

Register Number .....

**B.E. DEGREE EXAMINATIONS: APRIL/MAY 2012**

Eighth Semester

**ELECTRICAL AND ELECTRONICS ENGINEERING**

U07EE802: High Voltage Engineering

**Time: Three Hours**

**Maximum Marks: 100**

**Answer All Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. The peak value of current from the ground by the main return stroke of lightning is around.  
a) 250 A                      b) 2500 A                      c) 25000A                      d) 250000A
2. The protection angle of transmission line against lightning over voltages using shielded wire is around  
a)  $300^{\circ}$                       b)  $30^{\circ}$                       c)  $270^{\circ}$                       d)  $90^{\circ}$
3. The Paschen's law for breakdown in gases is given by  
a)  $f\left(\frac{v}{pd}\right) = 1$                       b)  $f\left(\frac{v}{pd}\right) = -1$                       c)  $v = f(pd)$                       d)  $v = -f(pd)$
4. An example for simple pure liquid is  
a) n-hexane                      b) silicone oil                      c) petroleum                      d) vegetable oil
5. Which type of circuit is used to generate high dc voltage?  
a) full wave rectifier                      b) half wave rectifier  
c) cascaded rectifier doubler circuit                      d) tesla coil.
6. If  $V_2$  is the secondary voltage of 1<sup>st</sup> stage of cascaded transformer connection, then the output voltage of n stage transformer is  
a)  $n^2 V_2$                       b)  $n V_2$                       c)  $V_2$                       d)  $\frac{V_2}{n}$
7. Magneto optical method is not used for measurement of  
a) High impulse current                      b) High dc current  
c) High ac voltage                      d) High ac current
8. The main advantage of connecting coaxial squirrel cage shunt is  
a) Reduction in heat dissipation                      b) easy installation  
c) No source loading by the meter.                      d) Scale is linear

9. The distance between two metal fittings on the insulator is known as  
 a) Loss tangent      b) protect gap      c) sphere gap      d) creepage distance
10. The relation between the maximum electrical stress  $E_m$  and the life of cable insulation in hours  $t$  is given by  
 a)  $E_m = K t^{-n}$       b)  $t = KE_m^{-n}$       c)  $E_m = Kt^{-(1/n)}$       d)  $t = KE_m^{(-1/n)}$

**PART B (10x2=20 Marks)**

11. Distinguish between direct strokes and induced strokes groups of lightning on transmission lines.
12. What are the causes of power frequency over voltages in power system?
13. List the preferred properties of a gaseous dielectric used for high voltage applications.
14. What is meant by intrinsic electric strength in solid dielectrics?
15. Write the significance of capacitor in rectifier circuit for generation of high dc voltages.
16. What are the essential parts of an impulse current generator?
17. Enumerate the techniques available for measurement of high dc voltages.
18. Write the principle of Hall Effect which is used for high dc current measurement.
19. Bring out the importance of partial discharge test on transformer.
20. What is meant by insulation coordination in power system?

**PART C (5x14=70 Marks)**

21. a) (i) Draw the cloud model according to Simpson's theory in formation of charge. (6)  
 (ii) Discuss the different situations of generation of switching over voltages in EHV systems. (8)
- (OR)**
- b) (i) Describe the various methods to control the over voltages due to switching and power frequency (7)  
 (ii) Explain the protective devices used for transmission line against over voltage.
22. a) Write the principle of vacuum breakdown and explain the various mechanisms by which breakdown occurs in vacuum.

**(OR)**

b) Explain the various theories that explain breakdown in commercial liquid dielectrics.

23. a) (i) Draw the Cockcroft – Walton voltage multiplier circuit and explain how high dc voltage generated from this circuit. (7)

(ii) Describe the principle and working of high impulse generator with relevant diagram. (7)

**(OR)**

b) Why is controlled tripping necessary? Explain the operation of tripping of an impulse generator with a three electrode gap and tripping circuit using a trigatron

24. a) Explain the principle and construction of an electrostatic voltmeter for very high voltages. What are its merits and demerits for high voltage AC measurements?

**(OR)**

b) Explain the method for measurement of high power frequency alternating current and measurement of high impulse current using Rogowski Coil.

25. a) (i) Explain the features of various impulse tests conducted on insulators. (7)

(ii) Draw the schematic diagram of synthetic testing of circuit breakers and explain with current and recovery voltage waveform across the test circuit circuit breakers. (7)

**(OR)**

b) Write the significance of impulse test on transformers. Describe the Procedure of impulse test and methods to detect and locate the faults during Impulse testing.

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