

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Seventh Semester

Electrical and Electronics Engineering

EE3701 - High Voltage Engineering

Regulations - 2021

Duration : 3 Hrs

Maximum : 100 Marks

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

Q.No	Questions	BLT	CO	Marks
1.	Label the mathematical model of lightning.	UN	1	2
2.	State the importance of insulation coordination in power system.	UN	1	2
3.	List the properties of dielectric materials.	RE	2	2
4.	Recall the applications of insulating materials in electrical equipment's.	RE	2	2
5.	What are the problems associated with measurement of very high impulse voltages?	RE	3	2
6.	Infer the principle of mixed potential divider? How is it used for impulse voltage measurements?	UN	3	2
7.	Compare the difference between type and routine test.	UN	4	2
8.	Identify the methods of impulse testing of high voltage transformers.	RE	4	2
9.	What factors influence the efficiency of electrostatic painting, and how can these factors be optimized?	RE	5	2
10.	Outline the applications of electrostatic spinning in the textile industries.	UN	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)

Q.No	Questions	BLT	CO	Marks
11.	a Examine various causes and its effects of power frequency over voltages in power systems and its control techniques. Also summarize the various schemes of protection against over voltages.	AP	1	13
	Or			
	b Develop the expression for reflection and refraction coefficients for voltage and current waves when the transmission line of surge impedance Z terminated with a resistance of R ohm.	AP	1	13
12.	a i Illustrate in detail about gaseous breakdown mechanism in uniform and non-uniform fields.	UN	2	8
	ii How vacuum breakdown occurs according to particle exchange mechanism?	UN	2	5
	Or			
	b i Interpret the thermal breakdown mechanisms in solid dielectrics. Derive an expression for critical thermal breakdown voltage (Vc) and critical electric field (Ec) for the same. State clearly the assumptions made.	UN	2	8
	ii Summarize the various theories that explain breakdown in pure and commercial liquid dielectrics.	UN	2	5

13.	a	i	Make use of Marx circuit arrangement for multistage impulse generators. How is the basic arrangement modified to accommodate the wave time control resistances?	AP	3	8
		ii	Build the impulse current generated using capacitor bank? Explain it in brief.	AP	3	5
Or						
	b	i	With a neat diagram explain the sphere gap arrangement method of HV measurement in detail and give the factors influencing the measurements.	AP	3	8
		ii	Discuss briefly about various digital techniques in HV measurement.	AP	3	5
14.	a	i	Examine in detail the power frequency and impulse voltage test need to be conducted on bushings with necessary diagrams.	AN	4	8
		ii	Summarize the various Indian and international standard specification for high voltage testing of electrical power apparatus.	AN	4	5
	Or					
	b	i	Analyze the various tests carried out in a circuit breaker at high voltage laboratories.	AN	4	8
		ii	Classify the various tests carried out the insulator.	AN	4	5
15.	a		What is electrostatic precipitation? Discuss its working principle and application in pollution control, specifically in the removal of particulate matter from industrial exhaust.	UN	5	13
	Or					
	b		Explain the concept of electrostatic pumping and its applications in microfluidics and chemical industries.	UN	5	13

*PART – C (Marks 1*15 = 15)*

<i>Q.No</i>	<i>Questions</i>			<i>BLT</i>	<i>CO</i>	<i>Marks</i>
16.	a	i	A coaxial shunt is to designed to measure an impulse current of 50 KA. If the bandwidth of shunt is to be at least 10 MHZ and if the voltage drop across the shunt should not exceed 50V, Find ohmic value & dimension.	AN	3	8
		ii	A generating voltmeter has to be designed so that it can have a range from 25 to 250 k V dc. If the indicating meter reads a minimum current of 2.5μA and maximum current of 30μA, what should the capacitance of the generating voltmeter be?	AN	3	7
	Or					
	b	i	Analyze how are electrostatics applied in imaging and printing technologies? Describe the principle behind laser printing and photocopying.	AN	5	8
		ii	Infer how electrostatics are applied in biomedical fields. Discuss the use of electrostatics in applications such as drug delivery, tissue engineering, and sterilization.	AN	5	7