

International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Examination, Autumn-2018
 Course Code: **EEE-4807**
 Time: **2 hours 30 minutes**

Program: **B.Sc. Engg. (EEE)**
 Course Title: **High Voltage Engineering**
 Full Marks: 50

Part A

[Answer any **two** questions from the followings; Figures in the right margin indicate full marks.]

- 1(a). Write down the different methods of producing switching impulses in test laboratories. 02
- 1(b). Why controlled tripping is necessary? Explain the controlled operation of impulse generator using trigatron gap. 04
- 1(c). Explain Marx circuit & modified Marx circuit for Multistage impulse generator. 04
- 2(a). Define ionization and ionization potential. 02
- 2(b). Briefly explain three different ways that cause ionization in gases. 03
- 2(c). Explain the Townsend's breakdown mechanism for the gas's dielectric using the current growth curve shown in Figure 1. 05

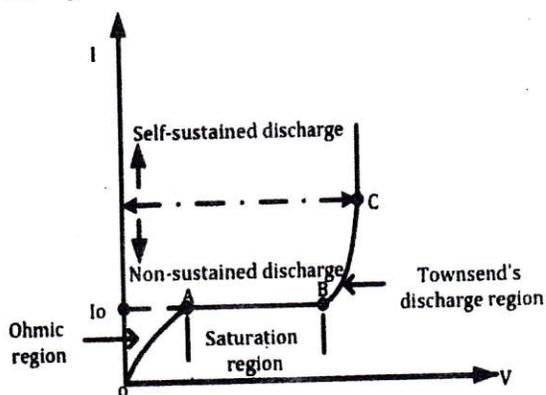


Figure 1: Typical current growth curve in Townsend's discharge.

- 3(a). "There is a minimum breakdown voltage for the product of gas pressure and electrodes spacing." Justify this statement using Paschen's curve. 05
- 3(b). Write down the name of the various mechanism of the breakdown in a solid dielectric. And briefly describe Treeing and Tracking from them. 05

Part B

[Answer any **three** questions from the followings; figures in the right margin indicate full marks.]

- 4(a). What do you mean by corona discharge? Briefly describe the corona inception characteristics for spheres of different diameter in sphere-plane geometry with necessary figures. 04
- 4(b). What are the methods used for direct high voltage measurement? With necessary sketch, explain the cable matching of resistive potential divider for high voltage impulse measurement. 06
- 5(a). What are the various methods of protecting the power system from lightning? 02
- 5(b). What is meant by insulation co-ordination? How are the protective devices chosen for optimal insulation level in a power system? 04

- 5(c). Explain the procedure for constructing Volt-time curves with neat sketch. Give its significance in power system studies. 04
- 6(a). Define BIL? 02
- 6(b). What are the selection parameters of surge diverters? 02
- 6(c). A lightning arrester is required to protect a 5 MVA, 66/11 kV transformer which is effectively earthed in the system. The transformer is connected to a 66 kV, 3 phase system which has a BIL of 350 kV. Select a suitable lightning arrester. Note that A 60-kV rated arrester have a maximum sparkover voltage of 250 kV. 06
- 7(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? 04
- 7(b). Describe briefly corona. Write the factors affecting corona. Also discuss the advantages and disadvantages of corona. 03
- 7(c). Define the following terms used in HV testing as per the standards. 03
- i) Disruptive discharge voltage
 - (ii) Creepage distance
 - (iii) Impulse voltage