CBCS SCHEME

Seventh Semester B.E. Degree Examination, June/July 2023
High Voltage Engineering

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a.   Explain the process of ionization by collision and hence derive the Townsend's current growth equation $I = I_0 e^{\alpha d}$. **(10 Marks)**

   b.   What is time lag of break down? Explain the two time – lags
   i)   Formative time – lag
   ii)   Statistical time – lag
   With step functions voltage pulse. **(10 Marks)**

OR

2   a.   State and explain Paschen's law. **(06 Marks)**

   b.   Explain the following breakdown mechanism in solids :
   i)   Intrinsic breakdown
   ii)   Electro mechanical breakdown **(14 Marks)**

Module-2

3   a.   Explain Cockcroft Walton voltage multiplier circuit to generate high ac voltages. **(08 Marks)**

   b.   Explain a 3-stage cascade transformers circuit for generation of very high ac voltages. **(06 Marks)**

   c.   Explain the use of Tesla coil for generation of high frequency damped oscillations. **(06 Marks)**

OR

4   a.   Define and explain impulse voltage waveform. **(06 Marks)**

   b.   With the help of a neat sketch, explain how impulse voltage can be developed in the laboratory using Marx circuit. **(08 Marks)**

   c.   A 12-stage impulse generator has 0.126µF capacitors. The wave front and the wave tail resistance are 800Ω and 5000Ω respectively. If the load capacitor is 1000pF, find the wave front and wave tail times of the impulse wave produced. **(06 Marks)**

Module-3

5   a.   With the schematic diagram, explain the working principle of operation of a generating voltmeter. Write advantages and disadvantages. **(10 Marks)**

   b.   Explain the principle of operation of an electrostatic voltmeter for measurement of very high dc and ac voltages. **(10 Marks)**

<center>OR</center>

6 a. Explain series capacitor peak voltmeter [Chubb – Fortescue Circuit] for measuring the peak value of ac voltages **(08 Marks)**

   b. Draw the vertical and horizontal arrangement of sphere gap for measurement of high voltages. **(06 Marks)**

   c. Write the diagram of Rogowski coil for high impulse current measurement and explain. **(06 Marks)**

<center>**Module-4**</center>

7 a. Explain Simpson's theory of charge formation in the clouds with a neat diagram. **(10 Marks)**

   b. Explain with suitable figures the working of i) expulsion gaps ii) protector tubes. **(10 Marks)**

<center>OR</center>

8 a. Explain the working of a surge arrester as a shunt protective device with a neat sketch. **(10 Marks)**

   b. Write note on :
      i) Ground wires for overhead line protection
      ii) Rod gaps, used as protective devices **(10 Marks)**

<center>**Module-5**</center>

9 a. Explain with a neat diagram the Schering bridge for measuring capacitance and dielectric loss. **(10 Marks)**

   b. Explain the impulse testing of power transformer with a neat diagram **(10 Marks)**

<center>OR</center>

10 a. What is partial discharge? Explain how it is measured using balanced detecting method. **(10 Marks)**

   b. Write short notes on :
      i) Testing of cables   ii) Testing of insulators. **(10 Marks)**

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