

CBCS SCHEME

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15EE73

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019 High Voltage Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Explain the current growth in the presence of secondary processes. (08 Marks)
b. Classify the breakdown mechanism in liquids and explain any one mechanism. (08 Marks)

OR

- 2 a. Classify the breakdown mechanism in solids and explain any one mechanism. (10 Marks)
b. In an experiment in a certain gas it was found that the steady state current is 5.5×10^{-8} A at a distance of 0.4cm between the plane electrodes. Keeping the field constant and reducing the distance to 0.1cm result in a current of 5.5×10^{-9} A. Calculate Townsend's primary ionization coefficient α . (06 Marks)

Module-2

- 3 a. What are the different forms of high voltage and mention their applications. (06 Marks)
b. Explain with schematic diagram the Marx circuit of multistage impulse generator incorporating the series and wave tail resistances within the generator. (10 Marks)

OR

- 4 a. With a neat sketch, explain Cockcroft Walton voltage multiplier circuit and also draw the voltage waveforms across the first and last capacitors of the cascaded voltage multiplier circuit. (10 Marks)
b. How a full impulse wave is characterized? Explain. (06 Marks)

Module-3

- 5 a. What are the factors influencing the spark over voltage of spheregaps? Explain any two factors. (08 Marks)
b. Determine the breakdown voltage for air gaps 2mm and 15mm lengths under uniform field and standard atmospheric conditions. Also determine the voltage is the atmospheric pressure is 750mm Hg and temperature 35°C (08 Marks)

OR

- 6 a. Draw Chubb – Fortescue circuit for measurement of peak value of a.c voltages. Discuss its advantages over other methods. (08 Marks)
b. What is Rogowski coil? Explain with a neat diagram its principle of operation for measurement of high impulse currents. (08 Marks)

Module-4

- 7 a. Explain the different theories of charge formation in the clouds. (08 Marks)
b. What are the different methods employed for lighting protection of over head lines? Explain them. (08 Marks)

OR

- 8 a. A 3-phase single circuit transmission line is 400km long. If the line is rated for 220kV and has parameters, $R = 0.1\Omega/\text{km}$, $L = 1.26\text{mH}/\text{km}$, $C = 0.009, \mu\text{F}/\text{km}$ and $G = 0$. Find (i) The surge impedance and (ii) The velocity of propagation neglecting the resistance of the line if a surge of 150kV and infinitely long tail strikes at one end of the line, what is the time taken for the surge to travel to the other end of the line? (08 Marks)
- b. Write a note on surge diverters. (08 Marks)

Module-5

- 9 a. With a neat circuit diagram, explain the balanced detection method using Schering bridge. (08 Marks)
- b. Explain the operation of Schering bridge for three terminal measurements with Wagner's earthing device. (08 Marks)

OR

- 10 a. A 33 kV, 50Hz, high voltage Schering bridge is used to test a sample of insulation. The various arms have the following parameters on balance. The standard capacitance 500pF, the resistive branch 500 ohms and branch with parallel combination R and C, has 180Ω and $0.15\mu\text{F}$. Determine the value of capacitance of this sample, its parallel equivalent loss resistance, The pF and power loss under these conditions. (08 Marks)
- b. Explain the methods to determine the large capacitance using shunt arrangement. (08 Marks)
