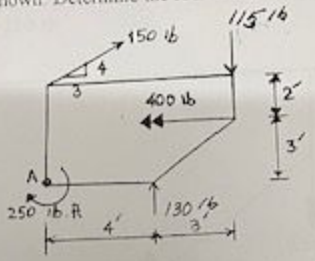
Samples of questions
Mechanic & Structures

Second Year

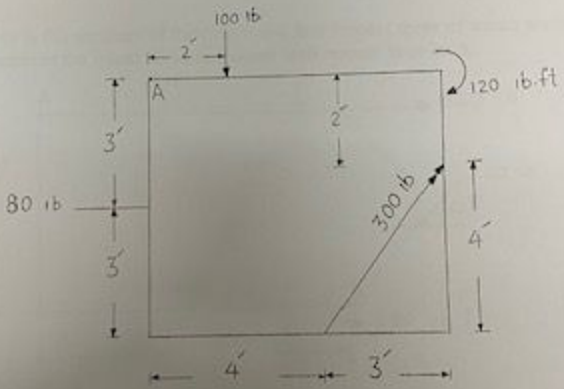
2014-2015

Dr. Ali I. Marouf

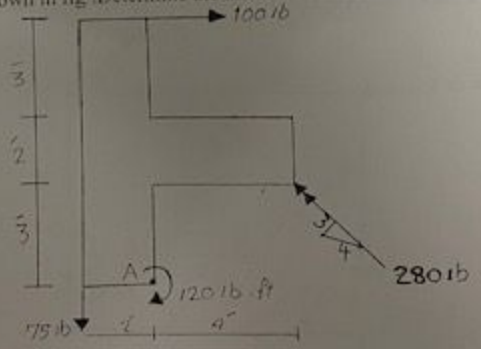
1/ The 400 lb force in fig shown is the Resultant of the couple and Four forces ; three of which are shown. Determine the fourth force and locate it with respect to point A.



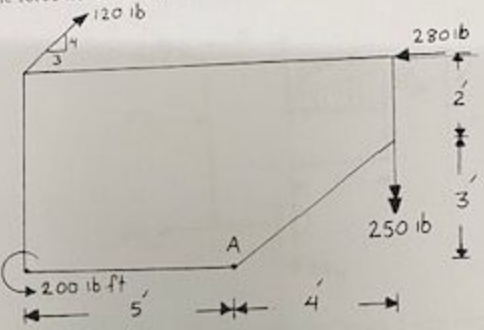
2/ The 300 lb force of fig is the resultant of a couple and three forces, two of which are shown. Determine the third force and locate it with respect to **point A** .



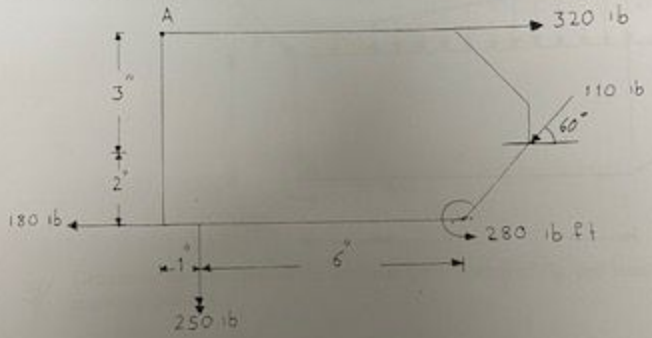
3/ The 280 lb force of fig is the resultant of the couple and three coplanar forces , Two of which are shown in fig .Determine the third force and locate it with respect to point A.



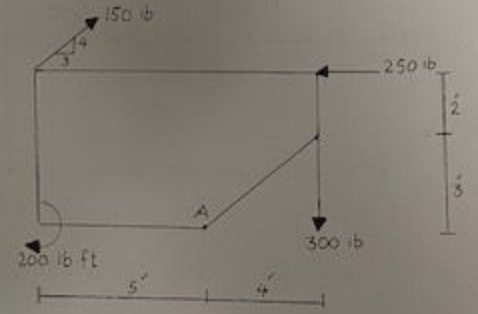
4/ The 250 lb force in fig is the resultant of three coplanar. Force and a couple. Determine the force not shown and locate it with respect to point A.



