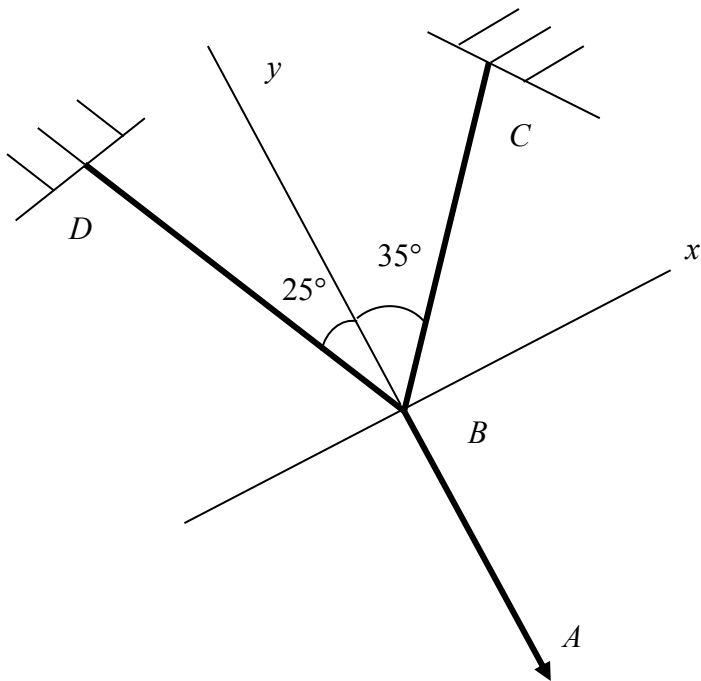8. If $F_{AB} \sim N(100,5^2)$ N , determine the distributions of F_{BC} and F_{BD} .

Solution:

$$\sum F_x = 0; \ F_{BC}\sin 35^\circ - F_{BD}\sin 25^\circ = 0$$

$$\sum F_y = 0; \ F_{BC}\cos 35^\circ + F_{BD}\cos 25^\circ - F_{AB} = 0$$

From above equations, we have

$$F_{BD} = \frac{1}{\cot 35^\circ \sin 25^\circ + \cos 25^\circ} F_{AB}$$

$$F_{BC} = \frac{\sin 25^\circ}{\sin 35^\circ} F_{BD}$$

Thus,

$$\mu_{F_{BD}} = \frac{1}{\cot 35^\circ \sin 25^\circ + \cos 25^\circ} \mu_{F_{AB}} = 66.23 \text{ N}$$

$$\sigma_{F_{BD}} = \frac{1}{\cot 35^\circ \sin 25^\circ + \cos 25^\circ} \sigma_{F_{AB}} = 3.31 \text{ N}$$

$$\mu_{F_{BC}} = \frac{\sin 25^\circ}{\sin 35^\circ} \mu_{F_{BD}} = 48.8 \text{ N}$$

$$\sigma_{F_{BC}} = \frac{\sin 25°}{\sin 35°} \sigma_{F_{BD}} = 2.44 \text{ N}$$

Therefore, we get the distributions $F_{BD} \sim N(66.23, 3.31^2)$ N and $F_{BC} \sim N(48.8, 2.44^2)$ N . **ANS.**