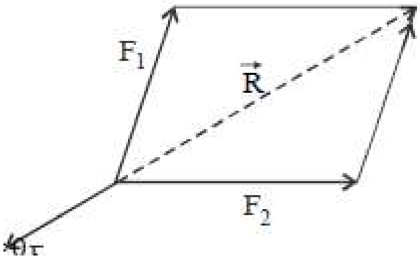
21. (3) (A) $\rightarrow$ (3); (B) $\rightarrow$ (4); C $\rightarrow$ (1); (D) $\rightarrow$ (2)

22. (3) Equilibrium under three concurrent forces F_1, F_2 and F_3 requires that vector sum of the three forces is zero.



$F_1 + F_2 + F_3 = 0$ $\quad\quad \vec{R} = \vec{F_1} + \vec{F_2} \quad \vec{F_3} = -\vec{R}$ (In eqbm)

23. (4) Inertia is defined as the ability of a body to oppose any change in its state of rest or of uniform motion.

24. (1) Given that $\vec{p} = p_x\hat{i} + p_y\hat{j} = 2\cos t\hat{i} + 2\sin t\hat{j}$ $\quad \therefore \vec{F} = \frac{d\vec{p}}{dt} = -2\sin t\hat{i} + 2\cos t\hat{j}$

Now, $\vec{F}.\vec{p} = 0$ i.e., angle between $\vec{F}$ and $\vec{p}$ is 90^o

25. (2)

26. (1)

27. (2) $u = 4\ m/s$, $v = 0$, $t = 2\ sec$

$v = u + at \Rightarrow 0 = 4 + 2a \Rightarrow a = -2\ m/s^2$ $\therefore$ Retarding force $= ma = 2 \times 2 = 4$ N

This force opposes the motion. If the same amount of force is applied in forward direction, then the body will move with constant velocity.

28. (4) $F = \frac{dp}{dt} \equiv \frac{d}{dt}(a + bt^2) = 2bt \therefore F \propto t$

29. (1) $F_{avg} = \frac{\Delta p}{\Delta t} = \frac{p}{0.5} = 2p$

30. (1) $\Delta P = F \times t = mat$