current Chopping. (7+6)	**BTL 1**	**Remember**	CO2
11	Explain the control of switching surges and high light how switching surges affects capacitive Current. (13)	**BTL 2**	**Understand**	CO2
12	Discuss (i) Current Chopping (ii) Resistance Switching. (13) (7+6)	**BTL 4**	**Analyze**	CO2
13	With neat sketch explain the capacitance switching with multiple restrikes. (13)	**BTL 4**	**Analyze**	CO2
14	Explain in detail about the simulation of switching surges and Ferro resonance effect. (13)	**BTL 2**	**Understand**	CO2
15	Explain briefly about overvoltage due to switching transients. (13)	**BTL 4**	**Analyze**	CO2
16	Explain the phenomena of ferro resonance in power system network with suitable illustration. (13)	**BTL 4**	**Analyze**	CO2
17	Explain the two categories of switching operations. (13)	**BTL 2**	**Understand**	CO2
	PART – C			
1	Explain in detail about (i)Resistance switching and interruption of resistance current with equivalent circuit. (10) ii)Load switching with their equivalent circuits. (5)	**BTL 5**	**Evaluate**	CO2
2	Derive an expression for the transient current in RLC.(15)	**BTL 6**	**Create**	CO2

Q.No	Questions	BT Level	Competence	Course Outcome
3	Explain with appropriate waveform and equivalent circuit i)Current suppression. (4) ii)Current chopping. (4) iii)capacitance switching. (4) iv)Ferro resonance. (3)	**BTL 5**	**Evaluate**	CO2
4	Draw an equivalent circuit for the resistance switching and explain the equivalent circuit for interrupting resistor current. (15)	**BTL 6**	**Create**	CO2
5	What is known as load switching? Derive its equivalent circuit. (15)	**BTL 6**	**Create**	CO2

Q.No	Questions	BT Level	Competence	Course Outcome
	UNIT III - LIGHTNING TRANSIENTS			
Review of the theories in the formation of clouds and charge formation - rate of charging of thunder clouds – mechanism of lightning discharges and characteristics of lightning strokes – model for lightning stroke - factors contributing to good line design - protection using ground wires - tower footing resistance - Interaction between lightning and power system.				
	PART – A			
Q.No	**Questions**	**BT Level**	**Competence**	**Course Outcome**
1	List out the important characteristics of the lightning stroke	**BTL1**	**Remember**	CO3
2	Discuss the significance of tower footing resistance?	**BTL 2**	**Understand**	CO3
3	Outline the concept of charge formation?	**BTL 3**	**Apply**	CO3
4	Mention different theories of charge formation.	**BTL 2**	**Understand**	CO3
5.	List out any two causes of over voltages.	**BTL 1**	**Remember**	CO3
6.	Interpret the concept of lightning and also highlight the factors which influence the lightning induced voltages on transmission lines?	**BTL 3**	**Apply**	CO3
7	List out the types of lightning.	**BTL 1**	**Remember**	CO3
8	Discuss about insulation failure.	**BTL 2**	**Understand**	CO3
9	Summarize the ways for over voltage protection.	**BTL 2**	**Understand**	CO3
10	Explain direct lightning strokes.	**BTL 1**	**Remember**	CO3
11.	What are the factors contributing to good transmission line	**BTL 3**	**Apply**	CO3
12	Explore the necessity of insulation co-ordination.	**BTL 5**	**Evaluate**	CO3
13	Examine the basic steps involved in insulation co-ordination.	**BTL 4**	**Analyze**	CO3
14	Explain counterpoise wires.	**BTL 4**	**Analyze**	CO3
15	Explain the various regions of cloud.	**BTL 4**	**Analyze**	CO3
16	Explain protective angle.	**BTL 4**	**Analyze**	CO3
17	Explore the concept of back flashover.	**BTL 6**	**Create**	CO3
18	Define isokeraunic level (or) thunder storm days.	**BTL 5**	**Evaluate**	CO3

