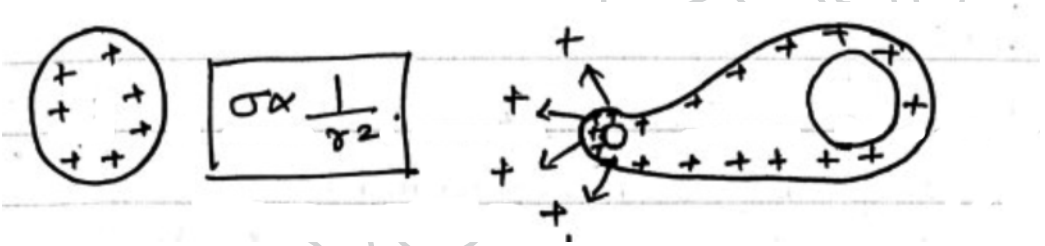
10 TNPSC GROUP II / IIA MAINS SCERT - SCIENCE & TECHNOLOGY QUESTION WITH ANSWER

10. Explain :
a) Lightning arrester or lightning conductor.
b) Yan de Graaff Generator

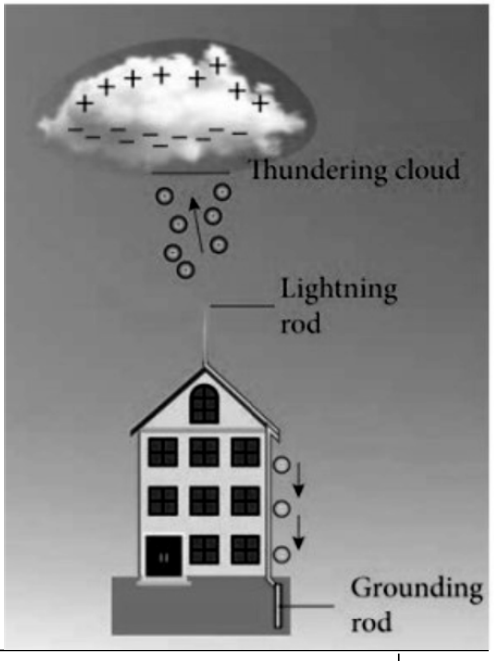
a) Lightning arrester or lightning conductor.

- Device used to protect tall buildings from lightning strikes
- Works on principle of Action at points / corona discharge



Principle :

- Irregular shaped charged conductor
- End of the conductor - smaller radius - larger charge accumulation.
- The electric field near this edge - very high & it ionizes the surrounding air
- Positive ions are repelled at the sharp edge.



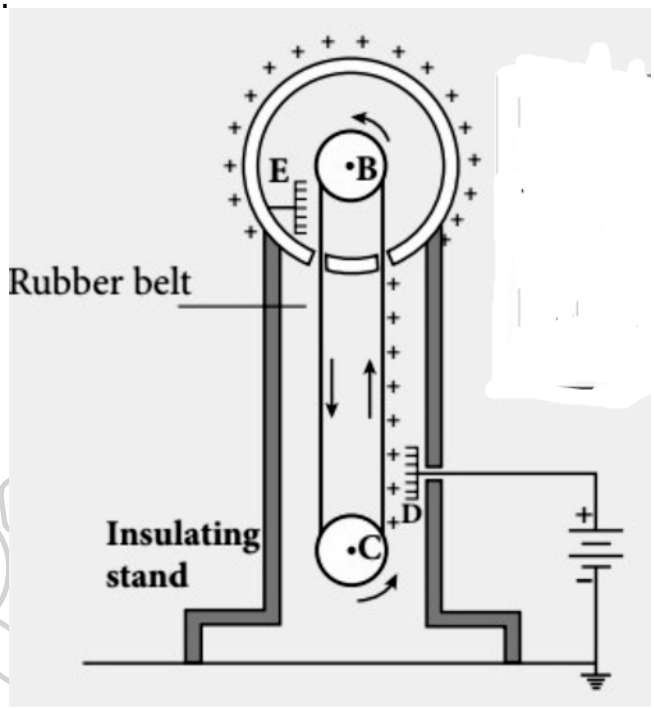
Lightning arrester

Mechanism

- Long thick copper rod passing from top of the building to the ground.
- When charged cloud pass above the building, induces +ve charge in spike
- Corona discharge - Large change density induced on thin sharp spike is large.
- Ionizes the surrounding air, neutralizes -ve charge in cloud.
- -ve charge pushed to spike to ground.

b) Van de Graaff Generator

- 1929 - Robert Vande Graaff.
- Produces large amount of electrostatic potential difference upto Several Million volts (10^7v)



Principles

- Electrostatic induction
- Action of points / Corona discharge

Mechanism

- 10^4v powern supply - bonnected to comb D positive potential
- By action of points +ve charges pushed towards the belt
- Comb E acquires -ve charge & sphere acquires +ve charge through Electrostatic induction.
- 10^7 potential difference produced at the outer surface.

Benefits

- Used to accelerate positive ions (protons & deuterons) for nuclear disintegrations & other applications.