Reg. No. : | | | | | | | | | | |

Question Paper Code: 46303

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

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. Which of the following is a polar dielectric?

   (a) Teflon (b) Quartz (c) Nylon (d) Polyethylene

2. The spark over voltage

   (a) Increases with humidity
   (b) Decreases with the partial pressure of water vapour in air
   (c) Humidity effect decreases with the size of spheres
   (d) Humidity is minimum for uniform field gaps

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. Which of the following gas has been used as insulating medium in electrical appliances?

   (a) Nitrogen (b) Carbon dioxide
   (c) Sulphur hexafluoride (d) Freon

6. Van de Graff generators are useful for

(a) Very high voltage and low current applications
(b) Very high voltage and high current applications
(c) Constant high voltage and current applications
(d) High voltage pulses only

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. Which theory explains the mechanism for breakdown under different conditions?

(a) Townsend theory (b) Streamer theory
(c) Clump theory (d) Only (a) and (b)

10. The maximum voltage gradient at the ground level due to a charged cloud before lightning strikes, can be as high as

(a) 1 V/cm (b) 30V/cm (c) 30V/cm (d) 300V/cm

PART - B (5 x 2 = 10 Marks)

11. Mention the different theories of charge formation.

12. State Paschen's law of breakdown

13. Define rise time.

14. List the factors that are influencing the peak voltage measurement using sphere gap?

15. Differentiate type test and routine test.

PART - C (5 x 16 = 80 Marks)

16. (a) Briefly explain about lightning phenomenon. (16)

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) State the criteria for sparking potential and hence obtain the relation between sparking potential and (pd) values (Paschen's law). Discuss on the nature of variations of sparking potential with (pd) values. (16)

18. (a) Explain any two methods to generate high direct current (DC) voltages. (16)

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) Describe the construction, principle of operation of a generating voltmeter and give its application. (16)

20. (a) Describe various tests carried out on the insulators. (16)

Or

(b) Discuss various tests carried out in a circuit breaker at the labs. (16)

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