Q.No	Questions	BT Level	Competence	Course Outcome
19	Show the objectives of ground wire.	**BTL 3**	**Apply**	CO3
20	Define basic impulse level.	**BTL 1**	**Remember**	CO3
21	Explain how protection of lines is achieved due to lightning.	**BTL 6**	**Create**	CO3
22	Discuss the effects and nature of danger made due to lightning strokes.	**BTL 5**	**Evaluate**	CO3
23	Explain the Wilson theory of lightning.	**BTL 3**	**Apply**	CO3
24	Give the effects of shield wire on over headline.	**BTL 1**	**Remember**	CO3
	PART-B			
1	i)Sketch the characteristics of lightning stroke. (6) ii)Explain the formation thunder clouds with the aid of various theories. (7)	**BTL 3**	**Apply**	CO3
2	Analyze the factors that contribute to good line design. (13)	**BTL 4**	**Analyze**	CO3
3	Evaluate the interaction between lightning and power system. (13)	**BTL 6**	**Create**	CO3
4	Derive an expression for the mathematical model for lightning. (13)	**BTL 5**	**Evaluate**	CO3
5	Explain the mechanism of lightning discharge and concept of footing resistance. (13)	**BTL 2**	**Understand**	CO3
6	i)What are the factors that contribute to good line design? Discuss in detail. (6) ii)How the ground wires protect the transmission line from lightning transients ?Explain. (7)	**BTL 3**	**Apply**	CO3
7	What are the two theories of charge formation in the clouds explain them in detail. (13)	**BTL 1**	**Remember**	CO3
8	Explain about grounding a line structure and protection offered by ground wires. (13)	**BTL 2**	**Understand**	CO3
9	Explain the lightning protection schemes for transmission lines. (13)	**BTL 2**	**Understand**	CO3
10	Investigate the mechanism of the lightning phenomenon and also interpret about the stepped leader. (13)	**BTL 1**	**Remember**	CO3
11	With neat sketches, explain the two different theories of charge formation in the clouds. (13)	**BTL 3**	**Apply**	CO3

Q.No	Questions	BT Level	Competence	Course Outcome
12	Explain the mechanisms by which lightning strokes develop and induce over voltages on overhead power line. (13)	**BTL 2**	**Understand**	CO3
13	With a neat diagram, explain the protection offered by ground wires. (13)	**BTL 2**	**Understand**	CO3
14	i) Discuss in detail about the lighting flash parameters.(6) ii) Differentiate between direct and indirect lightning strokes. (7)	**BTL 2**	**Understand**	CO3
15	Explain the characteristics of tower impedance and footing impedance. (13)	**BTL 3**	**Apply**	CO3
16	Explain the effects of shield wire on over headline with neat schematic. (13)	**BTL 4**	**Analyze**	CO3
17	Evaluate the various effects and nature of danger due to lightning discharge. (13)	**BTL 6**	**Create**	CO3
	PART-C			
1	Explain the mathematical models for lightning discharges and explain them. (15)	**BTL 5**	**Evaluate**	CO3
2	With a neat diagram explain the protection offered by ground wires. (15)	**BTL 6**	**Create**	CO3
3	Explain the counter poise method of protection. (15)	**BTL 5**	**Evaluate**	CO3
4	Propose and discuss the design methods, selection procedure and importance of various protective elements should be used in power systems against transients. (15)	**BTL 6**	**Create**	CO3
5	Summarize the mathematical model for lightning. (15)	**BTL 6**	**Create**	CO3
	UNIT IV - Travelling Waves on Transmission line computation of Transients			
	Computation of transients - transient response of systems with series and shunt lumped parameters and distributed lines. Traveling wave concept - step response - Bewely's lattice diagram - standing waves and natural frequencies - reflection and refraction of travelling waves.			
	PART – A			
Q.No	**Questions**	**BT Level**	**Competence**	**Course Outcome**
1	Give the specifications of a travelling wave?	**BTL 2**	**Understand**	CO4
2.	Express the equations for reflection coefficient and refraction coefficient.	**BTL 2**	**Understand**	CO4

