

Reg. No. :

Question Paper Code : 20525

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Seventh Semester

Electrical and Electronics Engineering

EE 8701 – HIGH VOLTAGE ENGINEERING

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is inducted stroke and returning stroke?
2. Define shielding angle in the protection of transmission line.
3. State Paschen's Law for gaseous dielectric breakdown.
4. Name some electro negative gases.
5. What are the limitations of van de graff generator?
6. How the impulse circuit is modified for generating switching surge voltage?
7. What are the functions of CVT in high voltage power system?
8. Compare electrostatic volt meter and generating voltmeter.
9. Why the fog test is conducted on power system equipment?
10. What is Tan delta test?

PART B — (5 × 13 = 65 marks)

11. (a) How the charges formed in the cloud as per Simson's and mason's theory?
Derive the mathematical model for lightning.

Or

- (b) Explain the methods of protecting power system against over voltages.

12. (a) Explain the mechanisms involved in solid dielectric breakdown.
Or
(b) Describe the theories involved in vacuum and commercial liquid dielectric breakdown.
13. (a) How the power frequency high voltage is generated through cascaded transformer and resonant transformer method? Explain with clear derivation.
Or
(b) Design a Marx multi stage impulse generator and explain the operation with clear derivation for output voltage and optimum number of stages.
14. (a) Explain the measurement of high voltages using horizontal sphere gap arrangement. Also give the factors affecting the measurement.
Or
(b) With neat diagram, discuss the operation of Faraday's generator and Rogowski coil deployed for measurements.
15. (a) Explain the tests conducted on insulators and bushings in detail.
Or
(b) Explain the testing of power transformers and power cables.

PART C — (1 × 15 = 15 marks)

16. (a) (i) Describe the working of a 4 stage cock craft Walton's cascaded voltage multiplier and derive the expression for ripple and output voltage. (10)
(ii) A cock craft Walton multiplier has eight stages with capacitances equal to $0.15 \mu\text{F}$. The supply voltage is 125 Kv (peak) at a frequency of 50Hz. If the load current is 5 milli ampere. Find (i) % ripple (ii) Regulation (iii) the optimum number of stages to obtain maximum output voltage. (5)
Or
(b) (i) Describe the Townsend's primary and secondary ionization process, and derive the breakdown criterion for gaseous dielectrics. (10)
(ii) A steady current of $600 \mu\text{A}$ flows when a voltage of 10Kv is applied through the plane electrode separated by a distance of 0.6 cm. when the distance of separation is reduced to 0.1 cm with constant field current is reduced to $60 \mu\text{A}$. Determine the Townsend's primary ionization coefficient. (5)