Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE/Electrical & Electronics) (2011 Onwards) (Sem.–7,8)
HIGH VOLTAGE ENGINEERING
Subject Code : BTEE-802
Paper ID : [A3033]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Q1. Write briefly:

a. What is vacuum?

b. Why bundled conductors are used in HVAC transmission lines?

c. Write the difference between photo-ionization and photo-electric emission.

d. What are electronegative gases?

e. What are commercial and liquid dielectrics?

f. What is *"stressed oil volume theory"*?

g. What are the common liquid insulants used in electrical apparatus?

h. Define intrinsic strength in solid dielectrics.

i. What is thermal breakdown in solid dielectrics?

j. What is a composite dielectric?

SECTION-B

Q2. Explain the difference between photo-ionization and photo-electric emission.

Q3. Write the temperature classification for solid insulating materials.

Q4. How is transformer insulation divided? Briefly describe the insulation arrangement indicating the insulating materials chosen.

Q5. Write the expression for ripple and regulation in voltage multiplier circuit.

Q6. Why are capacitance voltage dividers preferred for high ac voltage measurement?

SECTION-C

Q7. a. Explain the ionization processes responsible for the electrical breakdown of gaseous medium. (4)

b. Define Townsend's first ionization coefficient. Derive the Townsend's equation of average current growth in the presence of secondary process of ionization of gaseous medium. Hence derive the Townsend's criterion for breakdown of gaseous medium. (6)

Q8. a. State and explain Paschen's law. How do you account for the minimum voltage for breakdown under a given pd condition. (5)

b. A steady current of 600 micro-ampere flows through the plain electrodes separated by a distance of 0.5 cm when a voltage of 10 kV is applied. Determine the Townsend's first ionization coefficient if a current of 30 micro-ampere flows when the distance of separation is reduced to 0.1 cm and the field is kept constant at the previous value. (5)

Q9. a. Explain the following breakdown mechanisms in solid dielectrics:

i) Electromechanical breakdown,

ii) Breakdown due to Treeing and Tracking. (4)

b. A 200 kVA, 400V/ 250 kV testing transformer has 8% leakage reactance and 2% resistance. A cable has to be tested at 500 kV using the above transformer as a resonant transformer at 50 Hz. If the charging current of the cable at 500 kV is 0.4 A, find the series inductance required, assuming 3% resistance of the inductor to be used and the connecting leads. Neglect dielectric loss of the cable. Calculate the input voltage to the transformer. (6)