Q.No	Questions	BT Level	Competence	Course Outcome
3.	Comment on "Same velocity of propagation over all overhead line.	**BTL 6**	**Create**	CO4
4	Discuss about lumped parameters?	**BTL 2**	**Understand**	CO4
5.	Draw a neat sketch of standing waves.	**BTL 1**	**Remember**	CO4
6.	Outline the concept you understand from the word "travelling waves"?	**BTL 1**	**Remember**	CO4
7	List out the damages caused by the travelling waves.	**BTL 1**	**Remember**	CO4
8.	Define surge impedance of a line and comment on reason for naming it as natural impedance.	**BTL 6**	**Create**	CO4
9	Give the application of bewley's lattice diagram.	**BTL 3**	**Apply**	CO4
10	Define crest and front of a travelling wave.	**BTL 1**	**Remember**	CO4
11	Define refraction coefficients.	**BTL 1**	**Remember**	CO4
12.	Justify "Step waves are considered to be dangerous to the apparatus".	**BTL 5**	**Evaluate**	CO4
13.	Discuss the effect of shunt capacitance at the terminal of transmission lines.	**BTL 4**	**Analyze**	CO4
14.	Define attenuation? How they are caused.	**BTL 3**	**Apply**	CO4
15.	Outline the concept of distortion?	**BTL 3**	**Apply**	CO4
16.	Write an expression for amplitude of the over voltage with circuit diagram during the load rejection.	**BTL 1**	**Remember**	CO4
17	Draw the neat sketch of Bewley's lattice diagram.	**BTL 1**	**Remember**	CO4
18	Define crest and front of a travelling wave.	**BTL 4**	**Analyze**	CO4
19	Define Standing wave ratio.	**BTL 4**	**Analyze**	CO4
20	Differentiate travelling waves and standing waves.	**BTL 5**	**Evaluate**	CO4
21	What are the characteristics obtained in lossless transmission line?	**BTL 1**	**Remember**	CO4
22	Explain the need of lattice diagram.	**BTL 4**	**Analyze**	CO4
23	Give the transient response of systems with series and shunt lumped parameters.	**BTL 4**	**Analyze**	CO4
24	Explain the voltage reflection coefficient.	**BTL 5**	**Evaluate**	CO4
	PART-B			
1	Explore the steps involved in Bewely's lattice diagram construction with an example. (13)	**BTL 6**	**Create**	CO4

Q.No	Questions	BT Level	Competence	Course Outcome
2	Evaluate the value of current in a transmission line considering its series and shunt lumped parameters. (13)	**BTL 1**	**Remember**	CO4
3	Draw the step response of a travelling wave. Explain it by using Bewely's lattice diagram. (13)	**BTL 1**	**Remember**	CO4
4	Discuss elaborately on reflection of travelling wave.(13)	**BTL 1**	**Remember**	CO4
5	Examine multi-velocity waves of travelling waves in transmission lines. (13)	**BTL 4**	**Analyze**	CO4
6	Explain multi-conductor system of travelling waves in transmission lines. (13)	**BTL 3**	**Apply**	CO4
7	Develop wave equation of travelling waves in transmission lines. (13)	**BTL 5**	**Evaluate**	CO4
8	Describe the transient response of systems with series and shunt distributed parameters. (13)	**BTL 2**	**Understand**	CO4
9	Examine the behaviour of travelling waves at open circuited transmission line. (13)	**BTL 4**	**Analyze**	CO4
10	Describe briefly about standing waves and Standing Wave Ratio (SWR) and natural frequency. (13)	**BTL 2**	**Understand**	CO4
11	Derive the reflection and refraction co efficient of a travelling wave with diagrams. (13)	**BTL 6**	**Create**	CO4
12	Analyze the phenomenon of current interruption in a lumped capacitive circuit and a distributed constant transmission lines. (13)	**BTL 4**	**Analyze**	CO4
13	A long transmission line is energized by a unit step voltage 1.0 V at the sending end and is open Circuited at the receiving end. Develop the Bewley's Lattice diagram and obtain the value of the voltage at the receiving end after a long time. Take the attenuation factor α =0.8. (13)	**BTL 6**	**Create**	CO4
14	Explain the mathematical expression of voltage and current travelling wave. (13)	**BTL 4**	**Analyze**	CO4
15	Evaluate the transient response of systems with series and shunt lumped parameters. (13)	**BTL 2**	**Understand**	CO4
16	Discuss elaborately on refraction of travelling wave. (13)	**BTL 6**	**Create**	CO4
17	Analyze the phenomenon of current interruption in a lumped capacitive circuit and a distributed constant transmission lines. (13)	**BTL 4**	**Analyze**	CO4

