

Faculty of Engineering & Technology  
Seventh Semester B.E. (Electri.)/Sixth Semester  
B.E.P.T. (Electrical) Examination  
**HIGH VOLTAGE ENGINEERING**  
Sections—A & B

Time—Three Hours]

[Maximum Marks—80

**INSTRUCTIONS TO CANDIDATES**

- (1) All questions carry marks as indicated.
- (2) Answer **THREE** questions from Section A and **THREE** questions from Section B.
- (3) Assume suitable data wherever necessary.
- (4) Illustrate your answers wherever necessary with the help of neat sketches.
- (5) Use of Non-Programmable calculator is permitted.

**SECTION-A**

1. (a) "In Townsend's experiment the current growth characteristic has two different slopes." Elaborate the statement with necessary equations. 7
- (b) A solid dielectric specimen of dielectric constant 3 has an internal void of 1.5 mm thickness. The specimen is 10 mm thick and it is subjected to a voltage 80 kV (RMS). If the void is filled with air and the breakdown strength of air is 30 kV (peak)/cm, find the voltage at which internal discharge takes place. 6

2. (a) What are the factors that influence conduction in pure liquid dielectrics and commercial liquid dielectrics ? 6  
 (b) What is lightning mechanism and how it is related with generation of high voltage ? 7
3. (a) Explain gapless type lightning arresters. Write their probable ratings. 7  
 (b) What is travelling waves ? Explain the development of such wave on the overhead transmission line. 6
4. (a) Explain in brief about Basic Impulse Insulation Level, Reduced B/L and Switching Insulation Level. 7  
 (b) What are the causes for switching and power frequency over voltages ? How are they controlled in power system ? 6
5. Write short notes on any **THREE** :  
 (i) Treeing and Tracking in solid dielectrics. 4  
 (ii) Tower footing resistance. 5  
 (iii) Protective ratio and Earthing coefficient. 5  
 (iv) Mechanism for vacuum break down. 4

### SECTION-B

6. (a) Explain cascaded connection of transformer with isolating transformers for excitation, for producing AC high voltage. 7  
 (b) A Cock-Croft voltage multiplier circuit has 8 stages with capacitances equals to  $0.05 \mu\text{f}$ . The supply transformer secondary voltage is 132 kV at 150 Hz. If the load current to be supplied is 4 mA, calculate :  
 (i) Percentage ripple

- (ii) Percentage regulation
- (iii) Maximum output voltage. 6
7. (a) List the different methods for the generation of switching surges. Explain any one of the methods in detail. 7
- (b) Explain with neat diagram the principle of operation of an electrostatic voltmeter. Discuss the advantages and limitations for the measurement of high voltages. 6
8. (a) How sphere gap system is used for the measurement and calibration of high voltage in the Laboratory? Draw experimental set up and explain the same. 7
- (b) Explain the generation of high frequency AC voltage by Tester coil. 6
9. (a) Explain in detail, capacitance voltage transformer. 6
- (b) Explain measurement of dielectric constant and loss factor by high voltage Schering bridge and how it is measured. 7
10. Write short notes on any **THREE** :
- (i) Partial discharge measurement in cable. 5
- (ii) Testing of surge diverters. 5
- (iii) Testing of high voltage AC circuit breakers. 4
- (iv) Testing of cables. 4