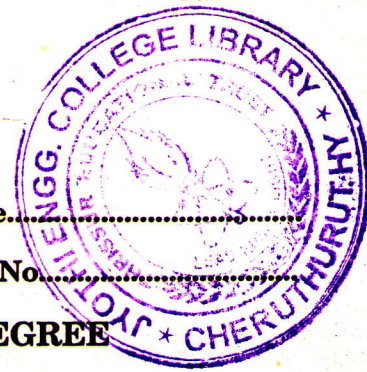


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Name.....

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**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, FEBRUARY 2005**

EE 2K 506 (C). HIGH VOLTAGE ENGINEERING

Time : Three Hours

Maximum : 100 Marks

1. (a) What is Paschen's law ?
(b) Derive the criterion for breakdown in electronegative gases.
(c) Define wavefront and tail time of an impulse wave.
(d) Give the expression for ripple and regulation in voltage multiplier circuits.
(e) Discuss the different methods of measuring high d.c. voltages.
(f) What are the conditions to be satisfied by a potential divider to be used for impulse work ?
(g) What are the earthing and shielding arrangements needed in the "Schering bridge" measurement ?
(h) What are partial discharges and how are they detected under power frequency operating conditions ?

(8 × 5 = 40 marks)

2. (a) What are the advantages of using plastic film insulation over the paper insulation. (8 marks)
(b) Explain the suspended particle theory in commercial liquids. (7 marks)

Or

- (c) How does temperature and moisture affect the breakdown strength of solid dielectrics ? (7 marks)
(d) In an experiment in a certain gas it was found that the steady-state current is 5.5×10^{-8} A at 8 kV at a distance of 0.4 cm. between the plane electrodes, keeping the field constant and reducing the distance to 0.1 cm. results in a current of 5.5×10^{-9} A. Calculate Townsend's primary ionization coefficient. (8 marks)

3. (a) Describe with neat sketch the working of a Van de Graff generator. What are the factors that limit the maximum voltage obtained ? (10 marks)
(b) Explain the different methods of producing switching pulses in test laboratories. (5 marks)

Or

Turn over

- (c) What is a Tesla coil ? How are damped high frequency oscillation obtained from a Tesla coil ?
(7 marks)
- (d) Give a Marx circuit arrangement for multistage impulse generators. How is the basic arrangement modified to accommodate the wave time control resistances ?
(8 marks)
4. (a) 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 ?
(10 marks)
- (b) Explain the different methods of high current measurements with their relative merits and demerits.
(5 marks)

Or

- (c) Why are capacitance voltage dividers preferred for high a.c. voltage measurements ?
(5 marks)
- (d) A Rogowski coil is to be designed to measure impulse currents of 10 KA having a rate of change of current of 10^8 A/S. The current is read by a (VTVM) as a potential drop across the integrating circuit connected to the secondary. Estimate the values of mutual inductance, and capacitance to be connected, if the meter reading is to be 10 V for full scale deflection. Assume $R = 2 \times 10^3$ ohm.
(10 marks)
5. (a) What are the earthing and shielding arrangements needed in the "Schering bridge" measurements ?
(7 marks)
- (b) How is lossy dielectric represented ? Explain how an ideal capacitor in parallel with a resistance can represent a lossy dielectric over a wide frequency range.
(8 marks)

Or

- (c) What are the mechanisms by which lightning strokes develop and induce over voltage on overhead power lines ?
(7 marks)
- (d) With suitable illustration explain how insulation level is chosen for various equipment in a 230/132 kV substation.
(8 marks)

[4 × 15 = 60 marks]