Q.No	Questions	BT Level	Competence	Course Outcome
	PART-C			
1	a) With neat diagrams discuss the behaviour of a travelling wave when it reaches the end of i) open circuited transmission line ii)Short circuited transmission line. (15)	**BTL 5**	**Evaluate**	CO4
2	Explain the behaviour of travelling waves at short circuited line. (15)	**BTL 5**	**Evaluate**	CO4
3	Explore the steps involved in Bewely's lattice diagram construction with an example. (15)	**BTL 6**	**Create**	CO4
4	Discuss and drive transient response of systems with series and shunt lumped parameters and Distributed lines. (15)	**BTL 5**	**Evaluate**	CO4
5	Obtain the value of current in a transmission line considering its series and shunt lumped. (15)	**BTL 6**	**Create**	CO4

UNIT V - TRANSIENTS IN INTEGRATED POWER SYSTEM

The short line and kilometric fault - distribution of voltages in a power system - Line dropping and load rejection - voltage transients on closing and reclosing lines - over voltage induced by faults - switching surges on integrated system Qualitative application of EMTP for transient computation.

PART – A

Q.No	Questions	BT Level	Competence	Course Outcome
1	Define short line or kilometric fault.	**BTL 1**	**Remember**	CO5
2	Sketch the Norton's equivalent circuit to model a capacitor in a network for EMTP calculation.	**BTL 3**	**Apply**	CO5
3	How will you calculate the probability of strikes for an overhead line?	**BTL 1**	**Remember**	CO5
4	Distinguish between closing and reclosing lines on voltage transients.	**BTL 2**	**Understand**	CO5
5	Outline the causes of over voltage.	**BTL 1**	**Remember**	CO5
6	Discuss about switching surges.	**BTL 2**	**Understand**	CO5
7	Draw the EMTP model of transmission line.	**BTL 1**	**Remember**	CO5

Q.No	Questions	BT Level	Competence	Course Outcome
8	Draw the EMTP model of resistor.	**BTL 1**	**Remember**	CO5
9	Outline the concept behind EMTP.	**BTL 1**	**Remember**	CO5
10	List out the effects of load rejection in power systems?	**BTL 1**	**Remember**	CO5
11	Write the network equation to model a transmission network for EMTP calculation	**BTL 3**	**Apply**	CO5
12	Discuss the effects of transients when a switch is closed.	**BTL 4**	**Analyze**	CO5
13	What are the effects of load rejection in power system?	**BTL 4**	**Analyze**	CO5
14	Comment on "Digital computation is required to analyze Power system transients".	**BTL 6**	**Create**	CO5
15	Identify any two advantages of EMTP software packages.	**BTL 4**	**Analyze**	CO5
16	Write an expression for amplitude of the over voltage with circuit diagram during the load rejection.	**BTL 3**	**Apply**	CO5
17	Draw the EMTP model of inductor and capacitor.	**BTL 1**	**Remember**	CO5
18	Give the applications of EMTP.	**BTL 6**	**Create**	CO5
19	Discuss about distribution of voltage in power system.	**BTL 6**	**Create**	CO5
20	Write short note on EMTP.	**BTL 3**	**Apply**	CO5
21	What is consistent betwwen all switching surge events?	**BTL 1**	**Remember**	CO5
22	Summarize the kilometric faults on transmission lines.	**BTL 6**	**Create**	CO5
23	Evaluate the major two classifications of overvoltages.	**BTL 6**	**Create**	CO5
24	How temporary overvoltages are differingfrom switching overvoltage?	**BTL 3**	**Apply**	CO5
	PART-B			
1	Discuss in detail about EMTP for the applications of transient computation. (13)	**BTL 6**	**Create**	CO5
2	Discuss about the distribution of voltage in a power system. Derive the voltage transient on closing lines.(13)	**BTL 2**	**Understand**	CO5
3	Analyze the computation of Transients in power system using EMTP. (13)	**BTL 4**	**Analyze**	CO5
4	Examine the switching surges in a power system and also outline the concept of line dropping and load rejection in an power system. (13)	**BTL 4**	**Analyze**	CO5

