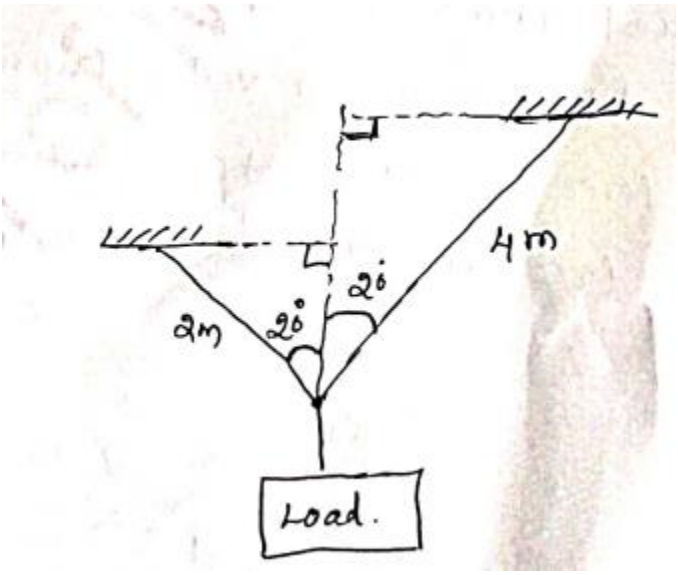
# Topic 2 Statics

Past Paper Questions

Q1. A load of 1 tonne is vertically hung from a horizontal beam by two equal length strops of 4 meters, separated by an angle of $40^0$.Take the gravitational acceleration as 9.81 m/sec$^2$.Calculate

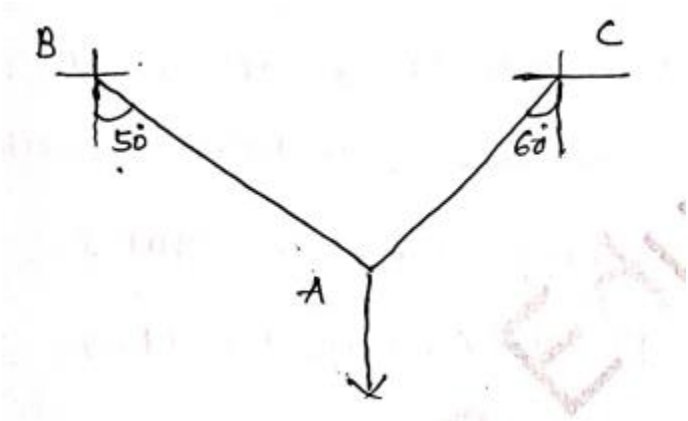
a. Sketch the arrangement -2m
b. Calculate the tensile force in the strops -5m

Q2. A load of 1 ton is supported from two wire strops as shown in fig below. Determine the tensile force in each strop -10m



Q3. A weight of 400N is suspended by strops from points B and C as shown in the figure below. Determine