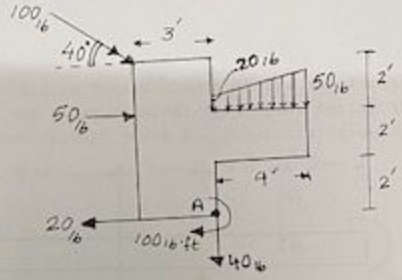
5/ The 250 lb force is the resultant of the couple and four forces , three of which are shown in diagram . Determine the fourth force and locate with respect to point A.



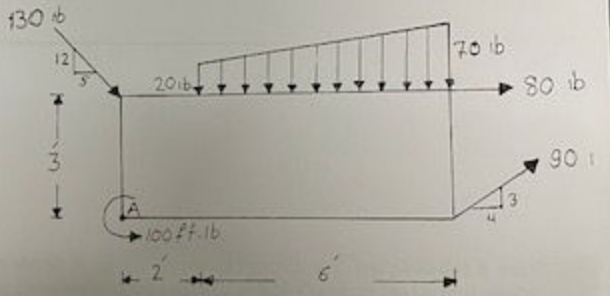
6/ Determine the resultant of the coplanar force system and locate it with respect to point A .



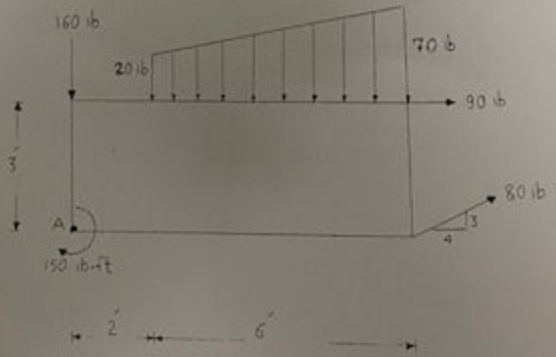
7/ The 100 lb of fig is the Resultant of the forces , one of which is unknown in the diagram ,Determine the unknown force and locate it with respect to point A .



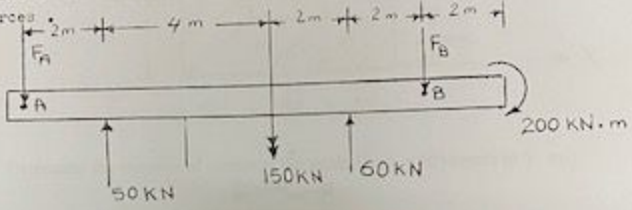
8/ Determine the resultant of the coplanar force system and locate it with respect to point A.



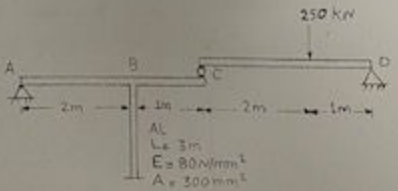
9/ Determine the Resultant of the coplanar force system of fig. and locate it with respect to point A.



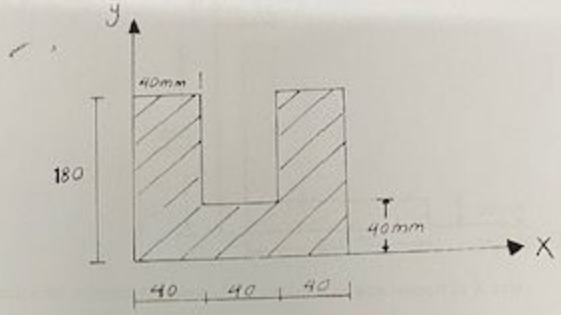
10/ The 150 KN force of fig is the resultant of the two forces shown and the couple and two other vertical forces, one acting through point A and the other through point B . Determine these unknowns forces .



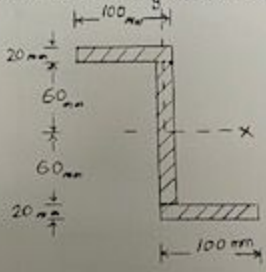
11/ The rigid bars shown in fig. are supported by roller at C and pinned at A and D . An aluminum rod helps support the load of 250 KN. Compute the vertical displacement of the roller at C.



