PSN COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University)

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Department of EEE

QUESTION BANK

Degree/Branch: B.E/ EEE

Semester: VII

Subject Code/Title: 504019 / Power system Transients

Regulation: 2018

UNIT I INTRODUCTION AND SURVEY			
Review and importance of the study of transients – 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 (2 marks)			
Q.No	Question	BT Level*	Competence#
1	Define power system transients.	K1	Remember
2	Define the term transients.	K1	Remember
3	What are the three classes of power system phenomena?	K1	Remember
4	Define switching transients.	K1	Remember
5	Mention the sources of power system transient	K1	Remember
6	What are the causes of switching surges?	K1	Remember
7	What is meant by arcing ground?	K1	Remember
8	What is meant by lightning?	K1	Remember
9	What are the types of lightning?	K1	Remember
10	What is meant by insulation failure?	K1	Remember
11	How line energizing of transmission lines causes transients?	K1	Remember
12	Classify transient based on their origin.	K1	Remember
13	Define transient due to Electromagnetic phenomena.	K1	Remember
14	Define impulsive transients	K1	Remember
15	Give the relation between time constant of parallel and series circuit	K1	Remember
Part B (16 marks)			
Q.No	Question	BT Level*	Competence#
1	What are the sources and effects of transients on power system? Explain in detail	K2	Analyse
2	Derive expression for instantaneous current in a RL circuit with sine wave excitation.	K3	Understand
3	Write short notes on Double frequency transients?	K2	Analyse
4	Explain the various types of power system transients with illustration.	K2	Analyse
5	Explain the significance of transient studies in power system planning.	K2	Analyse
6	Discuss transient effects in (i) motors (ii) lighting system (iii) transformers (iv) distribution system (v) measuring equipment	K2	Understand
7	Explain in detail, the double frequency transients with necessary waveforms.	K3	Analyse

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 (2 marks)

Q.No	Question	BT Level *	Competence#
1	What are the various causes of switching surges?	K1	Remember
2	What is meant by switching surges?	K1	Remember
3	What is meant by resistance switching?	K1	Remember
4	What is meant by current chopping?	K1	Remember
5	What is meant by capacitance switching?	K1	Remember
6	What is meant by load switching?	K1	Remember
7	What is meant by abnormal switching transients?	K1	Remember
8	What is meant by Ferro resonance condition?	K1	Remember
9	What is the need for resistance switching?	K1	Remember
10	Where do double restrike transients arise? What are their implications?	K1	Remember
11	Give a power system example for the occurrence of ferroresonance.	K1	Remember
12	What is the origin of ferro-resonance? What are the undesirable effects?	K1	Remember
13	Why multiple restrike occur due to capacitance switching?	K1	Understand
14	What is meant by multiple restriking transients?	K1	Remember
15	Differentiate normal and abnormal switching transients.	K1	Understand

Part B (16 marks)

Q.No	Question	BT Level *	Competence#
1	Explain Resistance Switching with neat circuit diagram.	K2	Analyse
2	Explain load switching with an example.	K3	Analyse
3	Describe about the Current chopping phenomenon in ac system with an example.	K2	Understand
4	Compare the normal and abnormal conditions for transients in power systems.	K2	Understand

5	Explain with appropriate waveform, the capacitance switching with one and multiple restrikes.	K2	Analyse

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 (2 marks)			
Q.No	Question	BT Level *	Competence#
1	What are the chief causes of over voltages in electric power system?	K1	Remember
2	What is meant by lightning?	K1	Remember
3	What are the effects of lightning?	K1	Remember
4	What are the types of lightning?	K1	Remember
5	Explain the various regions of the cloud.	K1	Understand
6	Mention the different theories of charge formation.	K1	Remember
7	What does a thunder cloud consist?	K1	Remember
8	What is back flashover?	K1	Remember
9	State the factors influence the lightning induced voltages on transmission lines.	K1	Remember
10	What is Thunder storm days?	K1	Remember
11	State the parameters and characteristics of the lightning strokes	K1	Remember
12	Name the various methods for protection of Transmission lines against lightning over voltages	K1	Remember
13	What is a ground wire in a Transmission System?	K1	Remember
14	What are the factors contributing to good transmission line design?	K1	Remember
Part B (16 marks)			
Q.No	Question	BT Level *	Competence#
1	Explain with neat diagrams the two different theories of charge generation and operator in a thunder cloud.	K2	Understand
2	Explain lightening phenomenon.	K2	Understand
3	Derive the rate of charging of thunder clouds	K2	Analyse

