

21.Let distance =  $x$  kmSpeed =  $y$  km/hr

$$\therefore \text{Time} = \frac{\text{distance}}{\text{speed}}$$

$$= \frac{x}{y} \text{ hours}$$

According to first condition,

$$\frac{x}{y} - \frac{x}{y+15} = 2 \quad \text{--- (I)}$$

According to 2<sup>nd</sup> condition;

$$\boxed{\frac{x}{y-5} - \frac{x}{y} = 1} \quad \text{--- (II)}$$

from I,

$$\frac{1}{y} - \frac{1}{y+15} = \frac{2}{x} \quad \text{--- (III)}$$

from II,

$$\frac{1}{y-5} - \frac{1}{y} = \frac{1}{x} \quad \text{--- (IV)}$$

Multiplying eq<sup>n</sup> IV by 2

$$\frac{2}{y-5} - \frac{2}{y} = \frac{2}{x} \quad \text{--- (V)}$$

from III and V we get

$$\frac{2}{y-5} - \frac{2}{y} = \frac{1}{y} - \frac{1}{y+15} \quad \left[ \text{from III, substitute value of } \frac{2}{x} \text{ in V} \right]$$

$$\therefore \frac{2y - 2y + 10}{y(y-5)} = \frac{y+15 - y}{y(y+15)}$$

$$\frac{10}{y^2 - 5y} = \frac{15}{y^2 + 15y}$$

$$\therefore 10y^2 + 150y = 15y^2 - 75y$$

$$\therefore 5y^2 = 225y$$

$$\therefore 5y = 225 \quad \left[ \text{Dividing by } y \right]$$

$$\boxed{y = 45} \quad \left[ \text{Dividing by } 5 \right]$$

Substitute  $y = 45$  in (IV)

$$\frac{1}{45-5} - \frac{1}{45} = \frac{1}{x}$$

$$\frac{1}{40} - \frac{1}{45} = \frac{1}{x}$$

$$\therefore \frac{45 - 40}{1800} = \frac{1}{x}$$

$$\therefore \frac{5}{1800} = \frac{1}{x}$$

$$\therefore \frac{1}{360} = \frac{1}{x}$$

$$\therefore x = 360 \text{ km}$$

$\therefore$  Distance covered by bus = 360 km