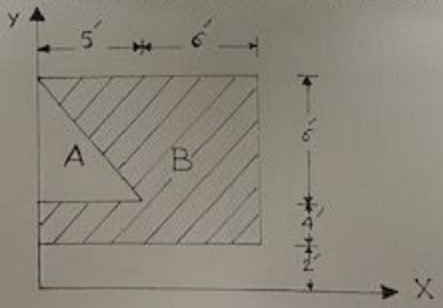
12/ Locate the centroid of the section shown in fig and determine the moment of Inertia of Area with respect to (y) axis.



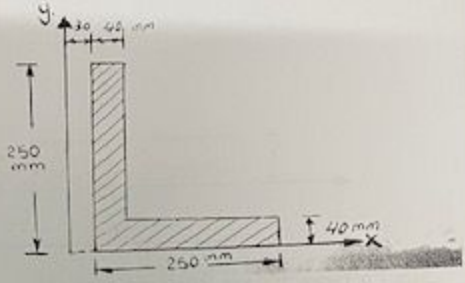
13/ Determine the moment of Inertia of the shaded area with respect to Y axis.



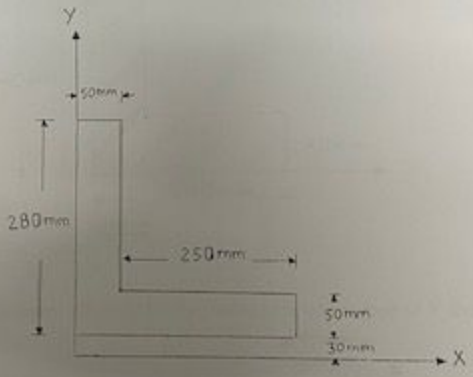
14/ Find the moment of Inertia about X axis for the shaded area as shown in fig.



15/ Determine the moment of inertia of the shaded area of Fig with respect to Y axis .



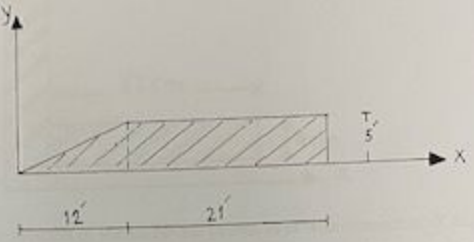
16/ Determine the moment of Inertia of the shaded area with respect to X axis



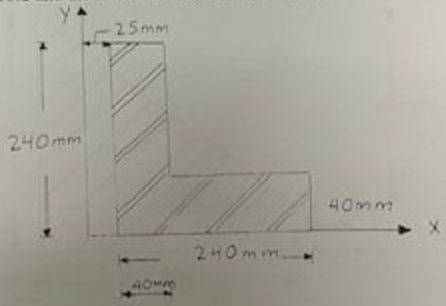
17/ Determine the moment of Inertia of the shaded area, with respect to the Y axis

21/ Find moment of Inertia about X axis for the shaded area as shown in fig.

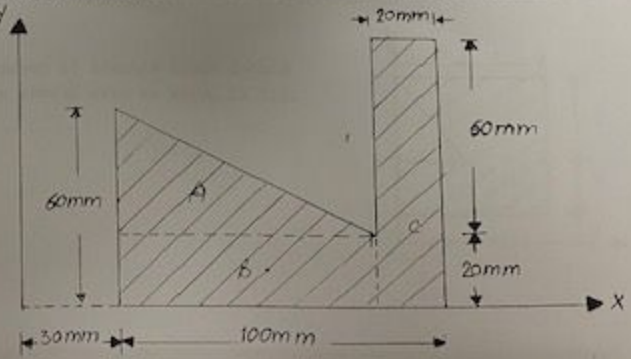
18/ Locate the centroid of the shaded area as shown in fig. with respect to the axes shown.



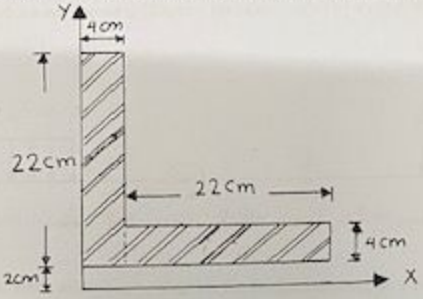
19/ Locate the centroid and the moment of Inertia of the shaded area with respect to Y axis.