Q.No	Questions	BT Level	Competence	Course Outcome
5	Interpret the need for simulation studies. Also describe the key points of EMTP software and the steps involved to do a simulation study of a sample power system. (13)	**BTL 3**	**Apply**	CO5
6	Develop an expression for response and recovery voltage of a shorted line. (13)	**BTL 5**	**Evaluate**	CO5
7	Discuss the causes of transients on closing and reclosing of transmission lines. (13)	**BTL 2**	**Understand**	CO5
8	Discuss in detail about the switching surges on an integrated power system. (13)	**BTL 2**	**Understand**	CO5
9	Evaluate the reflection and transmission coefficient in an integrated power system. (13)	**BTL 1**	**Remember**	CO5
10	Describe in detail about the causes of over voltages induced by various faults occurring in a power System. (13)	**BTL 1**	**Remember**	CO5
11	Discuss in detail about kilometric fault with necessary diagrams, expression and voltage and recovery voltage wave forms. (13)	**BTL 2**	**Understand**	CO5
12	Explain the voltage transients on closing and reclosing of lines and switching surges on integrated system. (13)	**BTL 3**	**Apply**	CO5
13	Explore the algorithm used for computation of transient voltages in EMTP. (13)	**BTL 6**	**Create**	CO5
14	Evaluate over voltages induced by Line to Line fault. (13)	**BTL 1**	**Remember**	CO5
15	Explain the causes of load rejection overvoltage. (13)	**BTL 2**	**Understand**	CO5
16	Explain the temporary overvoltages are differing from switching overvoltages. (13)	**BTL 3**	**Apply**	CO5
17	Summarize the EMTP representation of equivalent current source. (13)	**BTL 6**	**Create**	CO5
	PART C			
1	With a suitable illustration discuss computation mechanism and algorithms for analysing the transients in integrated power systems. (15)	**BTL 6**	**Create**	CO5
2	Evaluate the reflection and transmission coefficient in an integrated power system. (15)	**BTL 5**	**Evaluate**	CO5

Q.No	Questions	BT Level	Competence	Course Outcome
3	Describe the causes of over voltages induced by various faults in a power system. (15)	**BTL 5**	**Evaluate**	CO5
4	Explain in detail about the switching surges on an integrated power system. (15)	**BTL 6**	**Create**	CO5
5	Generalize the EMTP for Transient computation. (15)	**BTL 6**	**Create**	CO5

Cos	Course Outcome
CO1	Ability to Understand and analyze the importance of transients in power systems
CO2	Ability to acquire knowledge on generation of switching transients and their control
CO3	Ability to analyze the mechanism of lighting strokes
CO4	Ability to understand the importance of propagation, reflection and refraction of travelling waves
CO5	Ability to find the voltage transients caused by faults, and to understand the concept of circuit breaker action, load rejection on integrated power system