Problem:

Five bulbs of which three are defective are to be tried in two bulb points in a dark room. Find the number of trials in which the room can be lighted.

Solution :

Given : 3 bulbs are defective out of 5. There are two bulb points in the darkroom.

One bulb (or two bulbs) in good condition is enough to light the room.

Since there are two bulb points, we have to select 2 out of 5 bulbs.

No. of ways of selecting 2 bulbs out of 5 is

$$= 5P2$$

$$= 10$$

(It includes selecting two good bulbs, two defective bulbs, one good bulb and one defective bulb. So, in these 10 ways, room may be lighted or may not be lighted)

Number of ways of selecting 2 defective bulbs out of 3 is

$$= 3C2$$

$$= 3$$

(It includes selecting only two defective bulbs. So, in these 3 ways, the room cannot be lighted)

The number of ways in which the room can be lighted is

$$= 10 - 3$$

$$= 7$$