a. The tensile force in the strops AB and AC -10m

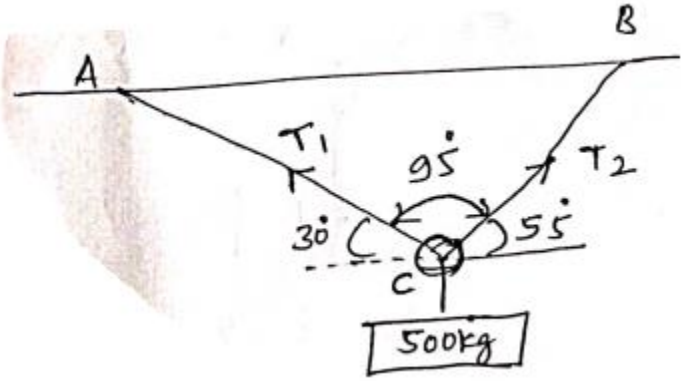



Q4. a. Describe the meaning of the term equilibrium -2m

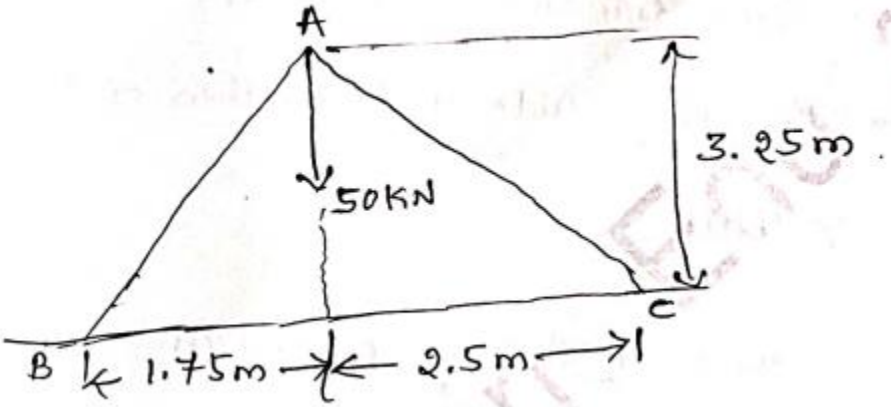
b. Fig below shows a mass suspended by wire strops from fixed points A and B. Determine

i. The force in strop AC -4m

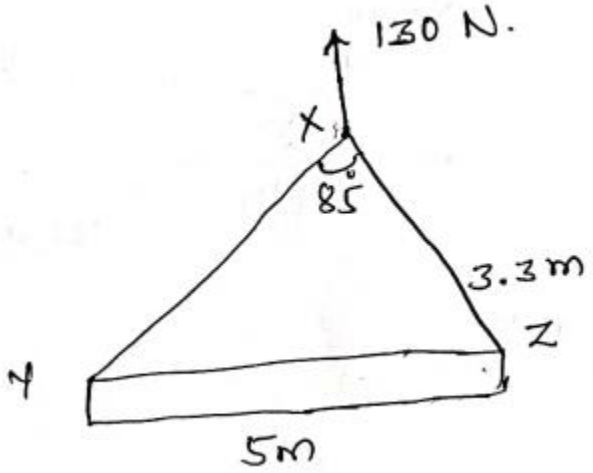
ii. The force in strop BC -4m



Q5. A vertical frame of two legs shown below has a weight of 50kN hanging from point A. Determine the forces in legs 'AB' and 'AC' produced by the 50kN weight -10m



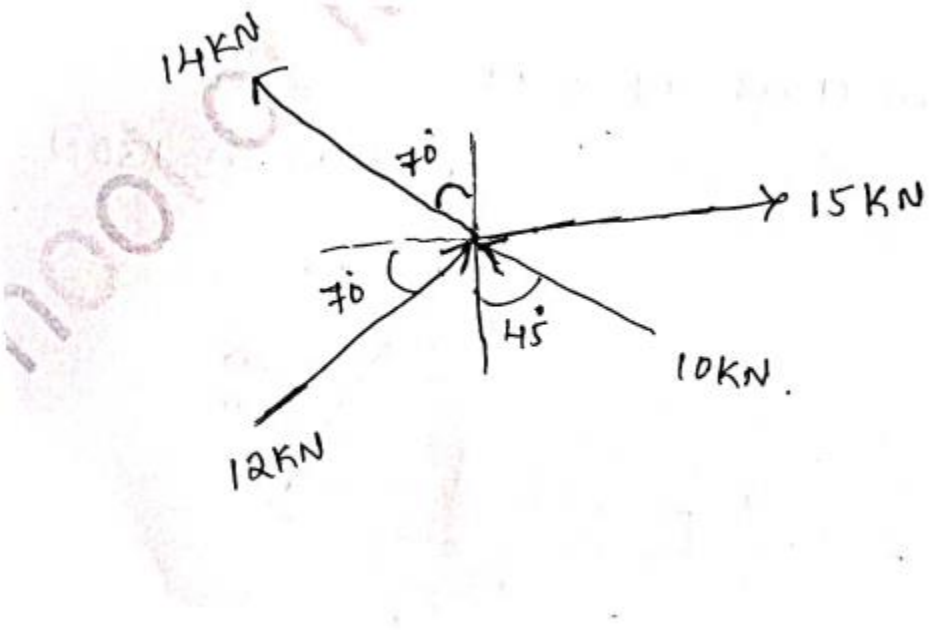

Q6. A crane lifts a 5m long beam as shown below. The load on the crane is 130N. Determine the tension in slings XY and XZ. -10m



