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**Reg. No. :**

**Question Paper Code: 46033**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Sixth Semester

Electrical and Electronics Engineering

14UEE603 – HIGH VOLTAGE ENGINEERING

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1.The electrical field developed within clouds before a lightning stroke occurs can be of the

order of

(a) 0.1 kV/cm (b) 1.0 kV/cm (c) 100 kV/cm (d) 10 kV/cm

2. The equivalent circuit of a surge arrester may be represented as

(a) Capacitor (b) An inductor (c) Non-linear resistor (d) Resistor

3. Which of the following liquids has highest breakdown strength?

(a) Mineral oils (b) Silicone oils

(c) Chlorinated hydrocarbon oils (d) Polyolefins or esters

4. Breakdown is permanent in

(a) Gases ( b) Liquids (c) Solids (d) All the three

5. A Van de Graaff generator has a belt speed of 2.5 m/s, charge density of 10 μc/m2 and a

belt width of 2 m. The maximum charging current is

(a) 50 μA (b) 5 μA (c) 2 μA (d) 12.5 μA

6. A trigetron gap is used with

(a) Cascade transformer units (b) Impulse current generator

(c) Impulse voltage generator (d) DC voltage double units

7. Sphere gaps are used to measure

(a) DC voltages (b) AC peak voltages

(c) DC, AC peak & impulse voltages (d) only DC & AC peak voltages

8. The type of measuring device preferred for measurement of impulse currents of short

duration is

(a) Park’s tubular shunt (b) current transformer

(c) Hall generator (d) Faraday ammeter

9. In wet flashover tests, the conductivity of water used is

(a) 10±1.5 μ Siemens (b) 100 ±15 μ Siemens at ambient temperature

(c) 45±10 μ Siemens at room temperature (d) < 1.0 μ Siemens at 27° C

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| 10. In EHV and UHV system, ratio of BIL to SIL will be usually   1. Less than unity (b) More than 1.5 (c) 1.5 to 2.0 (d) 1.2 to 1.5 |

PART - B (5 x 2 = 10 Marks)

11. What are switching over voltages?

12. What are commercial liquid dielectrics? How are they different from pure liquid dielectrics?

13. What are electrostatic generators?

14. What is the principle of electrostatic voltmeter?

15. Define creepage distance.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) State the characteristics of switching surges. (4)

(ii) What is a surge arrester? Explain its function as a shunt protective device. (8)

Or

(b) Explain with suitable figures the principle and functioning of expulsion gaps and

protector tubes. (16)

17. (a) Define Townsend’s first and second ionization co-efficients. How is the condition

for breakdown obtained in a Townsend discharge? (16)

Or

(b) (i) How does an ‘internal discharge’ phenomenon lead to breakdown in solid

dielectrics? (8)

(ii) Discuss the electrical properties that determine the dielectric performance of

liquid dielectrics. (8)

18. (a) (i)Describe with neat sketch, the working of a Van de Graff generator. State its

advantages and disadvantages. (12)

(ii)Define front and tail times of an impulse wave. What are the tolerances allowed

as per the specifications? (4)

Or

(b) (i) A Cockcroft-Walton type voltage multiplier has eight stages with capacitances, all

equal to 0.05µF. The supply transformer secondary voltage is 125 kV at a

frequency of 150 Hz. If the load current to be supplied is 5mA, find (a) the

percentage ripple (b) the regulation (c) the optimum number of stages for

minimum regulation or voltage drop. (9)

(ii) What is Tesla coil? How are damped high-frequency oscillations obtained from

Tesla coil? (7)

19. (a) Explain how sphere gap can be used to measure the peak value of voltages. What are

the parameters and factors that influence such voltage measurement? (16)

Or

(b) (i) Explain with a neat sketch, how hall effect principle is used in measuring

High direct currents. (8)

(ii) Explain how high impulse currents are measured using resistive shunts with a

neat circuit. Also discuss how resistance shunts are designed to reduce stray

effects. (8)

20. (a) (i) What are the different power frequency tests done on insulators? Mention the

procedure for testing. (8)

(ii) Explain the different aspects of insulation design and insulation co-ordination

adopted for EHV systems. (8)

Or

(b) (i) What is the significance of tests performed on electrical equipments? What are

the international and Indian standards being recommended for following the test

procedures? (8)

(ii) Define the terms a) disruptive discharge voltage b) withstand voltage

c) reference atmospheric conditions d) 50% flashover voltage

e) impulse voltage (8)