K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester: V
Class: TY	Program: B.Tech.
Branch Code: ELE	Pattern: 2023
Name of Course: High Voltage Engineering	Course Code: 2306306A
Max. Marks:60	Duration: 2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 02 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required but justify it.
4. Draw the neat, labelled diagrams, wherever necessary.
5. The last columns indicate the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1a)	**Describe the current growth phenomenon in a gas subjected to uniform electric fields.**	(6)	CO1
Question No. 2			
2a)	Explain the theory that explain breakdown in commercial liquid dielectrics.	(6)	CO1
Question No. 3			
3a)	Give different circuits that produce impulse waves explaining clearly their relative merits and demerits.	(8)	CO2
	OR		
3b)	A 12-stage impulse generator has 0.126μF capacitors. The wave-front and the wave-tail resistances connected are 800 ohms and 5000 ohms respectively. If the load capacitor is 1000 pF, find the front and tail times of the impulse wave produced.	(8)	CO2
3c)	Give the Marx circuit arrangement for multistage impulse generators. How is the basic arrangement modified to accommodate the wave time control resistances?	(8)	CO2
	OR		
3d)	A Tesla coil has a primary winding rated for 10 kV. The capacitance in the primary side is 2.0μF and on the secondary side is 1 nF, if the energy efficiency is 5%, calculate the output voltage.	(8)	CO2
Question No. 4			
4a)	What is capacitance voltage transformer? Explain with phasor diagram how a tuned capacitance voltage transformer can be used for voltage measurements in power systems.	(8)	CO3
	OR		
4b)	A resistance divider of 1400 kV (impulse) has a high-voltage arm of 16 kilo-ohms and a low-voltage arm consisting of 16 members of 250 ohms, 2-watt resistors in parallel. The divider is connected to a CRO through a cable of surge impedance 75 ohms and is terminated at the other end through a 75-ohm resistor. Calculate the exact divider ratio.	(8)	CO3

4c) Explain how a sphere gap can be used to measure the peak value of voltages. What are the parameters and factors that influence such voltage measurement? (8) CO3

OR

4d) A generating voltmeter has to he designed so that it can have a range from 20 to 200 kV dc If the indicating meter reads a minimum current of 2μA and maximum current of 25 μA, what should the capacitance of the generating voltmeter be? (8) CO3

Question No. 5

5a) Explain the modifications to be made to the Schering-bridge for high dissipation factor situations. (8) CO4

OR

5b) A Schering-bridge was used to determine the dielectric constant and loss factor of a 1 mm thick Bakelite sheet at 50 Hz using a parallel-plate electrode configuration. The electrode effective area is 100 cm^2. At balance, the bridge arms are AB: test object, BC: std, capacitor = 100pf. CD: variable capacitor in parallel with resistor 50 nF and 1000/π ohms. DA: variable resistance 62.0 Ω Determine the dielectric constant K and loss factor tan δ. (8) CO4

5c) Explain the following terminology used in partial discharge phenomenon. (8) CO4

(a) Electrical Discharge

(b) Partial Discharge

(c) Discharge Inception Voltage

(d) Discharge Extinction Voltage

(e) Discharge Energy

OR

5d) What is the surge arrester? Explain functions metal oxide surge arrester as a shunt protecting device. (8) CO4

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