**Q 1 / [20 Marks] Fill in the Blanks with suitable answer.**

1. **Ionization by electron impact is probably the most important process in the …………………**
2. **The effectiveness of the electron impact ionization depends upon the ………………**
3. **Electrons moving very ……………… will not produce ionization.**
4. **If the field strength is sufficiently high, then it is likely to ionize a gas molecule by simple collision resulting in 2 free electrons and a …………………**
5. **Townsend found that the current at first increased proportionally as the voltage is increased and then remains constant, at I0 which corresponds to the…………………**

**Q2 / [20 Marks] Briefly define the following:**

1. **Townsend’s first ionization coefficient.**
2. **Electron Avalanche.**
3. **Townsend’s second ionization coefficient.**
4. **Photoionization.**
5. **Thermal ionization.**

**Q3/ [20 Marks] Draw the followings:**

1. **Draw the mechanism of lightening and the propagation of lightening channel.**
2. **Draw the clouds and show the types of lightening in your drawing.**
3. **Draw transformers in cascading arrangement to produce 300 Kv.**
4. **Draw Voltage Doubler Circuit.**
5. **Draw Cockroft-Walton Circuit.**

**Q4 /** **[20 Marks] Give the mathematical Model for lightning, then if a lightning stroke 10KA strikes a line of 400 ohms surge Impedance. (a) What is the over Voltage caused? (b) If a direct stroke occurs over the top of the unshielded Transmission line what is the over voltage?**

**Q5/** **[20 Marks] What is the Resonant Transformer? Derive the mathematical equations and draw the circuit diagram of Resonant Transformer? What are the applications of Resonant Transformers?**