

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER – VI (NEW).EXAMINATION – WINTER 2016

Subject Code: 2160904

Date: 26/10/2016

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)** If a Steady State current of a certain gas is 1.4×10^{-4} 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 1.2×10^{-4} A. Calculate Townsend's primary ionization coefficient α . Also find value of η at 0.9 cm. **07**
- (b)** Explain Charge Simulation Method for solving Field Problems and Estimation of potential distribution. **07**
- Q.2 (a)** Explain the phenomenon 'Treeing and Tracking' in solid insulating materials under electrical stress. How does it lead to breakdown? **07**
- (b)** Explain the working of 'Van de Graff Generator' with neat sketch. What are the factors that limit the maximum voltage obtained? **07**
- OR**
- (b)** Explain Voltage Multiplier Circuit for generation of High Voltage. **07**
- Q.3 (a)** What is Paschen's Law? How do you account for the minimum voltage for breakdown under a given 'p x d' condition? **07**
- (b)** A 12- stage Impulse generator has 0.126 μ F capacitors. The wave front and the wave tail resistances connected are 800 ohms and 5000 ohms respectively. If the load capacitors is 1000 pF, find the front and tail times of the impulse wave produced. **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)** Design a peak reading voltmeter along with a suitable micro-ammeter such that it will be able to read voltages, up to 100 kV (peak). The capacitance potential divider available is of the ratio 1000 : 1 **07**
- Q.4 (a)** What is 'Stressed Oil Volume Theory'? How does it explain breakdown in large volumes of commercial liquid dielectrics? **07**
- (b)** Discuss the different methods of measuring high D.C. voltages. What are the limitation in each method? **07**
- OR**
- Q.4 (a)** Briefly explain the methods used for calibrating the partial discharge detectors. **07**
- (b)** What are the different methods and means for purification of liquid dielectrics? **07**
- Q.5 (a)** Explain the importance of RIV measurements for EHV power apparatus. **07**
- (b)** What is composite insulation? How does short term breakdown differ from long term breakdown? **07**
- OR**
- Q.5 (a)** What is meant by insulation co-ordination? How are the protective devices chosen for optimal insulation level in a power system? **07**
- (b)** What is Finite Element Method? Brief it for solving the field problems **07**
