

QP Code : 6121

(3 Hours)

[Total Marks :80]

**N. B.**

- (1) Question No. 1 is compulsory.
- (2) Attempt any three questions out of remaining questions.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.

1. Attempt any four :- 20
  - a) What are electro-negative gases? Why is the breakdown strength higher in these gases compared to that in other gases.
  - b) Explain the phenomenon of 'tracking' in solid insulating materials under electrical stress. How it can be minimized.
  - c) With a neat sketch explain trigatron spark gap used in impulse generators.
  - d) What are commercial liquid dielectrics, and how are they different from pure liquid dielectrics?
  - e) With a neat sketch explain Hall Generators for measurement of high currents.
2. a) Explain with neat diagrams the principle of operation of an Electrostatic voltmeter. Discuss its advantages and limitations for high voltage measurements. 10  
b) Why is Cockcroft-Walton circuit preferred for voltage multiplier circuits? Explain its working with a schematic diagram. 10
3. a) What is Paschen's law? How do you account for the optimum voltage for breakdown under a given 'pXd' condition? 10  
b) Describe in brief various tests carried out on overhead line insulators. 10
4. 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? 10  
b) In an experiment in a certain gas it was found that the steady state current is  $5.5 \times 10^{-8}$  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  $5.5 \times 10^{-9}$  A. Calculate Townsend's primary ionization coefficient  $\alpha$ . 10
5. a) Explain the various theories that explain breakdown in commercial liquid dielectrics. 10  
b) What is 'thermal breakdown' in solid dielectrics, and how is it practically more significant than other mechanisms. 10
6. a) Describe the construction, principle of operation and application of 3-stage Marx generator circuit. 10  
b) What are the various factors to be considered while designing a High Voltage Laboratory? 10