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Question Paper Code: 41363

B.E. / B.Tech. DEGREE EXAMINATION, MAY 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)

- Which of the following is a polar dielectric?
(a) Teflon (b) Quartz (c) Nylon (d) Polyethylene
- 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
- The relationship between the breakdown voltage V and gap d is normally given as
(a) $d = kV^2$ (b) $d = kV^3$ (c) $V = kd$ (d) $v = kd^n$
- The electrical breakdown strength of insulating materials depends on
(a) nature of applied voltage
(b) imperfections in dielectric material
(c) pressure, temperature and humidity
(d) all of the above

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. Surge diverters are
- (a) non-linear resistors in series with spark gaps which act as fast switches
(b) arc quenching devices
(c) shunt reactors to limit the voltage rise due to Ferranti effect
(d) over-voltages of power frequency harmonics
8. Impulse testing of transformers is done to determine the ability of
- (a) bushings to withstand vibrations
(b) insulation to withstand transient voltages
(c) windings to withstand voltage fluctuations
(d) all of the above
9. The tests which is not performed under power frequency tests is
- (a) Partial discharge tests (b) Momentary withstand test
(c) Visible discharge tests (d) Full wave withstand tests
10. While performing temperature rise tests, at any part of the bushing the steady temperature rise above the ambient air temperature should not exceed?
- (a) 20 °C (b) 25 °C (c) 35 °C (d) 45 °C

PART - B (5 x 2 = 10 Marks)

11. Name the source of switching surges.
12. Define vacuum discharge.
13. Draw a simple Tesla coil equivalent circuit for generation of high frequency AC high voltage?
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) (i) Give the mathematical models for lightning discharges and explain them. (8)
(ii) Explain the different characteristics of lightning strokes. (8)

Or

- (b) Write short notes on: (i) Rod gaps used as protective devices (ii) Ground wires for protection of over head lines. (16)
17. (a) Explain various theories of breakdown mechanism of the commercial liquid dielectrics. (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) How impulse currents are generated? Explain with the neat diagram. (16)

Or

- (b) What are the components of multistage impulse generator? Explain. (16)
19. (a) How do you measure the HVDC using sphere gap? State the factors influencing the measurements. (16)

Or

- (b) Explain sphere gap for measurement of high voltage with diagrams. (16)
20. (a) Discuss the various test carried out in a circuit breaker and isolator switches at HV labs. (16)

Or

- (b) What is meant by insulation coordination? How are the protective devices chosen for optimal insulation level in a power system? (16)

