

Code No: C5602

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**M.Tech I - Semester Examinations, April/May-2012****DIELECTRIC AND INSULATION ENGINEERING****(POWER SYSTEMS (HIGH VOLTAGE))****Time: 3hours****Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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- 1.a) Obtain the expression for Lorentz field.
b) Derive the Clausius - Mosotti equation.
- 2.a) Give the temperature classification for solid insulating materials.
b) What are insulation requirements for HV Air or SF_6 circuit Breakers?
- 3.a) Define Townsend's first and second ionization coefficients. How is the condition for breakdown obtained in Townsend mechanism?
b) What will be the breakdown voltage of a spark gap in a gas at Pressure = 760 ton at $25^\circ C$ if $A = 15/cm$, $B = 360/cm$, $d = 1mm$ and $\gamma = 1.5 \times 10^{-4}$.
- 4.a) What is Pascheu's law? How do you account for the minimum voltage for breakdown under a given 'P x d' condition?
b) Describe the various factors that influence breakdown in a gas.
5. Discuss the solid insulation applications in
 - a) Power cables
 - b) HV Bushings
 - c) Small - size rotating machines.
6. Explain the various theories that explain breakdown in commercial liquids.
- 7.a) What is a composite dielectric? Describe the mechanism of short-term breakdown of composite insulation.
b) A solid specimen of dielectric has dielectric constant of 4.2 and $\tan \delta = 0.001$ at a frequency of 50 HZ. If it is subjected to an alternating field of 50 kv/cm, Calculate the heat generated in the specimen due to the dielectric loss.
8. Write notes on any TWO of the following
 - a) Properties of insulating oils and their applications
 - b) Ionization Processes
 - c) Treeing and tracking phenomenon and its prevention.

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