Part I

Attempt All Questions

Question One (20 mark)

A) The weak link in the chain of reliability of equipment is still the insulation, and the science of materials has contributed greatly to the development of improved insulation systems for high voltage apparatus.   **(10 Mark)**
 i.   Explain the above statements.
 ii. Mention the different types for insultion which are used in the high voltage apparatus. Then explain the different applications which used each of them.
B) Explain with drawing the particle exchange mechanism for studying the vacuum breakdown.
C) If an electron starts at a distance of 0.001m from a cathode in a field where
$\alpha (X) = A - BX$ m^{-1} , Find the distance it must travel to produce an avalanche of 10^9 electrons. Where A = $4*10^4$ m^{-1} kPa^{-1} and B = $15*10^5$ V/m.kPa.

Questions Two (15 mark)
A) Explain with drawing the suspended particle mechanism to study breakdown in commercial insulating liquids..
B) Mention the electrical properties that are essential in determining the dielectric performance of a liquid dielectric. Then state about each of them.

Questions Three (15 mark)

A) Explain with drawing breakdown due to treeing and tracking for solid insulators.
B) A solid dielectric specimen of dielectric constant of 4.0 has an internal void of thickness 1mm. The specimen is 10mm thick and is subjected to a voltage of 80kV (r.m.s). If the void is filled with air and if the breakdown strength of air can be taken as 30kV (peak)/cm, find the voltage at which an internal discharge can occur.
C) State about the difference between the Townsend's criterion for breakdown in uniform and non-uniform field. Mention this criterion for electronegative gases.

Good Luck,,,,,,,,,,,,,
Prof. Dr. Sayed A. Ward