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Paper :- Theory of structures

(Q1) What is determinacy? Explain the types of determinacy with example including force diagrams.

(Ans) A determinat structure is defined as a structure in which the reaction and member force can be computed by using equactions of static equilibrium alone, while in an indeteminate structure equations of static equilibrum alone are not sufficient to calculated member forces and reactions.

"Beam, pin conected and frame are classified as determinate depending upon the internal forces in the member or external support reactions. Trusses also classified as determinate depending external support reaction.

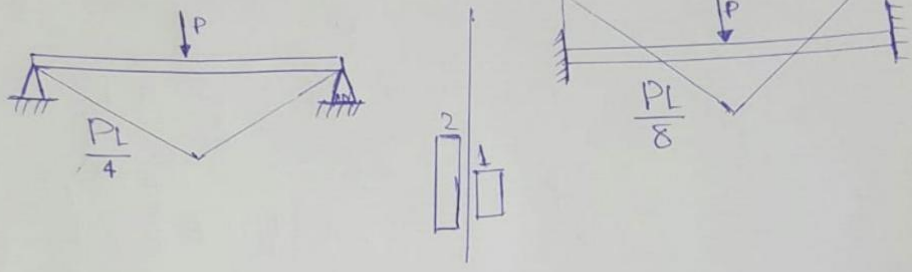
(Q2) What do you think about the advantages of statically indeterminate structures?

(Ans) A statically determinate system is neither better nor worse than a statically indeterminate system. It may be stronger or weaker depending on the details of two systems. Though Look at the advantages it may can provide.

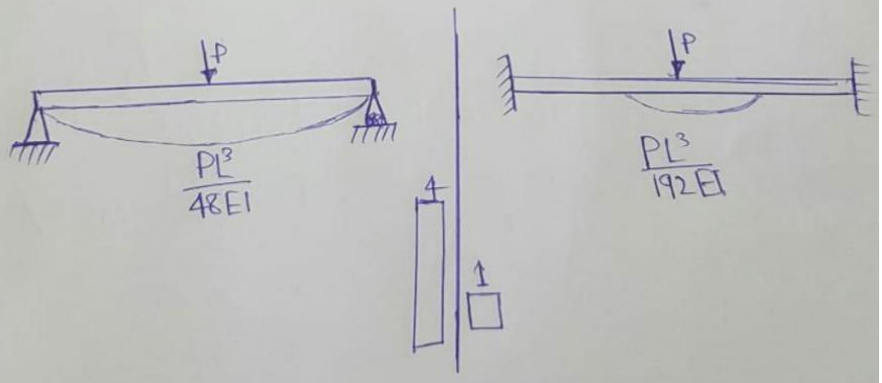
When we provid more support and/or member to structure than requrid of static stability. It makes structure indeterminate. By providing the excess stiffness of the member or structure. Such as in case of truss we provide additional diagonal member of ensure stability.

So, the advantages of Indeterminate structure over determinate

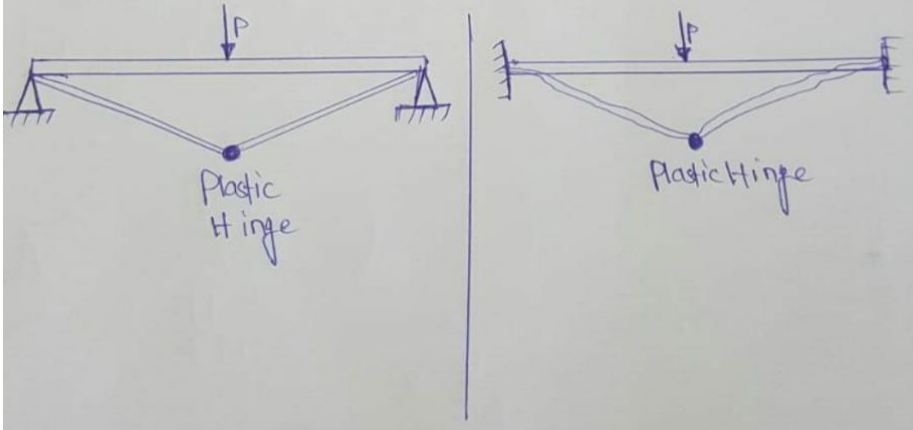
- Stresses in indeterminate are generally lower than determinate structure.



- Deflection in case of indeterminate structure is less than those compared to determinat due to greater stiffness.

