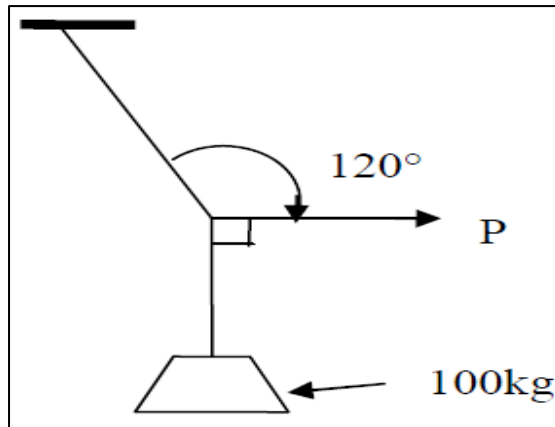


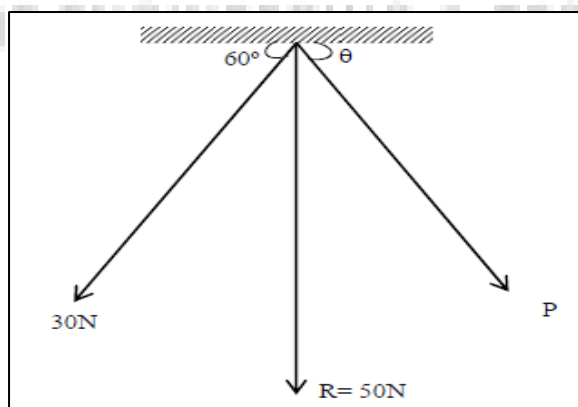
## MECHANICS OF SOLIDS

### ASSIGNMENT:2

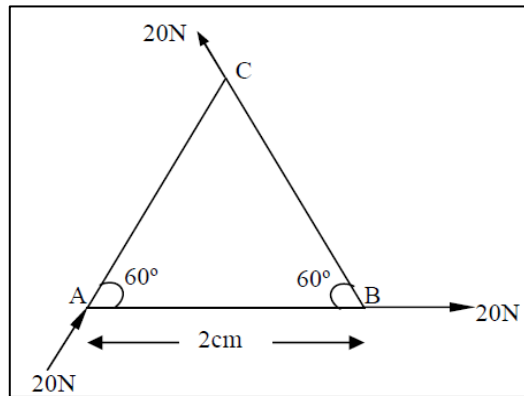
1. Two forces  $P$  and  $Q$  are acting at a point in a plane. The angle between the forces is ' $\alpha$ '. Prove that the resultant ( $R$ ) of the two forces is given by  $R = \sqrt{P^2 + Q^2 + 2PQ\cos\alpha}$
2. Explain with sketch the following system of forces:  
(1) Co planar forces (2) collinear forces (3) concurrent forces (4) Like parallel forces (5) coplanar –concurrent forces (6) unlike parallel forces
3. Define the moments. List examples of moment.
4. Differentiate Moment of force and moment of couple.
5. State the varignon's theorem. Prove that the resultant of two like parallel forces  $F_1$  and  $F_2$  is  $F_1 + F_2$ . Also prove that the resultant divides the line of joining the points of action of  $F_1$  and  $F_2$  internally in the inverse ratio of the forces.
6. Prove that a given force  $F$  applied to a body at any point  $A$  can always be replaced by an equal force applied at another point  $B$  together with a couple.
7. Explain the "Equivalent couples" with neat sketches.
8. State and explain the condition of equilibrium.
9. What is Free Body Diagram? What is the importance of Free Body Diagram?
10. Find the magnitude of the force  $P$ , required to keep the 100 kg mass in the position by strings as shown in the fig.



11. Resultant force of a system of two forces is directed vertically downwards. The magnitude of resultant force  $R$  is 50 N. One of the forces of the system has a magnitude of 30 N and is inclined at an angle of  $60^\circ$  with the horizontal as shown in Fig. Determine the magnitude  $P$  and direction of the second force.



12. Three forces are acting on a weightless equilateral triangular plate as shown in Fig. Determine the magnitude, direction and position of the resultant force.



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