Course Code: ESC106A
Course Title: Construction Materials and Engineering Mechanics

Lecture No. 14:
Problems on Coplanar Concurrent Force Systems

Delivered By: Deepthi M V

Lecture Intended Learning Outcomes

At the end of this lecture, students will be able to:

- Apply the method of resolution and find the resultant of coplanar concurrent force system
- Solve for the unknown forces given the resultant of concurrent force system
- Calculate the angles of applied forces given the resultant of concurrent force system

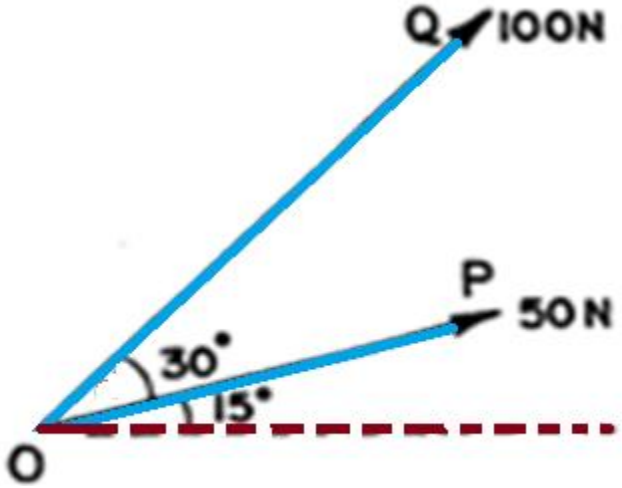
Contents

- **Analysis of Coplanar Concurrent and Non-Concurrent System of Forces**

Resultant of Concurrent force systems by method of Resolution-Numerical problems

Problems

1.Two forces are acting at a point O as shown in the figure. Determine the resultant in magnitude and direction.

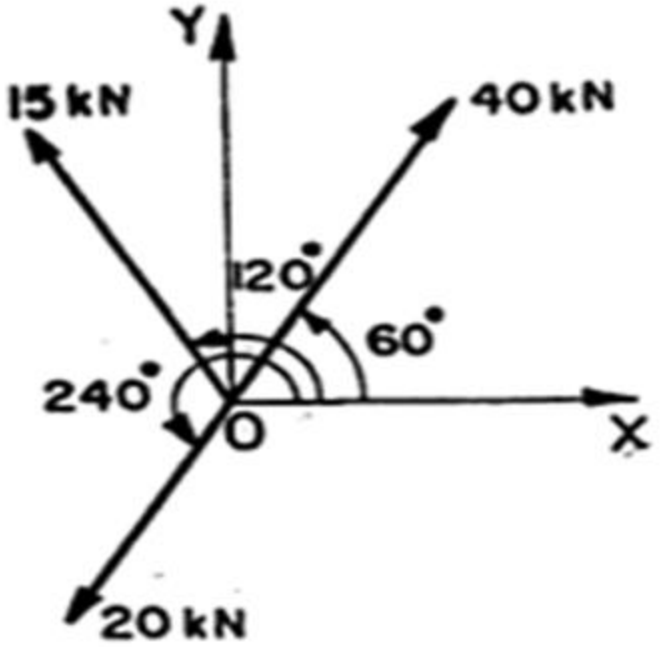


R=145.46N

α=35.10°

Problems

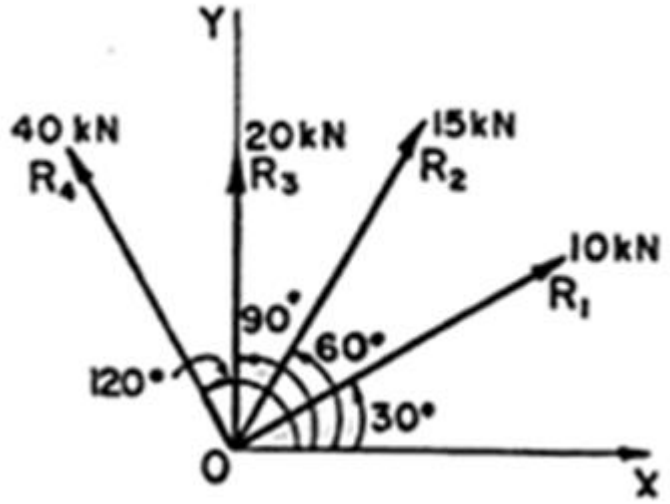
2.Three forces of magnitude 40 kN, 15 kN and 20 kN are acting at a point O as shown in the fig . The angles made by the 40 kN, 15kN and 20 kN forces with the x-axis are 60^0,120^0 and 240^0 respectively. Determine the magnitude and the direction of the resultant force.