4	Explain in detail how the charges are formed in the clouds.	K2	Understand
5	Explain with neat sketches the mechanism of lightning discharge.	K2	Understand
6	Explain the terms: 1.pilot streamer 2. Stepped leader 3.Return stroke	K2	Understand
7	Explain in detail, the different characteristics of the lightning strokes.	K2	Understand
8	What are the factors that contribute good line design? Explain the protection offered by ground wires.	K2	Analyse
9	Explain about the tower footing resistance.	K2	Understand
10	Describe Tower footing resistance with necessary diagrams	K2	Analyse

UNIT IV 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 (2 marks)			
Q.No	Question	BT Level *	Remember
1	Define lumped parameters.	K1	Remember
2	What are the specifications of travelling wave?	K1	Remember
3	What is the importance of Bewley's Lattice diagram?	K1	Remember
4	What are the standing waves?	K1	Remember
5	What is attenuation? How they are caused?	K1	Remember
6	What are the principles observed in lattice diagram?	K1	Remember
7	What are the damages caused by the travelling waves.	K1	Remember
8	Define front and crest of a travelling wave	K1	Remember
9	What is travelling wave? What is the role of distributed parameters (R,L ,C) in it	K1	Remember
10	Define attenuation and distortion.	K1	Remember
11	Distinguish between reflection and refraction of travelling waves with expressions.	K1	Understand
12	Define coefficient of reflection	K1	Remember
13	Define reflection and refraction.	K1	Remember
14	Define tail and polarity of a wave.	K1	Remember

Part B (16 marks)			
Q.No	Question	BT Level *	Competence#
1	Explore the steps involved in Bewely's lattice diagram construction with an example	K3	Analyse
2	Evaluate the value of current in a transmission line considering its series and shunt lumped parameters.	K2	Understand
3	Draw the step response of a travelling wave. Explain it by using Bewely's lattice diagram	K2	Analyse
4	Discuss elaborately on reflection and refraction travelling	K3	Analyse
5	Examine multi-velocity waves of travelling waves in transmission lines	K3	Understand
6	Explain multi-conductor system of travelling waves in transmission lines	K2	Analyse
7	Develop wave equation of travelling waves in transmission lines	K2	Analyse
8	Describe the transient response of systems with series and shunt distributed parameters	K3	Analyse
9	Examine the behavior of travelling waves at open circuited transmission line	K2	Understand

UNIT V PROTECTION AGAINST TRANSIENTS			
Protection of power systems against transient over-voltage due to switching and lightning, Lightning arrestors, Surge diverters, Surge capacitors and reactors, Overhead ground wires, Insulation coordination, Computer aids to calculate transient (EMTP)			
Part A (2 marks)			
Q.No	Question	BT Level*	Competence#
1	What is meant by kilometric fault?	K1	Remember
2	What are the causes of over voltage?	K1	Remember
3	What is meant by switching surges	K1	Remember
4	Define reflection coefficient.	K1	Remember
5	Define transmission coefficient.	K1	Remember
6	What is meant by EMTP?	K1	Remember

7	What are the effects of load rejection in power systems?	K1	Remembe r
8	Write the network equation to model a transmission network for EMTP calculation	K1	Remembe r
9	What are the effects of transients when a switch a switch is closed?	K1	Remembe r
10	What are the applications of EMTP?	K1	Remembe r
11	Define switching over voltage factor	K1	Remembe r
12	What is the effect of switching surges in integrated power system?	K1	Remembe r
13	Which software do you suggested to solve electrical transient Problems?	K1	Remembe r
14	What are the potential advantages of EMTP?	K1	Remembe r
15	Mention the features of EMTP	K1	Remembe r
Part B (16 marks)			
Q.No	Question	BT Level*	Competence#
1	Discuss in detail about kilometric fault with necessary diagrams, expression and voltage and recovery voltage wave forms.	K2	Understand
2	Examine the switching surges in a power system and also outline the concept of line dropping and load rejection in a power system.	K3	Analyse
3	Discuss about the distribution of voltage in a power system. Derive the voltage transient on closing lines.	K2	Understand
4	Examine the switching surges in a power system and also outline the concept of line dropping and load rejection in a power system.	K2	Analyse
5	Discuss the causes of transients on closing and reclosing of transmission lines.	K2	Understand
6	Describe in detail about the causes of over voltages induced by various faults occurring in a power System.	K2	Analyse
7	Explain in detail about the switching surges on an integrated power system.	K3	Analyse
8	Discuss in detail about the switching surges on an integrated power system.	K3	Understand