Q7. Coplanar forces act outwards from a common point. Three forces have the following magnitudes and directions. The angles being measured clockwise from a horizontal datum, 80N,0°; 50N,60° ; 100N,150°.

a. Draw the force diagram -3m
b. Determine the magnitude and direction of the resultant force -7m

Q8. Figure below shows a system of concurrent, coplanar forces. Calculate, by resolution of forces into vertical and horizontal components, the magnitude of the equilibrant force. -10m



Q9. Figure below shows an attempt to pull a cylinder head along a workshop floor. The cylinder head has two ropes attached to its top corner, one which passes over a frictionless pulley wheel with a weight attached to the other end. The other end has a horizontal force of 3kN. Calculate the magnitude and direction of the resultant force. -10m

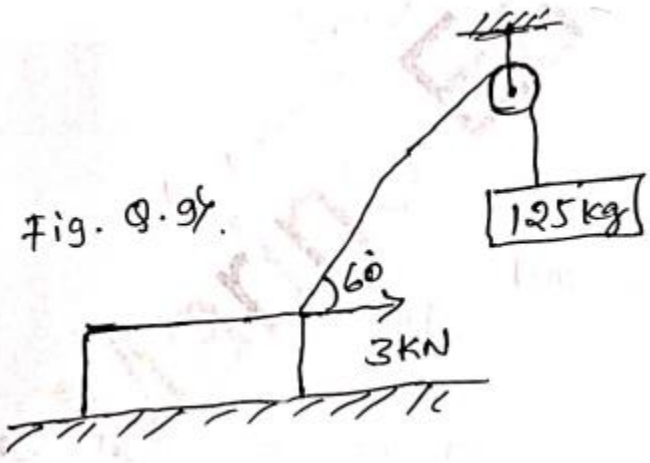


Fig. Q.9).

Q10. a. Determine the resultant horizontal and vertical components of the system of concurrent coplanar forces shown below -8m

b. State two of the three conditions for equilibrium -2m

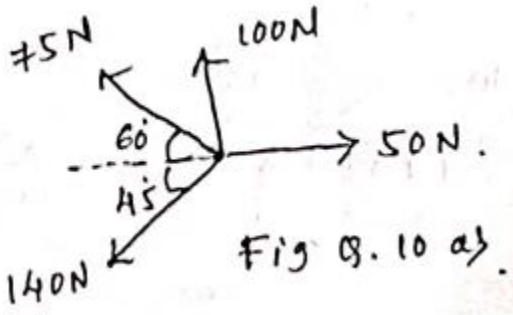


Fig Q. 10 a).

Q11. Figure shows a system of concurrent, coplanar forces. Calculate, by resolution into horizontal and vertical components, the magnitude and direction of the resultant force

-10m

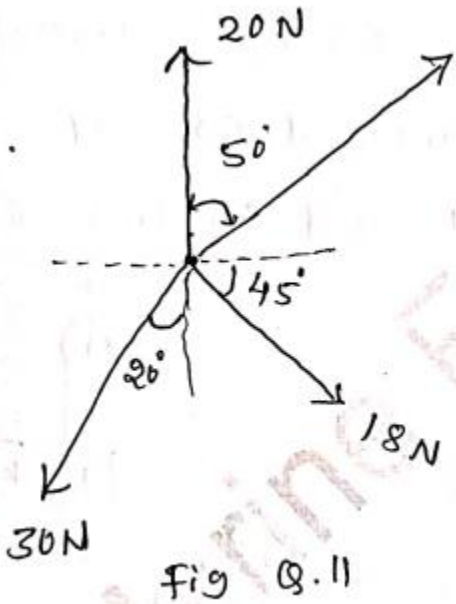
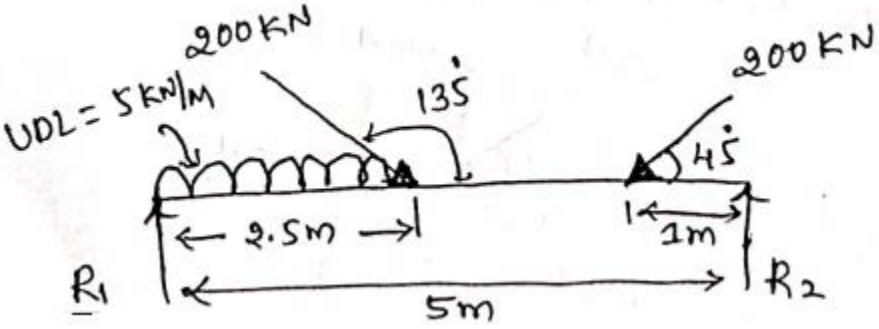



