CBCS SCHEME

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15EE73

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
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. Define Townsend's first and second ionization coefficient. Derive an expression for current growth in gas discharge considering secondary emission. **(08 Marks)**

b. Explain Paschen's law with breakdown voltage Pd curve. **(04 Marks)**

c. In an experiment in a certain gas as it was found that the steady state current is 5.5×10^{-8}A at 8KV at a distance of 0.4cm between the plane electrode. 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. **(04 Marks)**

OR

2 a. What is meant by corona discharge? Explain the break down in electronegative gases. **(04 Marks)**

b. Explain any two theories that explain breakdown mechanism in commercial liquid. **(08 Marks)**

c. Write the breakdown mechanism in solid dielectric by electromechanical breakdown concept. **(04 Marks)**

Module-2

3 a. Explain with neat figure how cascade transformer generate high AC voltage. **(06 Marks)**

b. Explain the principle of operation of a resonant transformer. **(06 Marks)**

c. A Cockcroft Walton-type voltage multiplies has 8 stage with capacitance all equal to 0.05μF the supply transformer secondary voltage is 125KV at a frequency of 150Hz. If the load current to be supplied is 5mA find : i) the parentage ripple ii) regulation iii) optimum number of stages for minimum regulation. **(04 Marks)**

OR

4 a. Explain the Marx circuit arraignment for multistage impulse generator. **(10 Marks)**

b. An impulse generator has 8 stage with each condenser rated for 0.16 pf and 125KV. The load capacitor available is 1000pf. Find the series resistance and damping resistance needed to produce 1.2/50μsec impulse wave what is maximum output voltage of generator if the charging voltage is 120KV. **(06 Marks)**

Module-3

5 a. Explain with neat diagram how high voltage can be measured using electrostatic voltmeter. **(06 Marks)**

b. Describe in detail how peak AC voltage is measured using Chubb and Fortescue circuit. **(05 Marks)**

c. Explain the factors that influence the measurement using sphere gap. **(05 Marks)**

OR

6 a. Explain the method of high voltage DC measurement by using high ohmic series resistance with microammeter. **(05 Marks)**

b. With neat diagram, explain principle of generating voltmeter. **(06 Marks)**

c. Write short note on mixed RC potential divider. **(05 Marks)**

Module-4

7 a. What is meant by insulation coordination? How are the protective device chosen for optimal insulation level in power system? **(08 Marks)**

b. Explain the following :
i) Surge arrestors
ii) Characteristics of switching surges. **(08 Marks)**

OR

8 a. What are the natural causes for overvoltage lightening phenomenon. **(08 Marks)**

b. Explain power frequency overvoltage in power system. **(08 Marks)**

Module-5

9 a. Describe the method of measuring capacitance and tan δ using HV Schering bridge. **(08 Marks)**

b. Explain the method of balanced detection for locating partial discharge in electrical equipment. **(08 Marks)**

OR

10 a. Explain in detail the testing of circuit breaker and insulators. **(08 Marks)**

b. What are the test on transform and explain in detail impulse test of transformer. **(08 Marks)**

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