

MASTER OF ELECTRICAL ENGINEERING EXAMINATION, 2019

(First Year, Second Semester)

HIGH VOLTAGE MEASUREMENTS

Time: Three Hours

Full Marks: 100

Answer any Five Questions

1. a) What is a Capacitive Voltage Transformer (CVT)? Explain with a phasor diagram, how a tuned CVT can be used for voltage measurement in power systems. 12
- b) Briefly explain the construction and the working principle of an electrostatic voltmeter with a neat diagram. 08
2. a) Explain how a sphere gap can be used to measure the peak value of high voltage. What are the parameters and factors that influence such voltage measurement? 12
- b) Describe the measurement procedure of high impulse current by a Rogowski Coil. 08
3. a) Briefly explain the operation of Klydonograph with suitable diagram. What is the significance of 'Lichtenberg figures' in lightning impulse voltage measurement? 12
- b) A generating voltmeter has to be designed so that it can have a range from 20kV to 200 kV dc. If the indicating meter reads a minimum current of $2\mu\text{A}$ and maximum current of $25\mu\text{A}$. What should be the capacitance of the generating voltmeter? 08
4. a) Draw the circuit diagram of a peak voltmeter that contain a bleeder resistance. Describe the principle of operation of such a peak voltmeter and discuss about the errors associated with peak voltage measurement with this meter. 13
- b) Explain the technique of impedance matching for the measurement of impulse voltage with CRO. 7
5. a) Briefly explain the operation of Schering Bridge for grounded object and with detector end grounded. 12
- b) An AC Schering bridge was made up as follows:
 Arm AB, a capacitor of $0.9\mu\text{F}$ in parallel with $1.5\text{k}\Omega$ resistance, BC a resistance of $3\text{k}\Omega$, arm CD an unknown capacitor C_x and R_x in series, arm DA a capacitance of $0.47\mu\text{F}$. The supply at 1kHz is connected across BD and a detector across AC. Determine the value of capacitance C_x , resistance R_x and dissipation factor. 08

6. Explain what you mean by apparent charge. Why the concept of apparent charge has to be introduced in measuring partial discharge? Describe an experimental setup for partial discharge measurement from a sample? 20

7. Write short notes on: 10×2

(i) High Voltage Potential Divider

(ii) Generating Voltmeter.