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**Question Paper Code: 59303**

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Sixth Semester

Electrical and Electronics Engineering

15UEE903 – HIGH VOLTAGE ENGINEERING

(Regulation 2015)

Duration: 1:15hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

**(Answer any six of the following questions)**

- Which of the following is a polar dielectric? CO1-U  
(a) Teflon            (b) Quartz            (c) Nylon            (d) Polyethylene
- The spark over voltage CO1-U  
(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 CO2-U  
given as  
(a)  $d = kV^2$             (b)  $d = kV^3$             (c)  $V = kd$             (d)  $v = kd^n$
- Breakdown is permanent in CO2-U  
(a) Gases            (b) Liquids            (c) Solids            (d) All the three
- A Van de Graaff generator has a belt speed of 2.5 m/s, charge density CO3-U  
of  $10 \mu\text{C}/\text{m}^2$  and a belt width of 2 m. The maximum charging current is  
(a)  $50 \mu\text{A}$             (b)  $5 \mu\text{A}$             (c)  $2 \mu\text{A}$             (d)  $12.5 \mu\text{A}$

6. According to the Paschen's Law, the breakdown voltage of a uniform field gap is CO3-U
- Directly proportional to the gas pressure and inversely proportional to the electrode gap
  - Inversely proportional to the gas pressure and directly proportional to the electrode gap
  - Directly proportional to the both electrode gap and gas pressure
  - Inversely proportional to the both electrode gap and gas pressure
7. Surge diverters are CO4-U
- non-linear resistors in series with spark gaps which act as fast switches
  - arc quenching devices
  - shunt reactors to limit the voltage rise due to Ferranti effect
  - over-voltages of power frequency harmonics
8. Impulse testing of transformers is done to determine the ability of CO4-U
- bushings to withstand vibrations
  - insulation to withstand transient voltages
  - windings to withstand voltage fluctuations
  - all of the above
9. In wet flashover tests, the conductivity of water used is CO5-U
- $10 \pm 1.5 \mu$  Siemens
  - $100 \pm 15 \mu$  Siemens at ambient temperature
  - $45 \pm 10 \mu$  Siemens at room temperature
  - $< 1.0 \mu$  Siemens at  $27^\circ$  C
10. In EHV and UHV system, ratio of BIL to SIL will be usually CO5-U
- Less than unity
  - More than 1.5
  - 1.5 to 2.0
  - 1.2 to 1.5

PART – B (3 x 8= 24 Marks)

**(Answer any three of the following questions)**

11. Give the mathematical models for lightning discharges and explain them. CO1- App (8)
12. Derive an expression for Townsend's criteria for breakdown of Gas medium CO2- App (8)

13. How impulse currents are generated? Explain with the neat diagram CO3- U (8)
14. How do you measure the HVDC using sphere gap? State the factors influencing the measurements. CO4- U (8)
15. Discuss the various test carried out in a circuit breaker and isolator switches at HV labs. CO5- U (8)