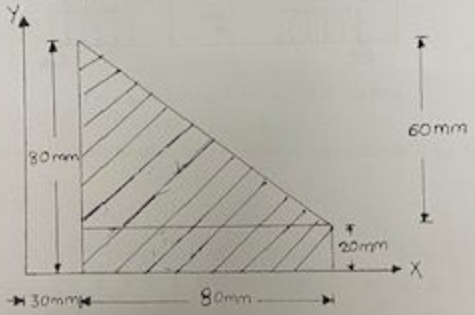
20/ Determine the moment of Inertia for the shaded area with respect to X and Y axis.



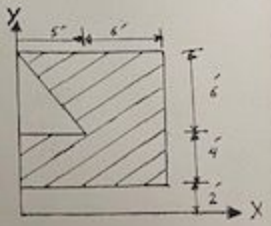
21/ Find moment of Inertia about X axis for the shaded area as shown in fig.



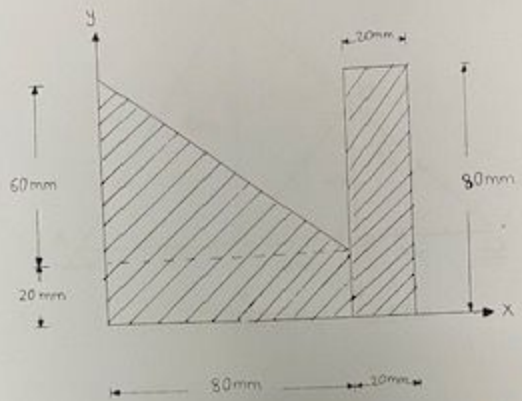
22/ Determine the moment of Inertia for the shaded area with respect to X axis.



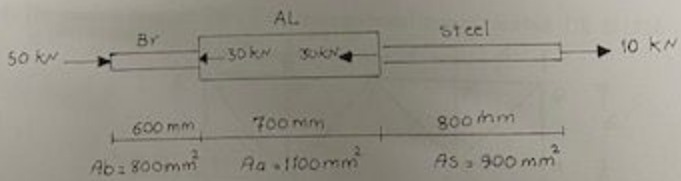
23/ Find moment of inertia about X-axis for the shaded area as shown in fig.



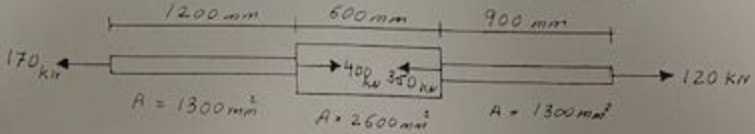
24/ Locate the centroid for the shaded area with respect to axes shown in fig.



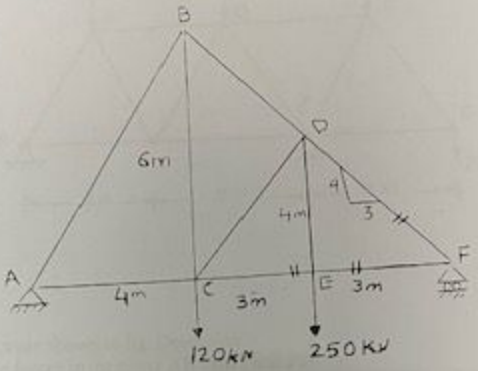
25/ An aluminum tube is rigidly fastened between a bronze rod and steel rod as shown in fig . axial loads is applied at positions indicated . Determine the stress in each material..



