

6E3110

B.Tech. VI Sem. (Main/Back) Exam., May/June-2014

Electrical Engineering

**6EE2 HIGH VOLTAGE ENGINEERING**

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

*Instructions 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 may suitably be assumed and stated clearly.*

*Units of quantities used/calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.*

1. \_\_\_\_\_ 2. \_\_\_\_\_

**Unit-I**

- Q.1 (a) Explain Townsend's breakdown mechanism for gases starting from the expression of current at anode for increase in voltage between anode and cathode. [8]
- (b) For breakdown in liquids show that breakdown strength (E) depends upon concentration of particles N, radius r of particle, viscosity  $\eta$  of liquid and temperature T of the liquid. [8]

**OR**

- Q.1 (a) Explain breakdown mechanism in solids and describe thermal breakdown phenomenon observed in breakdown for solid dielectrics. [10]
- (b) Describe the applications of gases in power system and oil in power apparatus. [6]

**UNIT-II**

- Q.2 (a) Describe the method of high voltage DC generation in which charging source transformer charges the capacitance through a number of rectifiers. [10]
- (b) Describe how data are obtained regarding lightning surges produced on transmission lines and other equipments. [8]

OR

- Q.2 (a) Describe the sphere gap method for measurement of high voltage by drawing neat diagram and explaining working of method. [10]
- (b) Draw neat diagrams for cascaded for cascaded transformers method for high AC voltage generation and Marx's multistage impulse generators. [6]

UNIT-III

- Q.3 (a) Describe the working of basic high voltage Schering bridge for measurement of dielectric loss of capacitances by drawing neat figure. [8]
- (b) Describe the loss factor and specific resistivity measurement method for an insulation specimen. [8]

OR

- Q.3 (a) Describe the working of basic narrow band partial discharge measuring circuit by drawing a neat figure. [8]
- (b) Draw the equivalent circuit for a typical partial discharge and also give some examples of partial discharges. [8]

UNIT-IV

- Q.4 (a) What are various reasons of over voltages? Describe the overvoltage due to lightning. [8]
- (b) Describe the mechanism of lightning stroke and Wilson's theory of charge separation for lightning phenomenon. [8]

OR

- Q.4 (a) Show that the current and voltage waves get attenuated exponentially as they travel over the line and magnitude of attenuation depends upon parameters of line. [10]
- (b) Describe the travelling wave phenomenon reflection and refraction at a T-Junction of line. [6]

UNIT-V

- Q.5 (a) Describe the junction of Ground rods, counterpoise with regard to overvoltage protection. Also explain what is Arcing horn phenomenon? [8]
- (b) Describe the basic requirements of surge diverters. Explain metal oxide gapless type lightning arrester. [8]

OR

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- (a) Explain insulation coordination problem. Describe the basic impulse insulation levels. [8]
- (b) Describe the volt-time curves construction and purpose by drawing neat diagram and mentioning all specifications of curve in diagram. [8]



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