

6E3110

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B. Tech. VI Semester (Main/Back) Exam. May/June 2013

ELECTRICAL ENGINEERING # 6EE2

HIGH VOLTAGE ENGINEERING

Time : 3 Hours

Min. Passing Marks : 24

Maximum Marks : 80

Instruction to Candidates :

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit-I

- (a) Discuss "Treeing and Tracking Breakdown" in solids. [8]
- (b) Explain "cavitations and Bubble theory" in context with breakdown in liquids. [8]

OR

- (a) Define Townsend's first and second ionization Coefficients. How is the condition for breakdown obtained in a Townsend discharge? [8]
- (b) Explain the phenomena of electrical conduction in liquids. How does it differ from that in gases? [8]

Unit-II

- (a) Explain different schemes for cascade connection of transformers for producing very high AC Voltages. [8]
- (b) Give the Marx circuit arrangement for multistage impulse generators. [8]

OR

- (a) Why is a Cockcroft – Walton circuit preferred for voltage multiplier circuit? Explain its working with schematic diagram. [8]
- (b) Give the expression for ripple and regulation in voltage multiplier circuits. How are the ripple and regulation minimized. [8]

Unit-III

- (a) What are partial discharges and how are they detected under power frequency operating conditions? [8]
- (b) What are "broad band" and "narrow band" detectors? What is the sensitivity in each of the above detectors? [8]

OR

- (a) Explain the high voltage Schering Bridge for the $\tan \delta$ and capacitance measurement of insulator or bushings. [8]
- (b) The volume resistivity of a Bakelite piece was determined by using standard circular electrodes, a sensitive galvanometer and stabilized power supply. When the applied voltage was 1000 V, the galvanometer deflection with the specimen was 3.2 cm. When a standard resistance of $R_s = 10 \text{ M}\Omega$ is used for calibration, the deflection was 33.30 cm with a universal shunt ratio of 3,000. The diameter of the electrodes is 10 cm, and the thickness of the specimen is 2 mm. Find the volume resistivity. [8]

Unit-IV

- (a) What are the mechanism by which lightning strokes develop and induce over - voltage on overhead power lines? [8]
- (b) Explain the terms "attenuation and distortion" of travelling waves propagating on overhead lines. [8]

OR

- Explain reflection and refraction of waves for following:
 - Open circuited line
 - Short circuited line
 - Line terminated through a resistance
 - Line terminated through a capacitance. [4×4=16]

Unit-V

- Explain various types of lightning arresters in detail. [16]

OR

- Write short notes on the following:
 - Coordination of insulation levels.
 - Operation of ground wires. [8+8=16]