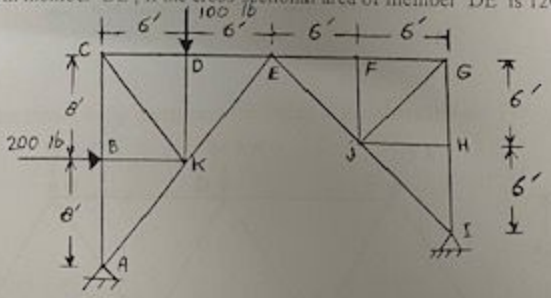
26/ Determine the total deformation of the steel rod shown of variable cross-section when it is subjected of the concentrated force, shown Assume; E= 200 Gpa



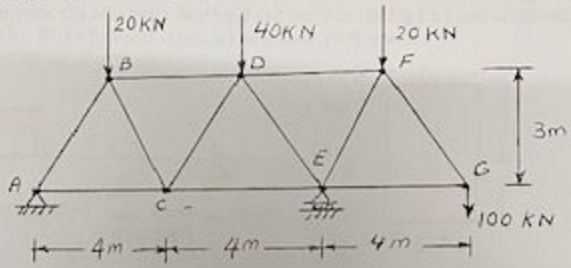
27/ In the truss shown in fig. Determine :
a : The forces in members EF , DF and CE.
b : The stresses in members DF and CE.the cross – sectional area of members is 1300 mm^2



28/ In the truss shown
a- Find the force in member DE
b- The stress in member DE , if the cross-sectional area of member DE is 1200 mm^2



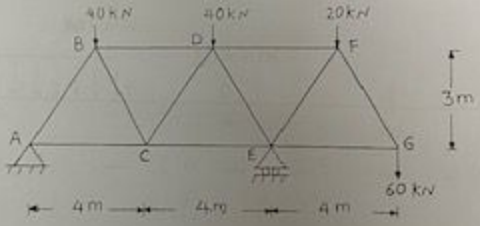
29/ In the truss shown in Fig . Determine the forces in members BD and FD .



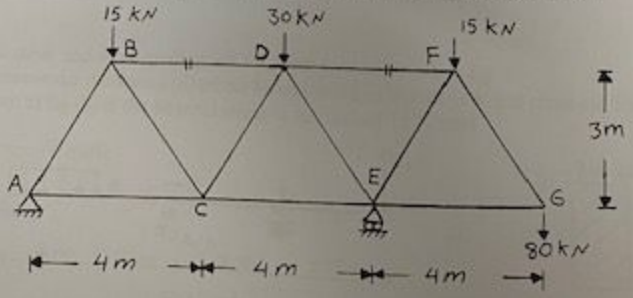
30/ In the truss shown in fig. Determine :-

a : The forces in members **AB** , **BD** , and **FD**.

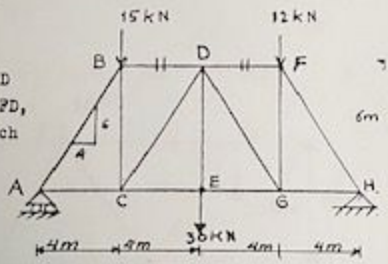
b : The stresses in members **AB** and **FD** the **cross-section area** in each member is **800 mm²**.



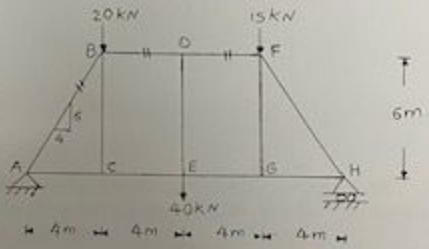
31/ In the truss shown in fig. Determine the forces in members BD and FD.



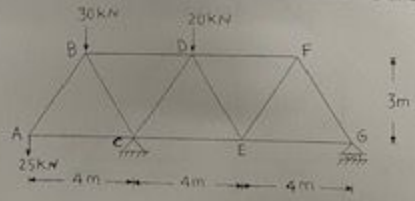
32/ In the truss shown:
Determine:
a/The forces in members BD and FD
b/The stresses in member BD and FD, the cross-sectional area in each member is 700mm .



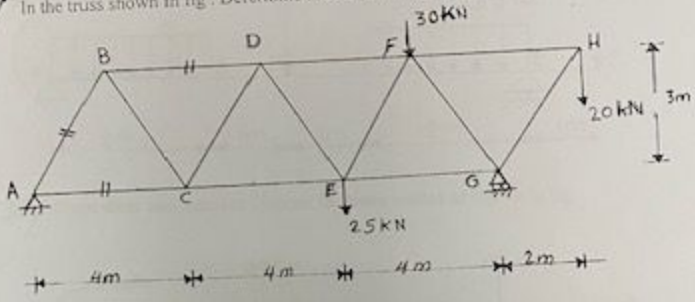
33/ In the truss shown in fig. Determine :-
a : the forces in members AB , BD , FD .
b : the stresses in member BD and FD. The cross-section area in each member is 700 mm^2 .



