

1257635

No. of Printed Pages : 4

BIEE-018

**B. TECH.-VIEP-ELECTRICAL
ENGINEERING (BTELVI)**

Term-End Examination

June, 2019

BIEE-018 : HIGH VOLTAGE ENGINEERING

Time : 3 Hours

Maximum Marks : 70

Note : Attempt any seven questions. All questions carry equal marks. Use of scientific calculator is allowed.

1. Draw the commonly used simplified equivalent circuits of impulse generators. Give a complete analysis of any one circuit and derive the expressions for output voltage, wave front time and wave tail time. 10

2. (a) What is a cascaded transformer ? Discuss with the help of a neat diagram a three stage cascaded transformers. 5

- (b) A Tesla coil has primary winding rated for 10 kV. If inductance and capacitance on primary side are 10 mH and 2 μ F and that on secondary side are 200 mH and 1nF

respectively, calculate the mutual inductance if coefficient of coupling is 0.6. Also determine output voltage if energy efficiency is 5%. 5

3. Explain with the help of a diagram how rod gaps can be used for measurement of high voltages. Compare its performance with a sphere gap. What are the factors which influence the breakdown of air in the gap of sphere gap? 10
4. (a) Why are capacitance voltage dividers preferred for high a. c. voltage measurements? Compare its performance with that of resistance voltage divider. 5
- (b) An electrostatic voltmeter has two parallel plates. The movable plate is 10 cm in diameter. With 10 kV between plates the pull is 5×10^{-3} N, determine the change in capacitance for a movement of 1 mm of movable plate. 5
5. Explain how partial discharges in an insulation system can be detected and displayed? Briefly explain the methods for calibrating the partial discharge detectors. 10

6. (a) Draw the equivalent circuit representing an insulating material. Discuss how the measurement of dielectric constant and loss factor and insulating material is done.

5

- (b) Explain the modifications needed in a Schering bridge for measuring large capacitances.

5

7. Discuss the short circuit tests and dielectric tests carried out on circuit breakers.

Draw the schematic diagram of a typical short circuit test plant for circuit breakers and explain its working.

10

8. Explain and compare the performance of half wave rectifier and voltage doubler circuits for generation of high d. c. voltages. How ripple voltage varies with load current and other circuit parameters in rectifier circuits ?

10

9. (a) Explain Townsend's first and second ionization coefficients. Explain the Townsend's criteria for spark formation.

5

- (b) A steady current of $600 \mu\text{A}$ flows through the plane electrode separated by a distance of 0.5 cm when a voltage of 10 kV is

applied. Determine Townsend's first ionization coefficient if a current of $60 \mu\text{A}$ flows when the distance of separation is reduced to 0.1 cm and the field is kept constant at the previous value. 5

10. What do you understand by intrinsic strength of a solid dielectric ? How does thermal breakdown in solids take place ? Explain why this mechanism is more significant than other mechanisms. 10