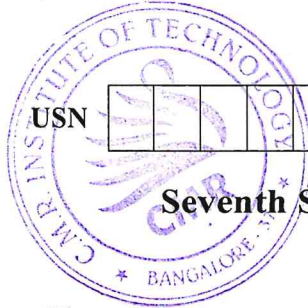


# CBCS SCHEME



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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  $5.5 \times 10^{-8}$  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  $5.5 \times 10^{-9}$  A calculate Townsend's primary ionization coefficient  $\alpha$ . (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  $0.05 \mu\text{F}$  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 1.2/50 $\mu\text{sec}$  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 : (08 Marks)
- i) Surge arrestors
- ii) Characteristics of switching surges.

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OR

- 8 a. What are the natural causes for overvoltage lightning phenomenon. (08 Marks)
- b. Explain power frequency overvoltage in power system. (08 Marks)

**Module-5**

- 9 a. Describe the method of measuring capacitance and  $\tan \delta$  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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