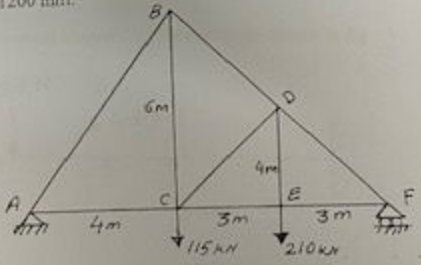
34/ In the truss shown determine the forces in members **AC** and **FD**



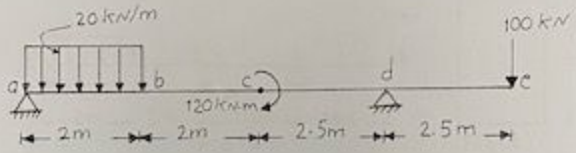
35/ In the truss shown in fig . Determine the force in members AB , AC , BD.



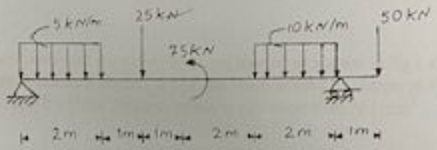
36/ In the truss shown in fig ,Determine the forces in members EF , DF and CE. Then Determine the stresses in members DF and CE . the cross-sectional Area of members is 1200 mm.



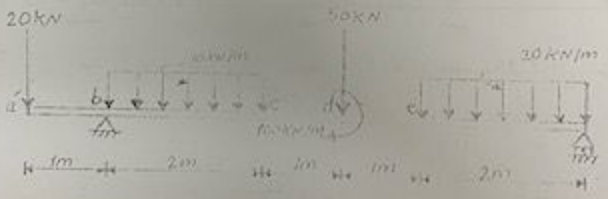
40/ Draw shear and moment Diagram for beam loaded as shown in fig.



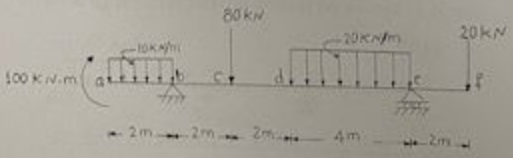
41/ Draw shear and moment diagram for the loaded beam as shown in fig.



42/ Draw shear and moment diagram for the loaded beam as shown in figure.



43/ Draw shear and moment diagram for beam loaded as shown in fig.



50/ a: Draw shear & moment diagram for beam loaded as shown in fig (a)

44/ a : Draw shear and moment diagram for the beam loaded as shown in **fig (a)**.
b : Determine the minimum **depth (d)** of the beam in **fig (a)** and **cross-section** in fig (b) .If the **flexural stress** is not exceed **10 N\mm2**.

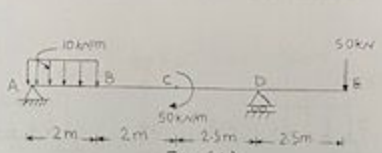


Fig (a)

Fig (b)

45/ a : Draw shear and moment diagram for beam loaded as shown in fig (a).
b : Determine the minimum depth (d) of the beam loaded as shown in fig (a) and cross-section as in fig (b) if the flexural stress is not exceed 10 N / mm^2.

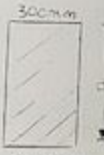


Fig (b)

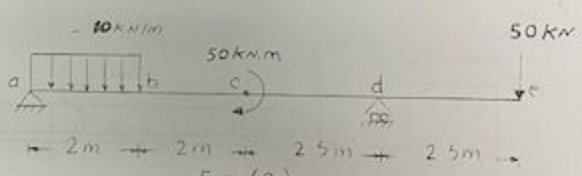
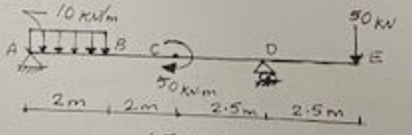
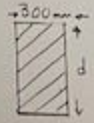


