

**THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY, PATIALA**  
**DEPARTMENT OF CIVIL & MECHANICAL ENGINEERING**  
 MECHANICS-UES009

BE FIRST YEAR

SESSION: 2021-22

**TUTORIAL SHEET-01**

**(REPRESENTATION OF FORCES AND THEIR RESULTANTS)**

1. A force of 100 units acts along the line OP, terminating at P. If the coordinates of point O and P are  $(-3, 1, 2)$  and  $(10, 5, 8)$  respectively, specify the force in terms of unit vectors.
2. Compute the magnitude of the force F, whose components along the x, y, and z direction are 15kN, 26kN and -33kN, respectively. Also compute the inclination with all axes.
3. Forces 30kN, 40kN, 50kN and 60kN, are concurrent at O(1, 2, 3) and are directed through M(6, 3, -2), N(-4, -2, 5), P(-3, 2, 4) and Q(4, -3, 6), respectively. Determine the resultant of the system.
4. Determine the magnitude, direction and sense of the resultant of forces acting as shown in Fig. 1.
5. Two forces of magnitude 10N and 6N act on the ring. If the largest magnitude of the resultant force the ring can support is 14N, determine the angle between the forces, Fig 2.
6. The force F acting on the frame as shown in Fig. 3 has a magnitude of 500N and is to be resolved into two components acting along struts AB and AC. Determine the angle  $\phi$ , measured below the horizontal, so that the component FAC is directed from A towards C and has a magnitude of 400 N.
7. In Fig. 4, if the tensions in the pulley cable are equal i.e. 400N, express the force R exerted on the pulley by the two tensions. Determine the magnitude of R.
8. Find out the magnitude, orientation and sense of the resultant force of the force system shown in Fig. 5. Forces are acting on the sides of the hexagon.

