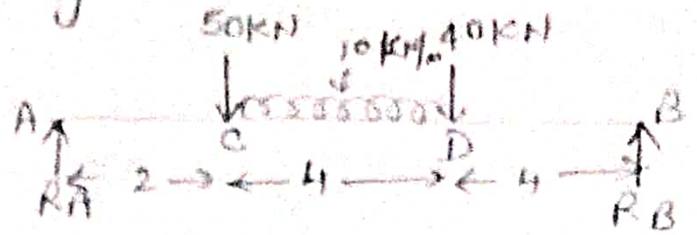
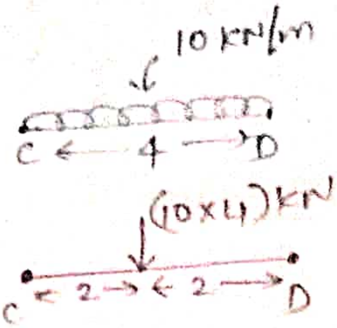
Q. A simply supported beam of length 10 m, carries the uniformly distributed load and two point load shown in Fig. Calculate the Reaction R_A & R_B.



Solution →

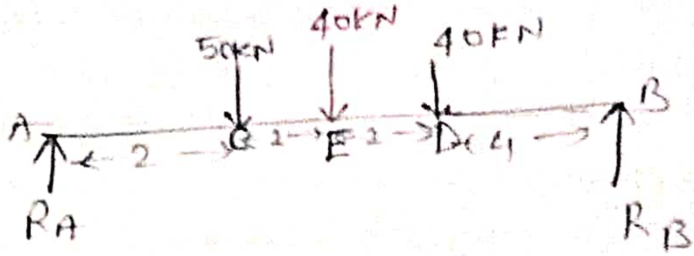


UDL = 10 KN/m

∴ Total load due to UDL

$= 4 \times 10$

$= 40 KN$



Apply condition of Equilibrium on Beam.

$\Sigma V = 0$

$R_A + R_B - 50 - 40 - 40 = 0$

$R_A + R_B = 130 KN$ — ①

Now Taking moment about poin A.

$50 \times AC + 40 \times AE + 40 \times AD - R_B \times AB = 0$

$50 \times 2 + 40 \times 4 + 40 \times 6 = R_B \times 10$

$R_B = \frac{500}{10} = 50 KN$

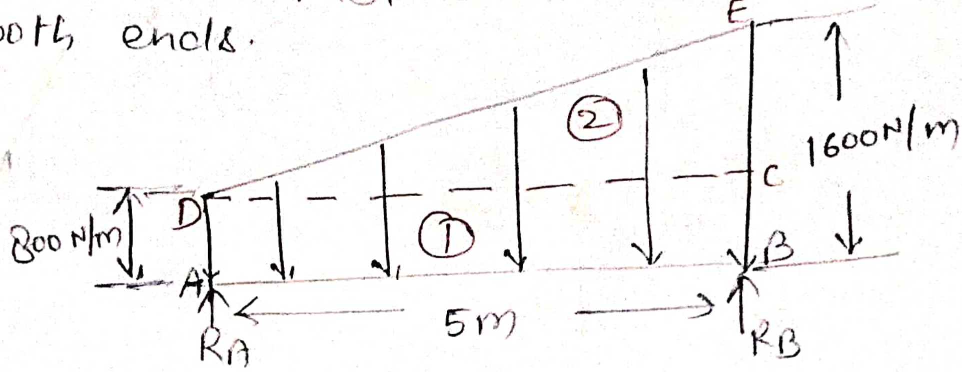
$R_B = 50 KN$

put R_B value in eqn ①

$R_A + 50 = 130$

$R_A = 80 KN$ Ans

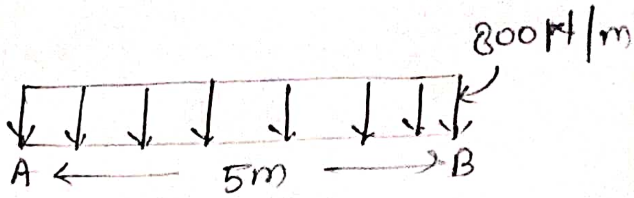
Q. A simply supported beam of length 5 m carries a uniformly increasing load of 800 N/m at one end to 1600 N/m at the other end. Calculate the reaction at both ends.



Solution.

FBD

ABCD shows the UDL from A to B point.

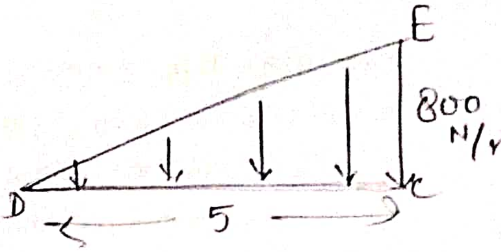


So, Total load due to UDL

$= 800 \times 5$

$= 4000$ N

Now DCE shows the UVL from A to B.

