

Exam.Code:0937

Sub. Code: 6992

1129

B.E. (Electrical and Electronics Engineering)

Seventh Semester

EE-711: Electrical Insulation in Power Apparition and Systems

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- a) Explain the term 'electron attachment'. Why are electron attaching gases preferred for practical use as insulations when compared to non-attaching gases?
- b) What is Páschen's law? How do you account for the minimum voltage for breakdown under a given 'p x d' condition?
- c) What are the special features of high voltages rectifier valves?
- d) Compare the relative advantages and disadvantages of using a series resistance micro ammeter and a potential divider with an electrostatic voltmeter for measuring high d.c. voltages?
- e) Why is grounding very important in a H.V. laboratory? Explain. (5x2)

UNIT – I

- II. a) What do you understand by "intrinsic strength"* of a solid dielectric? How does breakdown occur due to electrons in a solid dielectric?
(b) What are the properties that make plastics more suitable as insulating materials? What are the special features of epoxy resin insulation? (2x5)
- III. What are commercial liquid dielectrics, and how are they different from pure liquid dielectrics? Explain the various theories that explain breakdown in commercial liquid dielectrics. (10)
- IV. a) A solid specimen of dielectric has a dielectric constant of 4.2, and $\tan\delta$ as 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.
b) What will the breakdown strength of air be for small gaps (1 mm) and large gaps (20 cm) under uniform field conditions and standard atmospheric conditions? (2x5)

P.T.O.

(2)

UNIT - II

- V. A dielectric specimen 5cm thick having dielectric constant of 5.0 has an internal cavity of thickness 1.5 mm. The specimen is subjected to a voltage of 80 kV RMS. If the void is filled with air and if the breakdown strength of air can be taken as 30 KV (peak)/cm, find the voltage at which an internal discharge can occur. (10)
- VI. a) Describe, with a neat sketch, the working of a Van de Graff generator. What are the factors that limit the maximum voltage obtained?
- b) Explain the different schemes for cascade connection of transformers for producing very high a.c. voltages (2x5)
- VII. Write note on following:-
- a) Capacitance voltage transformer
- b) Partial discharges in an insulation system (2x5)

x-x-x

UNIT - I

- II. (a) What do you understand by "intrinsic strength" of a solid dielectric? How does breakdown occur due to electrons in a solid dielectric?
- (b) What are the properties that make plastics more suitable as insulating materials? What are the special features of epoxy resin insulation? (2x5)
- III. What are commercial liquid dielectrics, and how are they different from pure liquid dielectrics? Explain the various theories that explain breakdown in commercial liquid dielectrics. (10)
- IV. (a) A solid specimen of dielectric has a dielectric constant of 4.2, and has an 0.001 m frequency of 50 Hz. It is subjected to an alternating field of 30 kV/cm. Calculate the heat generated in the specimen due to the dielectric loss.
- (b) What will the breakdown strength of air be for small gaps (1 mm) and large gaps (20 cm) under uniform field conditions and standard atmospheric conditions? (2x5)