

Exam. Code: 0937

Sub. Code: 6992

1078

B. Engg. (Electrical and Electronics Engineering)-7th Semester
EE-711: Electrical Insulation in Power Apparatus and Systems

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Q. No. 1 (Unit-I) which is **compulsory and selecting two questions each from Unit II-III.**

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- I. (a) What are insulation tests basics?
 (b) What is loss factor of an insulation?
 (c) What is Rogowski coil in HV system?
 (d) Define impulse puncture voltage.
 (e) Write various mechanisms of breakdown in solids. (5×2)

UNIT-I

- II. (a) Define Townsend first & second ionization coefficient. Derive an expression for the current growth in gas discharge considering secondary emission.
 (b) In an experiment in a certain gas it was found that steady state current 5.5×10^8 A at $8 \mu v$ at a distance of 0.4cm between electrodes. Keeping the field constant and reducing the distance to 0.1cm results in a current of 5.5×10^9 A. Calculate the Townsend's primary ionization coefficient ' α '. Neglect secondary ionization effects. (5+5)
- III. (a) Explain in detail electro connection breakdown in a transformer.
 (b) Explain streamer theory of breakdown in gases. (5+5)
- IV. (a) A ten stage Cockraft-Walton circuit has all capacitors of $0.06 \mu F$. If the secondary voltage of supply transformer is 100kv at a frequency of 150Hz. If the load current is 1MA. Determine voltage regulation, ripple, the optimum no. of stages for maximum output and maximum O/P voltage.
 (b) What is thermal breakdown in solid dielectrics and how is it practically more significant than other mechanism? (5+5)

UNIT-II

- V. (a) Explain the construction & working of electrostatic voltmeter.

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- (b) Calculate the front and tail resistance for 5 stage, 1000kv with the capacitance of each stage is $5\mu F$ and load capacitance of $10,000\mu F$ for $1\mu\text{sec}$ front and $50\mu\text{sec}$ tail. (5+5)
- VI. (a) Explain in detail the testing of circuit breaker and insulation.
 (b) Explain the Marx circuit arrangement for multistage impulse generation. (5+5)
- VII. (a) A generating voltmeter is required to measure voltage between 15kv to 250 kv. If the indicating meter reads a minimum current of $2\mu A$ and maximum of $35\mu A$, determine the capacitance of generating voltmeter. Assume that the speed of driving synchronous meter is 1500rpm.
 (b) Explain with a neat diagram, the procedure for impulse testing of power transformer. (5+5)

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