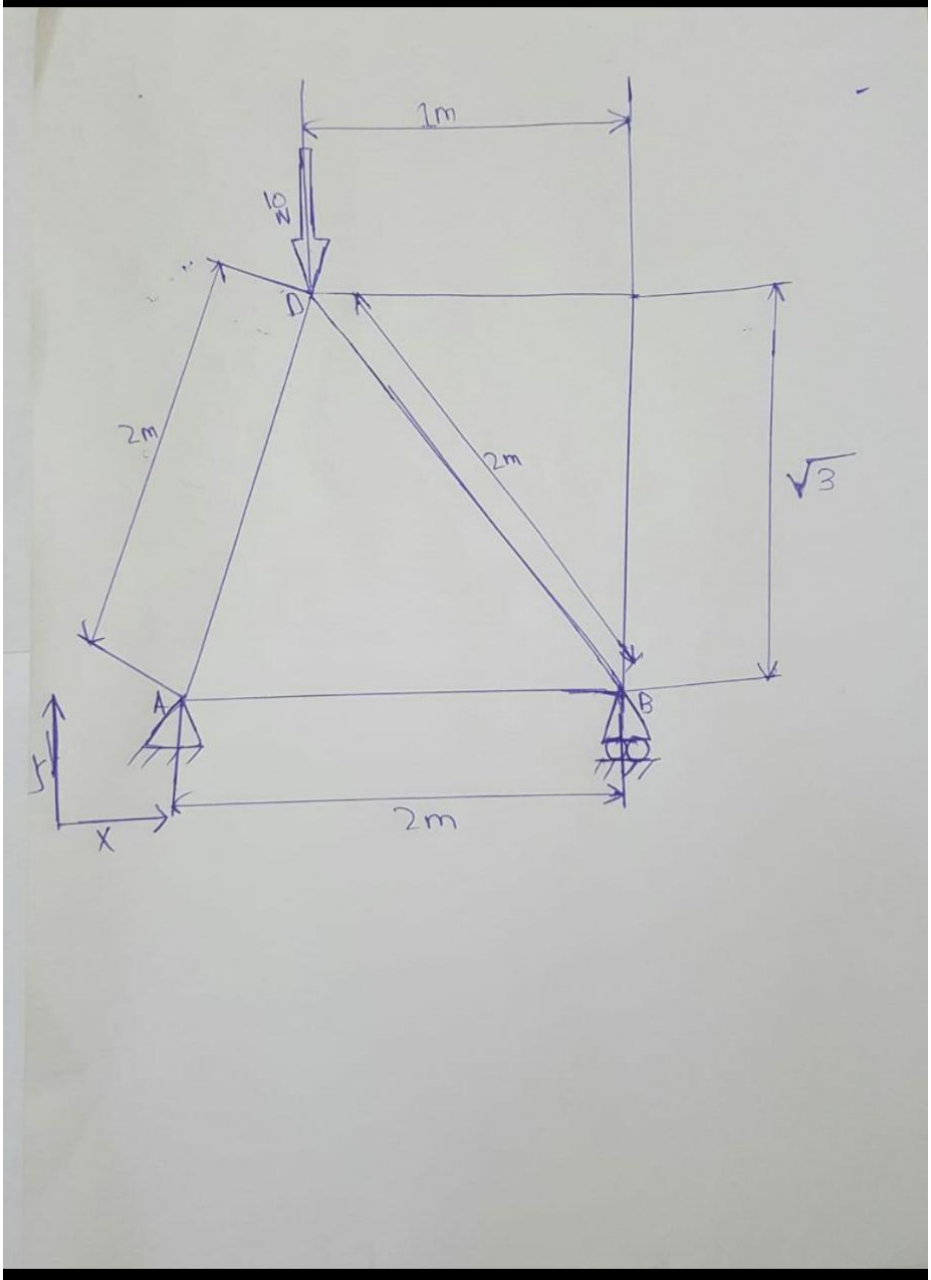


• Statically indeterminate structure have capacity to redistribute the loads. if a part (or member or support) of such a structure fails, the entire structure will not necessarily collapse, and the loads will be redistributed to the adjacent portions of the structure.

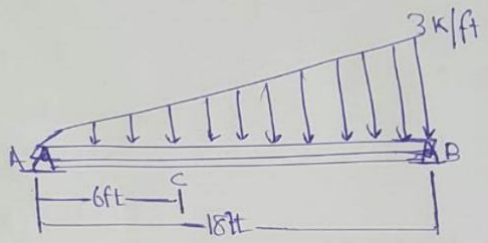


(Q2(b)) Describe role of structural analysis in structural engineering project?

(Ans) Structural analysis is the determination of the effects of loads on physical structures and their components. Structures subject to this type of analysis include all that must withstand loads, such as buildings, bridges, aircraft and ships,.... Structural analysis is thus key part of the engineering design of structures.


1m
10N
D
2m
2m
√3
A
B
Y
X
2m

(Q3) Determine shear and moment acting at a section passing through point 'C' in the beam as shown in figure below.



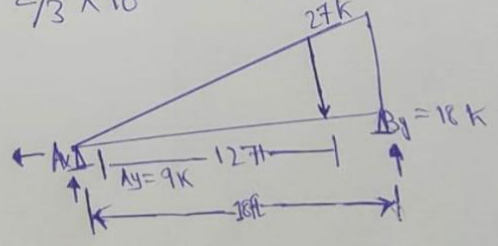
(a)

know we first convert to point load the u.d.l load.

$\frac{1}{2} \times L \times h = \frac{1}{2} \times 18 \times 3 = 27K$

know we find there moment.

$\frac{2}{3} \times 18 = 12ft$



$+\uparrow \sum mA = 0$

Reaction:-

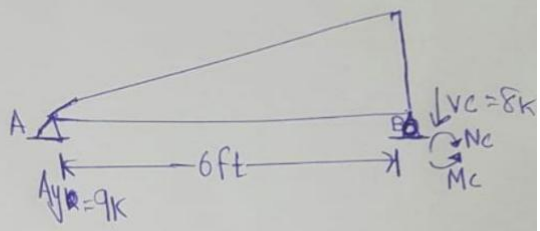
$By \times 18 - 27 \times 12$

$= By$ 18K

$+\uparrow \sum +y = 0 \quad Ay - 27 + 18K = Ay - 27 - 18$

$Ay = \boxed{9K}$

Sect A-C



Concent rated load at

(Δ) triangle

$\frac{2L}{3}$ from A side

4/3 from B side

know we find reaction

$+\uparrow \sum +y = 0$

$= -Vc - 1 + 9K = 0$

$\boxed{VC = 8K}$

$+\circlearrowleft \sum Mc = 0$

$Mc + 1(2) - 9(6) = 0$

$\boxed{Mc = 52\ K\cdot ft}$