Fig (a)

46/ a: Draw shear and moment diagram for beam loaded shown in fig a.
b: Determine the minimum (d) of the beam loaded as shown in a and cross-section as shown in fig (b) if the flexural stress is not exceed 15 N/mm^2

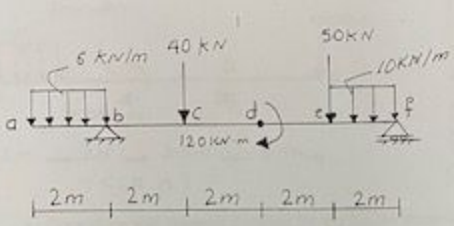


(Fig a)



(Fig b)

47/ a : Draw shear and moment diagram for beam loaded shown in fig (a)
b : Determine the minimum (d) of the beam loaded as shown in fig (a) and cross – section as in fig (b) .
If the flexural stress is not exceed 15 N/mm^2 .



48/ a: Draw shear and moment diagram for the loaded beam as shown in fig (a)
b : Determine the minimum depth (d) of the loaded as shown in fig (a) and cross – section in fig (b) . If the flexural stress is not exceed 30 N \ mm^2

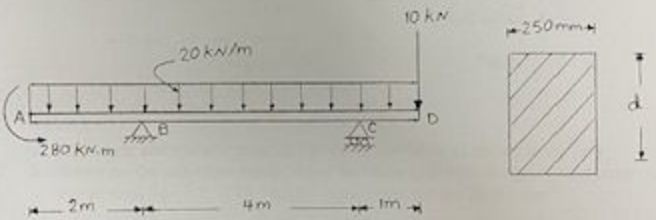


Fig a Fig b

49/ **a:** Draw shear and moment diagram for the loaded beam as shown in **fig (a).**
b: Determine the minimum width (b) for the beam loaded as in **fig (a)** and cross – section as in **fig (b) . If** the flexural stress is not exceed 15 N \mm^2 .

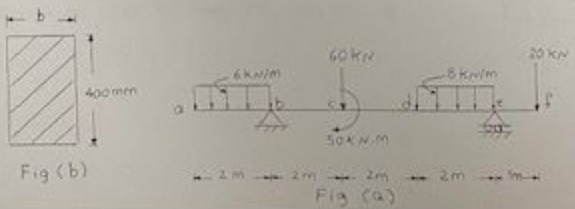
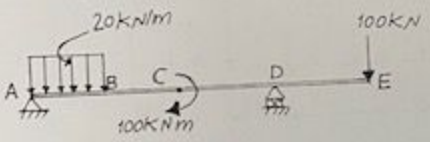
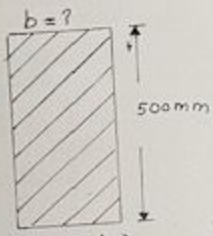


Fig (b)
Fig (a)

50/ a: Draw shear & moment diagram for beam loaded as shown in fig (a).
b: Determine the minimum width (b) of the beam loaded as shown in fig (b) .If the flexural stress is not exceed 20 N/mm^2.



(Fig a)



(Fig b)

51/ a : Draw shear and moment diagram for the loaded beam as shown in **fig (a)**
b : Determine the minimum **depth (d)** of the beam as shown in **fig (a)** and **cross- section** as in **fig (b)** . If the **flexural stress** is not exceed **15 N \ mm^2**

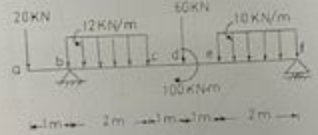


Fig a

Fig b

52/ a : Draw shear and moment diagram for the loaded beam as shown in fig (a)
b : Determine the minimum depth (d) of the beam as shown in fig (a) and cross – section as in fig (b) . If the flexural stress is not exceed 20 N \ mm^2

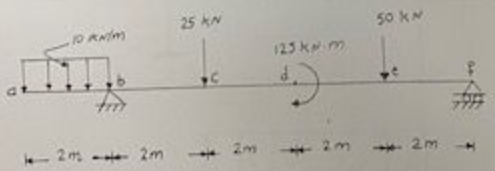


Fig "a"