fig Q.11

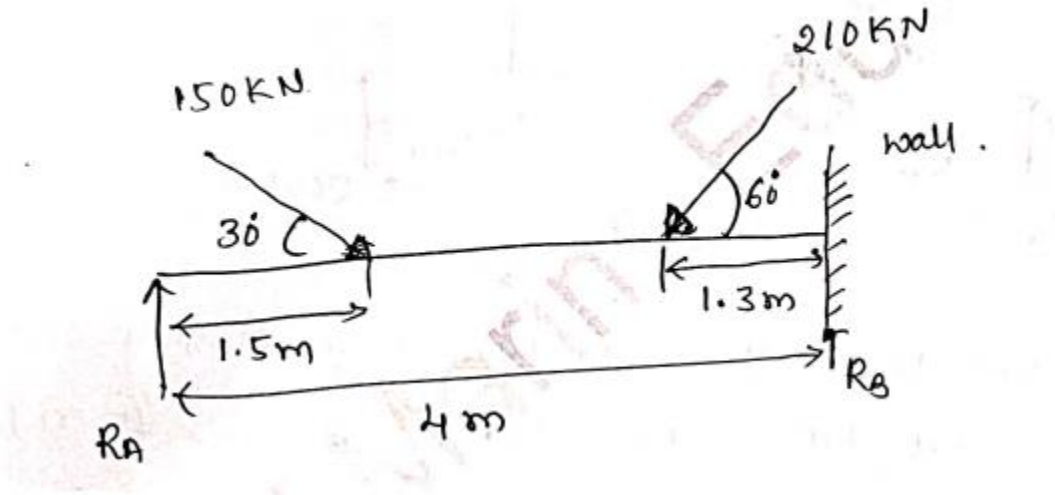
Q12. Figure below shows a simply supported beam. Calculate

a. The reaction force R1 -6m
b. The reaction force R2 -3m
c. The resultant horizontal component -1m



Q13. The figure below shows a simply supported beam of negligible mass which is in equilibrium. Calculate

a. The value of reactions $R_A$ and $R_B$ -6m
b. The value and directions of the horizontal reaction force at the wall -4m

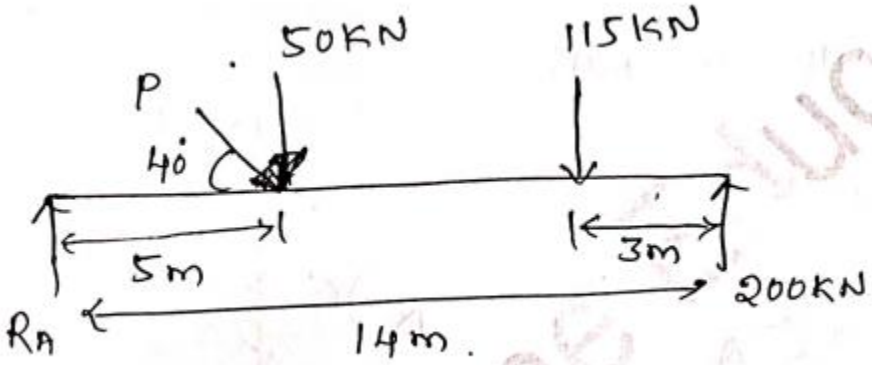



Q14. A simply supported beam 10m long has a mass of 1.5 tons and has a uniformly distributed load of 1.5kN/m over 3m from one end.

a. Sketch the arrangement showing all forces -2m
b. Calculate the reaction forces $R_A$ and $R_B$ at each end of the beam -8m

