



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech (EE-NEW)/SEM-7/EE-704A/2010-11

2010-11

HIGH VOLTAGE ENGINEERING

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

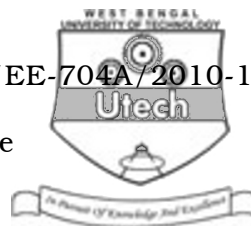
1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) Corona is
 - a) dark discharge
 - b) partial discharge
 - c) disruptive discharge
 - d) none of these.
- ii) Sphere gap is used for the measurement of
 - a) r.m.s. value of *ac* voltage
 - b) peak value of *ac* voltage
 - c) average value of *ac* voltage
 - d) none of these.
- iii) A high tower footing resistance will result
 - a) back flashover
 - b) reduction of number of lightning surges
 - c) no switching surge
 - d) none of these.



- iv) A Generating Voltmeter has
- a) linear scale
 - b) non-linear scale
 - c) none of these
 - d) all of these.
- v) A 132 kV transmission line is designed based on
- a) switching surge
 - b) lightning impulse
 - c) corona
 - d) radio interference.
- vi) The mechanism responsible for dielectric loss in a dielectric material is due to
- a) conduction current
 - b) absorption current
 - c) displacement current
 - d) none of these.
- vii) The surge impedance of a overhead transmission line is
- a) 50Ω
 - b) 400Ω
 - c) 4000Ω
 - d) none of these.
- viii) A standard lightning impulse wave should be
- a) $1.2/50 \mu s$
 - b) $1/50 \mu s$
 - c) $1.2/500 \mu s$
 - d) $8/20 \mu s$.
- ix) In a single stage impulse generator, to produce standard impulse wave
- a) Wavefront resistance is equal to wave tail resistance
 - b) Wavefront resistance is greater than wave tail resistance
 - c) Wave tail resistance is greater than wavefront resistance
 - d) None of these.



- x) An electrostatic voltmeter can measure
- impulse voltage
 - peak value of *ac* voltage
 - dc* voltage
 - none of these.
- xi) The material used in gapless arrester in EHV power system is
- Iron oxide
 - Aluminium oxide
 - Zinc oxide
 - None of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

- The disruptive discharge voltage for rod-rod gap assembly for a given gap distance is lesser for positive polarity than that for negative polarity voltage application. Justify the statement.
- How would you determine the wavefront and wave tail time of a lightning impulse voltage as per Indian Standard specifications ?
- Explain the separate source withstand test of a distribution transformer.
- Explain the mechanisms involved in the production of charged particles in a gaseous medium.
- Explain the electrification of cloud and hence explain direct stroke and indirect stroke.



GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) What are the advantages of a Series Resonant circuit over a cascaded testing transformer for testing a length of a cable ?
- b) Explain the operation of a two-stage series resonant circuit.
- c) A series resonant circuit is used to test a cable of length 10 m of capacitance $0.01 \mu\text{F}/\text{metre}$ at 100 kV. The unit has a resistance of 100Ω . Find the equivalent inductive reactance needed in the circuit and the input voltage if the feed transformer is 250 V/2500 volts. $5 + 5 + 5$
8. a) State and prove Pashen's law.
- b) Explain how does it help in the design of electrical apparatus.
- c) Determine the Paschen's minimum voltage. $5 + 2 + 8$
9. a) What conditions are to be satisfied for the measurement of voltage by sphere gaps ? Explain.
- b) Explain generating voltmeter for the measurement of dc high voltage. $8 + 7$
10. a) Explain the mechanism of breakdown of a gaseous medium according to Townsend.
- b) Explain the physical significance of the condition of breakdown according to Townsend.
- c) What are the limitations of the Townsend theory ? $8 + 3 + 4$
11. a) Explain the operation of a Cockroft Watton voltage doubler circuit.
- b) Drive an expression of its output under loaded condition. $7 + 8$