Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

M.E DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

Second Semester

Power Systems Engineering

PS4203/PPST2423 - Power System Transients

Regulations – 2021/2024

Duration : 3 Hrs ***Maximum: 100 Marks***

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	Mention the significance of tower-footing resistance.	L2	1	2
2.	Define striking distance in lightning phenomena.	L1	1	2
3.	Recall the Ferranti Effect in power systems.	L1	2	2
4.	Define ferro resonance and Under what conditions does it typically occur?	L1	2	2
5.	How does a change in line impedance affect reflection coefficients?	L2	3	2
6.	Recall the boundary conditions used to derive the wave equation on a line.	L2	3	2
7.	Define Basic Insulation Level (BIL) and its relevance in system design.	L2	4	2
8.	Differentiate between self-restoring and non-self-restoring insulation.	L2	4	2
9.	List any two components typically modeled in EMTP for transient studies.	L1	5	2
10.	List out the limitations of simplified methods for transient computation.	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a		Derive the relationship between lightning current and induced voltage on overhead lines. Analyze how this relationship affects design of protection systems.	L4	1	16
			Or			
	b		Compare the performance of shield wires versus direct stroke shielding techniques for transmission line protection using electro-geometric modeling principles.	L4	1	16
12.	a	i	Compare ferro resonance and temporary overvoltage phenomena in isolated neutral systems. How would you prevent these in a substation design?	L4	2	10
		ii	Discuss the origin and nature of switching transients in power systems.	L4	2	6
			Or			

	b	i	Interpret the impact of load rejection in a long transmission line and derive the resulting overvoltage conditions using equivalent circuit modeling.	L4	2	10
		ii	Compare and contrast switching surges and lightning surges.	L4	2	6
13.	a		Derive the reflection and refraction coefficients for a travelling wave at a junction between two transmission lines with different surge impedances.	L3	3	16
			Or			
	b		Construct and interpret a lattice diagram for a 3-section transmission line system. Analyze the energy distribution and transient wave paths.	L3	3	16
14.	a	i	Analyze the coordination between BIL levels and expected overvoltages in a 400kV substation.	L4	4	8
		ii	Evaluate the optimization of arrester energy absorption capability based on statistical lightning surge data.	L4	4	8
			Or			
	b	i	Derive volt-time characteristic equations and analyze their role in protective device operation and insulation strength selection.	L4	4	8
		ii	Compare insulation coordination challenges between AIS and GIS environments.	L4	4	8
15	a		Explain the modeling of power system components in EMTP.	L2	5	16
			Or			
	b	i	Analyze the compliance of your transient computation with IEEE and IEC standards. How do standard limits influence system design?	L4	5	8
		ii	Categorize the steps to simulate a gas-insulated substation using EMTP.	L4	5	8