R15

Code No: 127DQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, May/June - 2019
HIGH VOLTAGE ENGINEERING
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) What are the physical conditions governing ionization mechanism in gases dielectrics [2]
b) What are field intensity co-efficient when referred to charge simulation method [3]
c) What is 'TRACKING' and 'TREEING' is solid dielectric Break down. [2]
d) Distinguish between Break down in uniform field and Break down in Non uniform field. [3]
e) What is the necessity for generating high voltages [2]
f) How Impulse voltages are produced in the laboratory for testing the Specimens? [3]
g) Compare H.V. and E.H.V power systems. [2]
h) What are self restoring and Non self restoring insulation? [3]
i) What are partial discharges? [2]
j) What are the electrical tests to be conducted on H.V Isolators? [3]

PART-B

(50 Marks)

2.a) Explain how the electric stress can be estimated and controlled.
b) Explain the finite element method for the determination of the potential distribution.[5+5]

OR

3.a) Explain the importance of air as an insulating material with necessary properties.
b) What are the various insulating medium used in bushings and cables? [5+5]

4.a) What are different ionization mechanisms occur in gaseous dielectrics?
b) Explain how breakdown occurs in solid dielectric due to over voltage phenomenon.[5+5]

OR

5.a) Explain Town-sends secondary ionization co-efficient, and give the conditions for Breakdown.
b) A specimen of solid dielectric has a dielectric constant of 4.8, and tan δ = 0.022 at a frequency of 50 Hz. If it is subjected to an alternating field of 65 KV/cm, calculate the heat generated in the specimen due to the dielectric loss. [5+5]

6. Draw the Marx circuit arrangement for multistage impulse generators. How is the basic arrangement modified to accommodate the wave time control resistances? [10]

OR

7.a) Explain with neat diagram the principle of operation, application and limitations of Van de Graff generator

b) Explain with neat diagram how rod gaps can be used for measurement of high voltages. Compare its performance with a sphere gap. [5+5]

8.a) What are the mechanisms by which lightning strokes develop and induce over voltages on overhead power lines ?

b) What is meant by insulation co-ordination? How are the protective devices chosen for optimal insulation level in a power system? [5+5]

OR

9.a) What are the causes for switching and power frequency over voltages ? How are they controlled in power systems?

b) What are the different methods employed for lightning protection of overhead lines? [5+5]

10.a) What is non-destructive testing of insulating materials? Explain briefly the characteristics of these methods.

b) Explain the importance of Radio interference voltage measurements for EHV power apparatus. [5+5]

OR

11.a) Explain the phenomena of partial discharge tests on high voltage cables.

b) A 30 kV, 50 Hz Schering bridge has a standard capacitance of 96 μF. In a test on Bakelite sheet balance was obtained with a capacitance of 0.44 μF in parallel with a non-inductive resistance of 398 ohms, the non-inductive resistance in the remaining arm of the bridge being 150 ohms. Determine the equivalent series resistance and capacitance and the power factor of the specimen. [5+5]

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