Intermediate
[10+2]

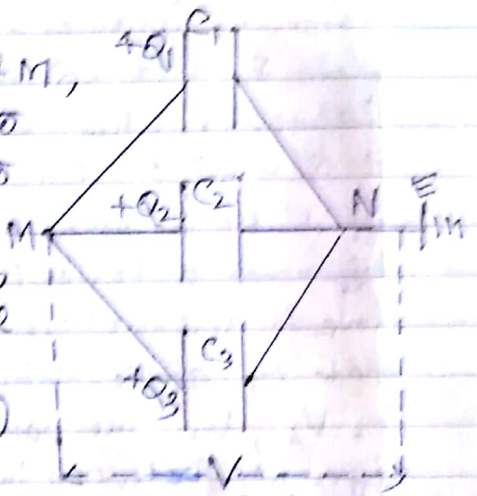
Dr. Supriya Kumari
Deptt. of Physics
T.M.C, Madhubani

Combination of Capacitors [contd....]

(b) In Parallel. In this arrangement, the similar plates are joined to a common terminal M which is connected with the source of potential, and, similarly, the other plates are joined to another common terminal N which is earthed. It is clear that all the capacitors, being directly connected to the source and the earth, have the same potential difference V.

When a charge is given at M, the charge is distributed to the capacitors according to their capacitances. If Q_1, Q_2, Q_3 be the charges of the capacitors, the total charge

$$Q = Q_1 + Q_2 + Q_3 \quad \cdots (1)$$



If C_1, C_2, C_3 be the individual capacitances and C the combined capacitance, we have

$$Q = VC; \quad Q_1 = VC_1; \quad Q_2 = VC_2; \quad Q_3 = VC_3$$

Hence from eq (1)

$$VC = VC_1 + VC_2 + VC_3$$
$$= V(C_1 + C_2 + C_3)$$

$$\text{i.e.} \quad C = C_1 + C_2 + C_3 + \ldots \quad (2)$$

Thus the combined capacitance of a number of capacitors in parallel is the sum of the separate capacitances.

This arrangement is used when a large capacitance is required to build up out of a number of small capacitance units available.