R=30.41kN

Problems

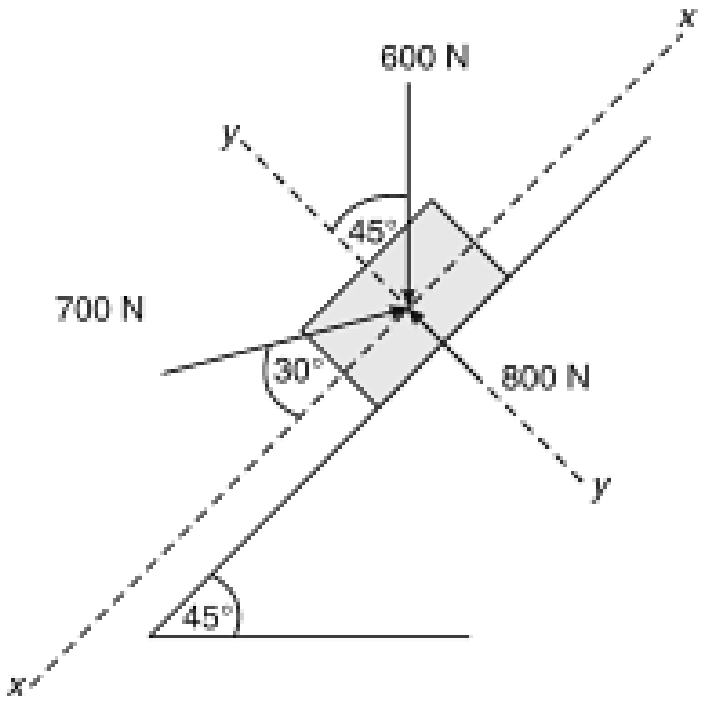
3. Three forces of magnitude 40 kN, 20 kN, 15kN and 10 kN are acting at a point O as shown in the fig . The angles made by the 40 kN, 20 kN, 15kN and 10 kN forces with the x-axis are 120^0, 90^o,60^0, and 30^0 respectively. Determine the magnitude and the direction of the resultant force.



R=72.73kN

Problems

4.Determine the resultant of the system of the forces acting on the body as shown in the figure



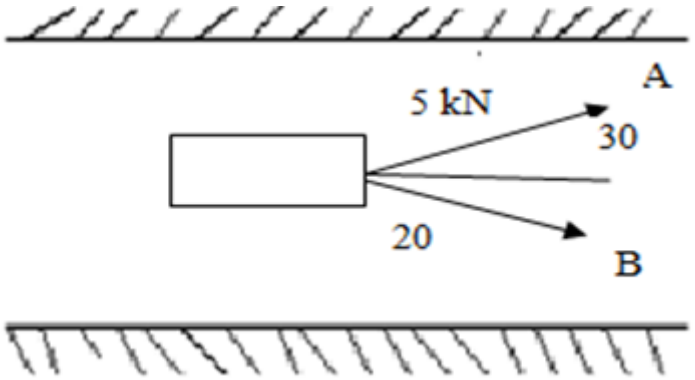
R=183.764kN

Problems

5.A truck has to be pulled along a straight road as shown in Figure

i) If the force applied along rope A is 5 KN inclined at 30^0, what should be the force in the rope B, which is inclined at 20^0, so that vehicle moves along the road?

ii) If force of 4 KN is applied in rope B at what angle rope B should be inclined so that the vehicle is pulled along the road?



(i)F_B=7.31kN
(ii)α=38.68˚

Summary

- The forces can be resolved and the resultant of coplanar concurrent force system can be obtained

- The unknown forces can be evaluated if the resultant of concurrent force system and direction of the resultant is known