

Here, we are dealing with public good. Therefore, there will be no price discrimination even if both the individuals have different willingness to pay.

Therefore, firstly we will change the form of demand functions for both the individuals as a function of price. So, that we can find the total quantity demanded by the two individuals at any price.

$$\text{Indi 1: } P = 90 - 2Q$$

$$\Rightarrow 2Q = 90 - P$$

$$\Rightarrow Q = 45 - 0.5P \quad \text{--- (i)}$$

$$\text{Indi 2: } P = 30 - Q$$

$$\Rightarrow Q = 30 - P \quad \text{--- (ii)}$$

$$\begin{aligned} \text{Aggregate Demand} &= (i) + (ii) \\ &= 75 - 1.5P \end{aligned}$$

At equilibrium,

$$75 - 1.5P = -10 + 0.5P$$

$$\Rightarrow 85 = 2P \Rightarrow \boxed{42.5 = P}$$

$$\therefore Q = -10 + 0.5(42.5)$$

$$= -10 + 21.25$$

$$Q = 11.25 = \text{Socially optimal good}$$