



- Notes :
1. All questions carry equal marks.
 2. Answer **all** questions as per given internal choice.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.
 5. Use of non programmable calculators, Drawing instruments is permitted.

1. a) Explain the Townsends criterion for breakdown. Enumerate the limitations of Townsends criterion. Write down the significance of α & γ . **10**
- b) What will breakdown strength of air be for small gaps (1 mm) & large gaps (20 cm) under uniform field conditions & standard atmospheric conditions? **6**

OR

2. a) Write a short note on streamer theory for breakdown in gases. **5**
- b) What is time lag? Discuss it's components & the factors which affect these components. **5**
- c) What are the common liquid insulations (insulating oil) used in an electrical device? Briefly give their properties of oil as an insulating medium. **6**
3. a) Explain different mechanism by which breakdown occurs in solid dielectrics. **8**
- b) Write a short note on : **8**
- 1) Tower footing resistance
 - 2) Shielding angle

OR

4. a) Explain the lightning phenomenon with the help of neat sketches. **8**
- b) Write a short note on surge absorber. **5**
- c) What is the best location of lightning arrester & why? **3**
5. a) Explain how high DC voltages are generated by voltage multiplier circuit. **8**
- b) A 100 KVA, 400V/250KV testing X'mer has 8% leakage reactance & 2% resistance on 100 KVA base. A cable has to be tested at 500 KV using this X'mer as a resonance X'mer at 50 Hz. If the charging current of cable at 500 KV is 0.4 Amp. Find a series inductance required. Assume 2% resistance for the inductor to be used & connecting leads. Also calculate the i/p voltage of the X'mer. **8**

OR

6. a) A 12 stage impulse generator has capacitors each related at $0.3\mu\text{f}$, 150 KV. The capacitance of the test specimen is 400 PF. Determine the wave front & wave tail resistances to produce a $1.2/50\mu\text{sec}$ impulse wave. Also determine the maximum output voltage if the charging voltage is 125 KV. **9**
- b) Write a short note on multistage Impulse generators. **7**
7. a) Explain measurement of high voltage by capacitance voltage transformer with the help of neat sketches. **9**
- b) An electrostatic voltmeter has two parallel plates. The movable plate is 10 cm in diameter with 10 KV between the plates the pull is $5 \times 10^{-3} \text{ N}$. Determine the change in capacitance for a movement of 1mm of movable parts. **7**

OR

8. a) Write a short note on peak reading voltmeter by Chubb – Fortescue method. **10**
- b) A generating voltmeter is required to measure voltage between 15 KV to 250 KV. If the indicating meter reads a minimum current of $2\mu\text{A}$ & max^{m} of $35\mu\text{A}$ determine the capacitance of the generating voltmeter. Assume that the speed of driving synchronous motor is 1500 rpm. **6**
9. a) Draw a neat diagram of high voltage Schering bridge & analyse it for balanced condition. Draw its phasor diagram. **8**
- b) Explain measurement of dielectric constant & loss factor by low frequency method. **8**

OR

10. a) What are partial discharges? Differentiate between internal & external discharges. **8**
- b) Write a short note on testing of surge diverters & circuit breakers. **8**