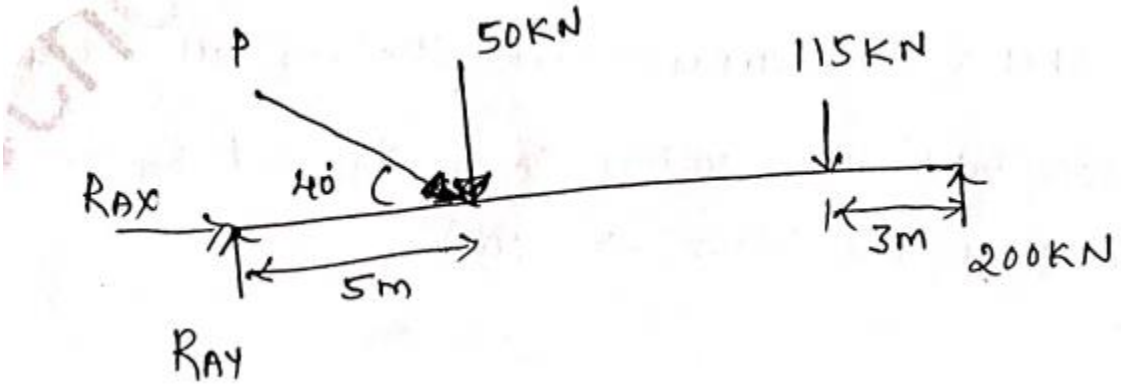
Q15. Figure below shows a 14m long simply supported beam. Calculate

a. Force P -6m
b. Reaction $R_A$ -4m




Q16. Figure below shows a 14m long simply supported beam. Calculate

a. Force P -5m
b. Reactions $R_{AX}$ and $R_{AY}$ -3m
c. Resultant $R_A$ and the horizontal angle -2m



Q17. Figure below shows a simply supported beam. Calculate

i. The total length of the beam -5m
ii. Reaction force R1 -3m

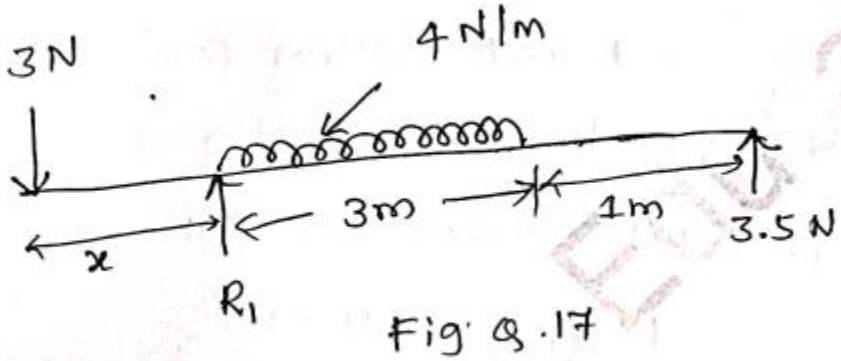
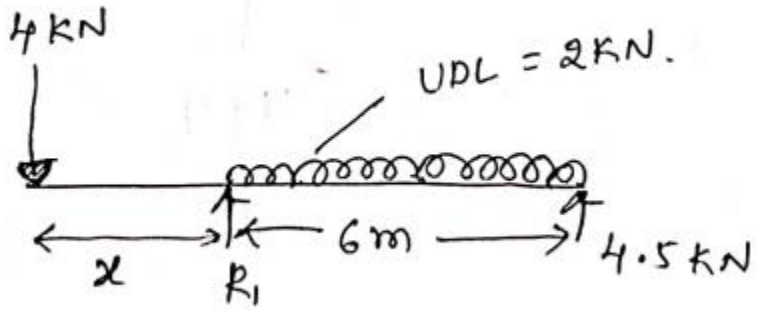


