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

## Lecture No. 14:
## Problems on Coplanar Concurrent Force Systems

**Delivered By: Mr. Shrihari K. Naik**

# 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

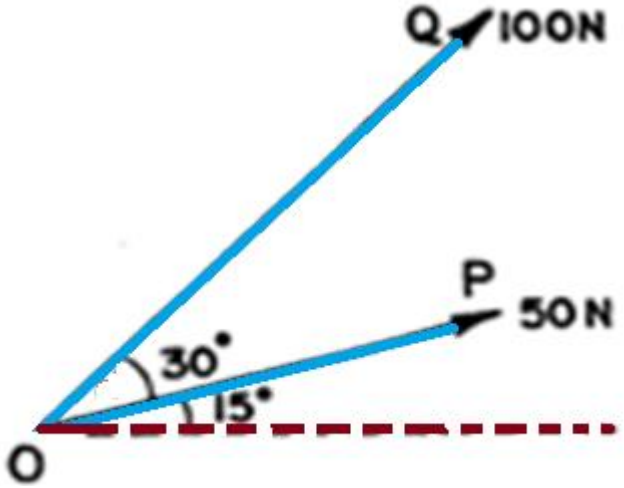
# Contents

- **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.

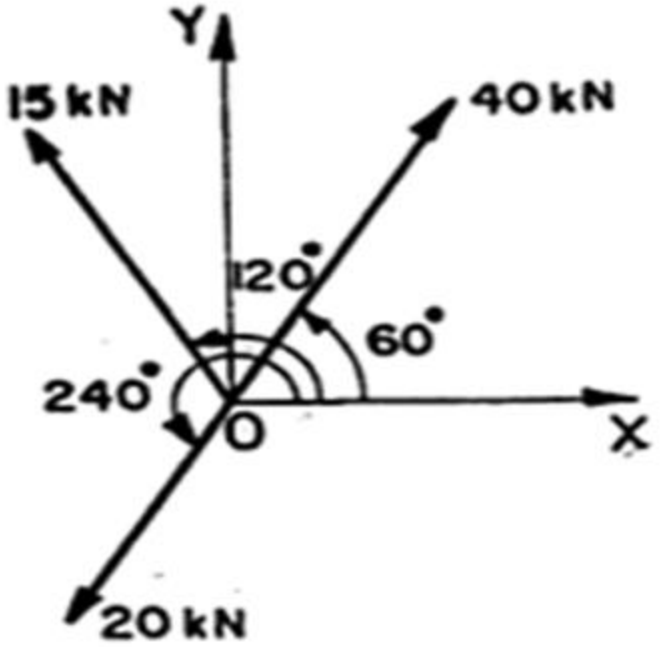



R=145.46N

α=35.10°

# Problems

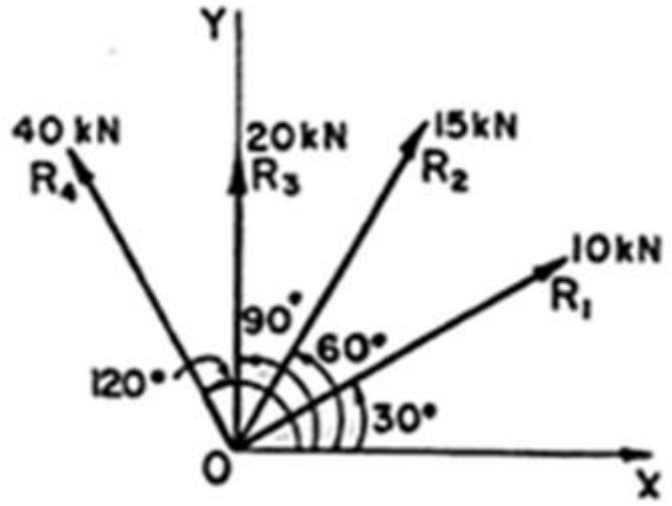
2.Three forces of magnitude 40 kN, 15 kN and 20 kN are acting at a point O as shown in the fig . The angles made by the 40 kN, 15kN and 20 kN forces with the x-axis are $60^0$,$120^0$ and $240^0$ respectively. Determine the magnitude and the direction of the resultant force.




R=30.41kN

# Problems

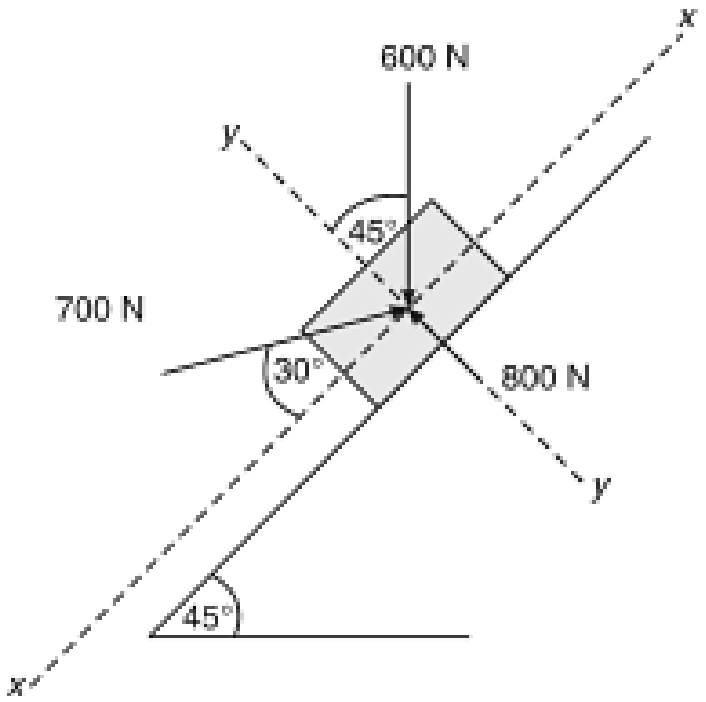
3. Three forces of magnitude 40 kN, 20 kN, 15kN and 10 kN are acting at a point O as shown in the fig . The angles made by the 40 kN, 20 kN, 15kN and 10 kN forces with the x-axis are $120^0$, $90^o$,$60^0$, and $30^0$ respectively. Determine the magnitude and the direction of the resultant force.




R=72.73kN

# Problems

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



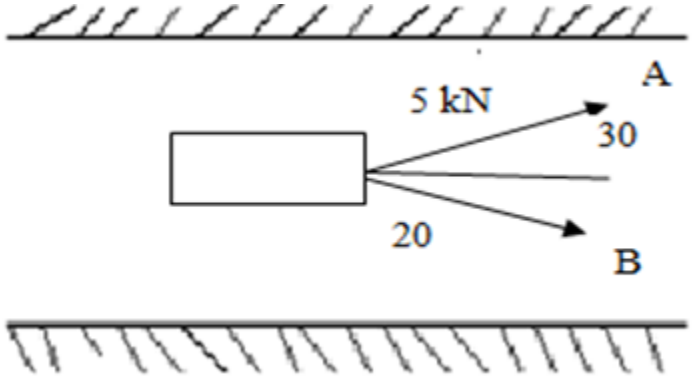

R=183.764kN

# 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