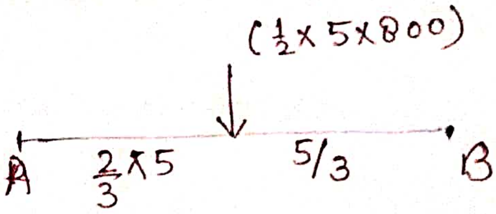


So, Total load due to UVL

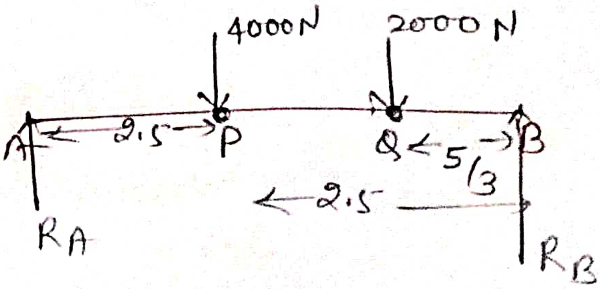
$= \frac{1}{2} \times CD \times CE$

$= \frac{1}{2} \times 5 \times 800$

$= 2000$ N



That load act at the C.G of ΔDCE i.e. ($\frac{1}{3} \times AB$) from Base.



$\Sigma V = 0$

$R_A + R_B = 4000 + 2000$

$R_A + R_B = 6000$ N — ①

$\Sigma M_A = 0$

$4000 \times 2.5 + 2000 \times (5 - 5/3) - R_B \times 5 = 0$

$5 R_B = 10000 + \frac{2000 \times 10}{3}$

$R_B = 3333.33$ N

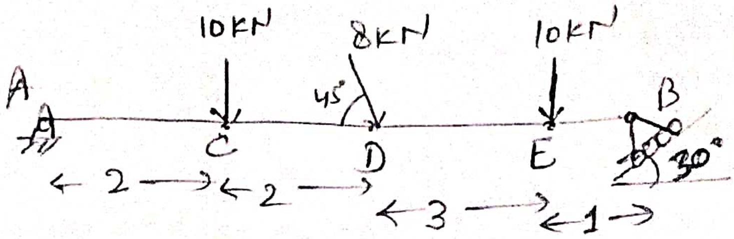
and $R_A = 6000 - 3333.33$

$R_A = 2666.67$ N

Ans

Q. Determine the support reactions.

Soln.

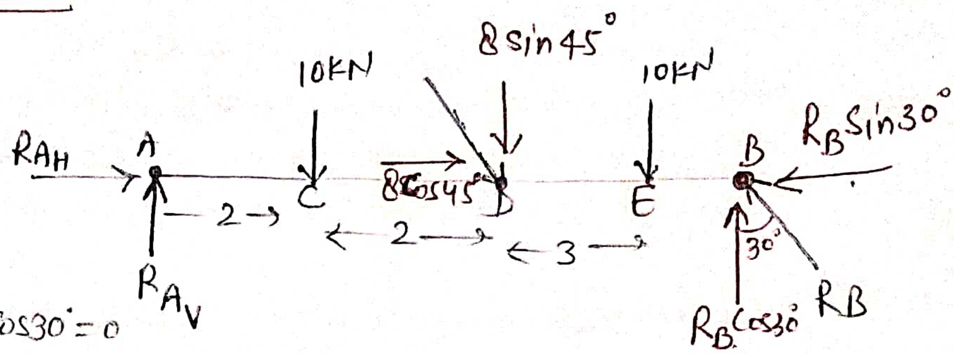


Apply condition of Equilibrium.

FBD

$\Sigma H = 0$

$R_{AH} + 8\cos 45° - R_B \sin 30° = 0$ —— ①



$\Sigma V = 0$

$R_{AV} - 10 - 8\sin 45° - 10 + R_B \cos 30° = 0$

$R_{AV} + R_B \cos 30 = 20 + 8\sin 45°$ —— ②

$\Sigma M_A = 0$

$10 \times 2 + 8\sin 45 \times 4 + 10 \times 7 - R_B \cos 30° \times 8 = 0$

$8 R_B \cos 30 = 20 + 32 \sin 45 + 70$

$R_B = 16.25\ KN$

put this into eqn ① and eqn ②

$R_{AH} + 8\cos 45 - 16.25 \sin 30 = 0$

$R_{AH} = 2.47\ KN$

Now from eqn ②

$R_{AV} + 16.25 \cos 30 = 20 + 8\sin 45$

$R_{AV} = 11.578\ KN$

Then $R_A = \sqrt{R_{AH}^2 + R_{AV}^2}$

$= \sqrt{2.47^2 + 11.58^2}$

$R_A = 11.838\ KN$

Ans