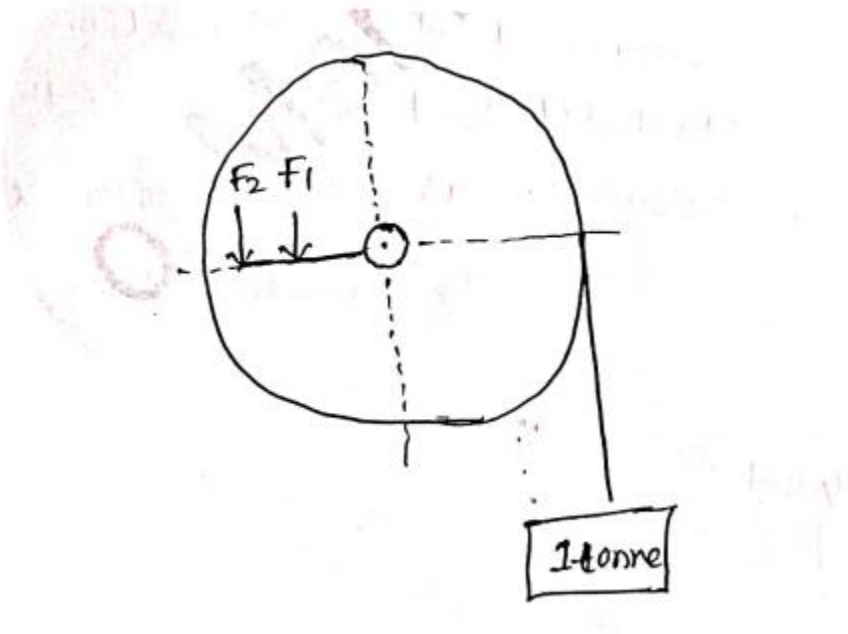

Fig. Q.17

Q18. A simply supported beam of negligible mass has a uniformly distributed load over 6m. If the beam is in equilibrium Calculate

a. The length 'x' -7m
b. Reaction force R1 -3m



Q19. In the figure below a 1 ton load hangs by a rope from a wheel 1.5m diameter. A handle fixed on the same shaft has a length of 600mm Two forces are applied to the handle as shown. F1 is 400mm from the Centre, F2 is at the end and friction forces are negligible. Take the gravitational acceleration as 9.81 m/sec$^2$. If F1 is 10kN, Calculate the force "F2" required to stop the load from falling. -10m



Q20. The handle shown in the figure below is keyed to a shaft and has a force of 200N, acting perpendicular to the handle at its free end preventing rotation. Calculate

i. The torque on the shaft -3m
ii. The force on the key -5m

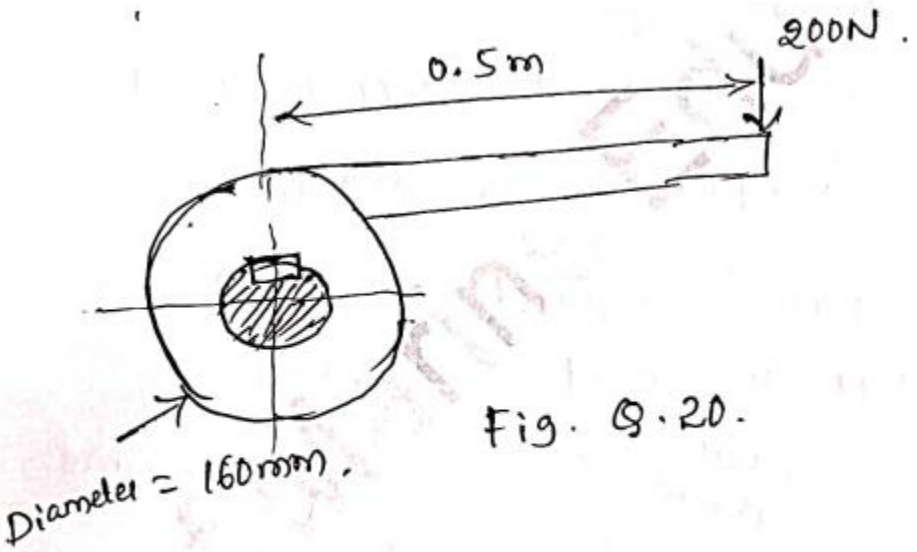



Fig. Q.20.

Q21. A 1.5 ton load is supported from a drum as shown in figure below. The drum is attached to a toothed wheel of the same diameter on the same axis which is driven by a matching toothed pinion. Take the gravitational acceleration as 9.81 m/sec$^2$ and friction forces are negligible. Calculate

a. The force required to lift the load at the drum -2m
b. The torque at the drum centre -3m
c. The force 'F' required at the end of a 100mm handle to lift the load -5m