Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII • EXAMINATION – SUMMER 2014

Subject Code: 180805 Date: 27-05-2014

Subject Name: High Voltage Engineering

Time: 10:30 am TO 01:00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** A steady current of 600μA flows through the plane electrodes separated by a distance of 0.5cm when a voltage of 10kV is applied. Determine the Townsend's first ionization constant (coefficient) if a current of 60μA flows when the distance of separation is reduced to 0.1 cm and the field is kept constant at previous value. **07**

(b) Explain the difference between photo- ionization and photo-electric emission. **07**

Q.2 **(a)** What is Vacuum? Discuss the various mechanisms of vacuum breakdown. **07**

(b) Why are both electrical & thermal properties important for liquids for use in an apparatus like a transformer? **07**

OR

(b) What is "stressed oil volume theory", how does it explain breakdown in large volumes of commercial liquid dielectrics? **07**

Q.3 **(a)** What are the different methods and means for purification of liquid dielectric? **07**

(b) Discuss the different methods of measuring high dc voltages. What are the limitations in each method? **07**

OR

Q.3 **(a)** What is capacitance voltage transformer? Explain with phasor diagram how a tuned capacitance voltage transformer can be used for voltage measurements in power systems. **07**

(b) What is a trigatron gap? Explain its function and operation. **07**

Q.4 **(a)** For a High voltage d.c generator using Cockroft- Walton circuit with 4 stages and peak input a.c voltage of 100kV, 200Hz, the load current of 4mA and each stage capacitance of 0.02μF, calculate the ripple voltage and voltage drop. **07**

(b) What is the principle of operation of a resonant transformer? How is it advantages over the Cascade connected transformer? **07**

OR

Q.4 **(a)** Compare the use of uniform field electrode spark gap & sphere gap for measuring peak values of voltage. **07**

(b) Explain one method of controlled tripping of impulse generators. Why is controlled tripping necessary? **07**

Q.5 **(a)** Give the Marx circuit arrangement for multistage impulse generators. How is the basic arrangement modified to accommodate the wave time control resistance? **07**

(b) Define the following term. **07**

(a) Corona Discharge
(b) Loss tangent
(c) Impulse ratio
(d) Partial discharge
(e) Surge impedance
(f) Dielectric strength
(g) Townsend's first ionization constant.

OR

Q.5 **(a)** Write short notes on : (i) Type test (ii) Routine test **07**

(b) Explain in details the H.V Schering bridge. How is it different from low voltage Schering- bridge ? **07**

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