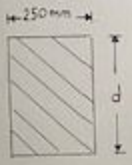


Fig "b"

53/ a. Draw shear and moment diagram for the loaded beam as shown in the Fig. (a)

b. Determine the minimum depth (d) of the beam as shown in Fig. (a) and cross – section as in (b) if the flexural stress is not exceed 15 N/mm^2

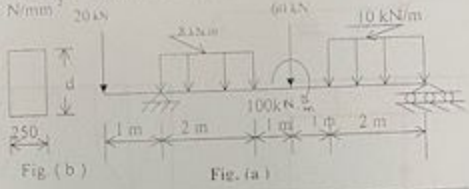
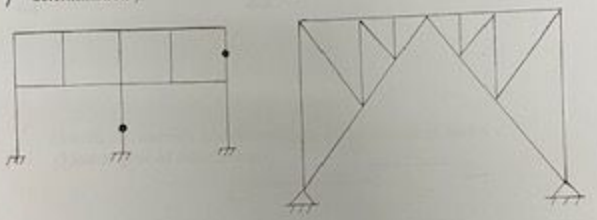


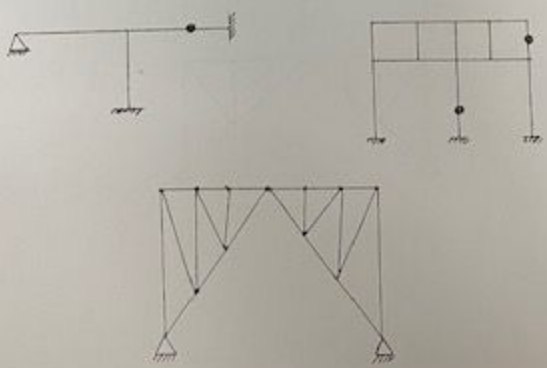
Fig. (b)

Fig. (a)

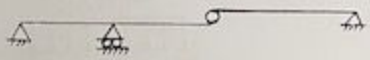
54/ Discuss the stability and determinacy of the structures shown .(find degree of determination).

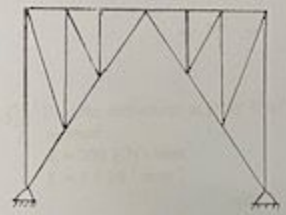


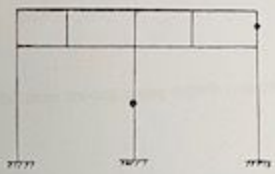
55/ Discuss the stability and determinacy of the structures below (Find degree of determination).



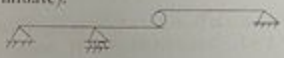
56/ Discuss the stability and determinacy of the structures below (Find degree of determinate).



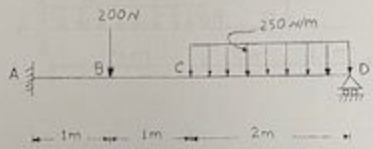




57/ Discuss the stability and determinacy of the structures below .
(Find degree of determinate).



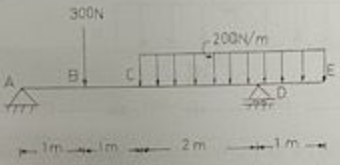
58/ Find the reactions at A and D for loaded beam as shown in fig. using unit load method. If EI = Constant.



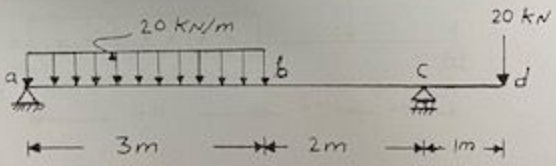
59/ Find the deflection at point **E** of the loaded beam as shown, using double integration method .

$E = 200\ KN \setminus mm^2$

$I = 1 * 10^6\ mm^4$



60/ Find the deflection and slope at point D (Δ_d, θ_d) of the loaded beam as shown in fig. Using unit load method , If $E = 200\ KN/mm^2$, $I = 1 * 10^6\ mm^4$.



61/ Find the deflection at **point D**. Using double integration method.

$E = 200\ KN\setminus mm^2$, $I = 2 * 10^6\ mm^4$.