

MASTER OF ELECTRICAL ENGINEERING EXAMINATION, 2017

(1st Year, 2nd Semester)

HIGH VOLTAGE MEASUREMENTS

Time: Three Hours

Full Marks: 100

Answer any Five Questions

1. a) Briefly explain the construction and the working principle of Generating voltmeter with a neat diagram. Also mention the advantage and limitations of this voltmeter. 14
- 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? 06
2. a) Draw the circuit diagram of a Chuub - Fortescue peak voltmeter circuit. Describe the principal of operation of this peak voltmeter circuit and discuss about the limitation of this peak voltage measurement.. 10
- b) 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? 10
3. 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
4. a) What are the different types of resistive shunts that are used for impulse current measurement? Discuss their characteristics and limitations. 13
- b) Describe the measurement procedure of high impulse current by a Rogowski Coil. 07
5. 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) Explain the techniques of impedance matching for the measurement of high voltage surge with respect to both divider end and oscilloscope end. 8

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) Lichtenberg figures in lightning impulse voltage measurement.

(ii) Electrostatic voltmeter.

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