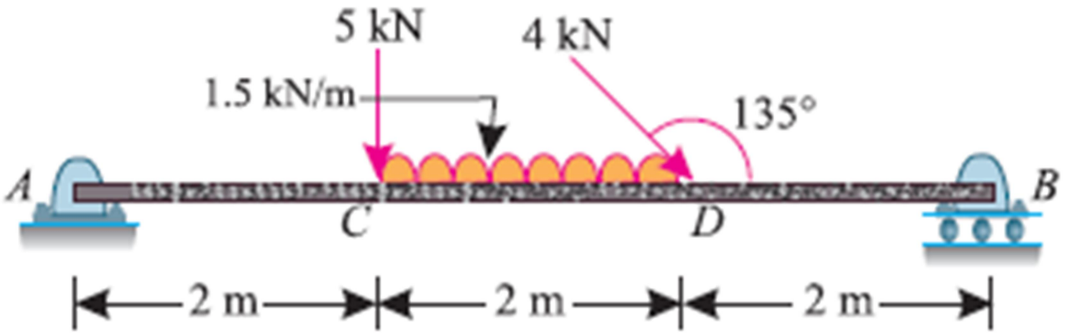
Q. A simply supported beam AB of 6 m span is subjected to loading as shown in Fig. Find the support reactions at A and B.



Solution - Given: Span (l) = 6 m
Let R_A = Reaction at A, and
R_B = Reaction at B.
We know that anticlockwise moment due to R_B about A

$$= R_B \times l = R_B \times 6 = 6\ R_B \text{ kN-m} \qquad \ldots(i)$$

and sum of clockwise moments due to loads about A

$$= (4 \times 1) + (2 \times 1)\ 1.5 + (4 \times 2) + \frac{(0 + 2)}{2} \times 3 \times 5 = 30 \text{ kN-m} \qquad \ldots(ii)$$

Now equating anticlockwise and clockwise moments given in (i) and (ii),

$$6\ R_B = 30$$

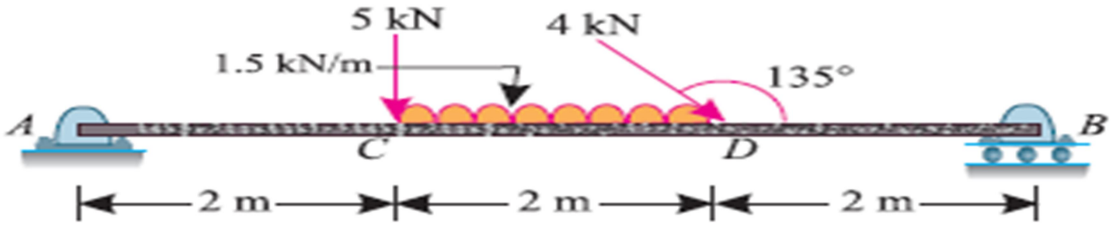
$$\boldsymbol{R_B = 5 \text{kN}}$$

and

$$R_A = (4 + 2 + 4 + 3) - 5$$

$$\boldsymbol{R_A = 8 \text{ kN}}$$

Q. A beam AB of 6 m span is loaded as shown in Fig. Determine the reactions at A and B.



Solution. Given: Span = 6 m
Let R_A = Reaction at A, and
R_B = Reaction at B.
We know that as the beam is supported on rollers at the right hand support (B), therefore the reaction R_B will be vertical (because of horizontal support). Moreover, as the beam is hinged at the left support (A) and it is also carrying inclined load, therefore the reaction at this end will be the resultant of horizontal and vertical forces, and thus will be inclined with the vertical.

Resolving the 4 kN load at D vertically

$$= 4 \sin 45° = 4 \times 0.707 = 2.83 \text{ kN}$$

and now resolving it horizontally

$$= 4 \cos 45° = 4 \times 0{\cdot}707 = 2{\cdot}83 \text{ kN}$$

We know that anticlockwise moment due to R_B about A

$$= R_B \times 6 = 6\ R_B \text{ kN-m} \qquad ...(i)$$

and sum of clockwise moments due to loads about A

$$= (5 \times 2) + (1.5 \times 2)\ 3 + 2.83 \times 4 = 30.3 \text{ kN-m} \qquad ...(ii)$$

Now equating the anticlockwise and clockwise moments in (i) and (ii),

$$6\ R_B = 30.3$$

$$\boldsymbol{R_B = 5.05 \text{ kN}}$$

We know that vertical component of the reaction R_A

$$= [5 + (1.5 \times 2) + 2.83] - 5.05 = 5.78 \text{ kN}$$

Reaction at A,

$$(R_A)^2 = (5.78)^2 + (2.83)^2$$

$$R_A = \mathbf{6.44 \text{ kN Ans}}$$