



Statics, Earth's Atmosphere and Astrophysics

Vikasana - CET 2012



- 1 The necessary condition for the static equilibrium of a rigid body is that**
- a) the resultant external force acting on it must be zero**
 - b) the resultant torque acting on it must be zero about any point**
 - c) both (a) and (b)**
 - d) neither (a) nor (b)**



2. A number of forces acting on a body are in equilibrium. Then the body

- a) must be at rest
- b) must move with uniform velocity
- c) may be either at rest or may move with uniform velocity
- d) must move with constant acceleration



Q.3 The equilibrant of a 5N force towards east is a

- a) 5N force towards west
- b) 5N force towards east
- c) 10N force towards north
- d) $5\sqrt{2}$ N force along north – east



- 4) The maximum and minimum values of the resultant of two forces P and Q are 13 N and 7 N respectively. Then, the values of P and Q are
- | | |
|-----------------------------------|----------------------------------|
| a) 10 N and 3 N | b) 7 N and 6 N |
| c) 8 N and 5 N | d) 9 N and 4 N |



5) Two identical forces are acting on a body. The magnitude of each force is equal to the magnitude of their resultant. The angle between the two forces is

a) 60°

b) 120°

c) 90°

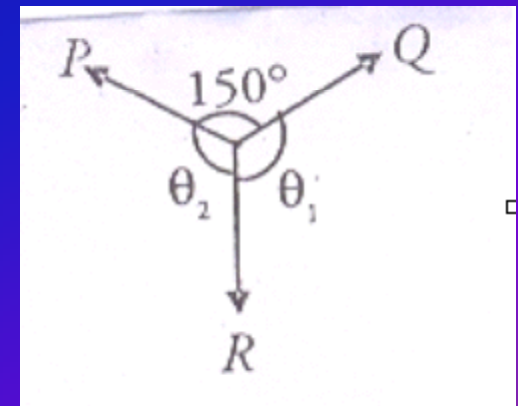
d) 0°

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6) P, Q and R are three coplanar forces acting at a point and are in equilibrium. Given $P = 1.9318 \text{ Kg} - \text{Wt}$, $\sin\theta_1 = 0.9659$, the value of R is (in Kg – Wt)

- a) $\frac{1}{2}$ b) 1 c) 2 d) 0.9659





- 7) If three concurrent forces acting at a point are in equilibrium, then
- a) each force is proportional to the angle between the other two
 - b) each force is proportional to sine of the angle between the other two
 - c) each force is inversely proportional to the sine of the angle between the other two
 - b) each force is inversely proportional to the angle between the other two



- 8) Two concurrent equal forces of magnitude 5 N each act at an angle of 120° . The magnitude of their resultant is
- a) 15 N b) $5\sqrt{3}$ N
c) 5 N d) 10 N



- 9) Moment of a force is also known as
- a) momentum
 - b) linear momentum
 - c) angular momentum
 - d) torque



10) The SI unit of Moment of a force is

a) N / m

b) N m^2

c) N m^{-2}

d) $\text{N} - \text{m}$



11) The dimensional formula of Moment of force is

a) $[MLT^{-2}]$

b) $[ML^2T^{-2}]$

c) $[ML^{-2}T^{-2}]$

d) $[ML^2T^2]$



12) If the line of action of force passing through the axis of rotation, what is the moment of force?

a) 1

b) zero

c) no effect

d) both (a) and (b)



- 13) If a body rotates clockwise direction, the moment of force is
- a) Positive
 - b) Negative
 - c) may positive or negative
 - d) Neither positive nor negative



- 14) Moment of a force does not depends on
- a) Magnitude of the force
 - b) direction of the force
 - c) Point of application of the force
 - d) axis of rotation



15) A gate of 2 m wide requires a force of $2 \text{ Kg} - Wt$ to be applied at one end to open it. The force that must be applied at a point 0.5 m distant from the hinges for opening the gate is

- a) $0.5 \text{ Kg} - Wt$ b) $2 \text{ Kg} - Wt$
c) $4.5 \text{ Kg} - Wt$ d) $8 \text{ Kg} - Wt$



16) Two unlike parallel forces 6 N and 10 N act on a rigid body at points A and B. If their resultant acts at a distance of 0.5 m from the greater force, the separation between A and B is

a) 1 m

b) $\frac{1}{4}$ m

c) $\frac{2}{3}$ m

d) $\frac{1}{3}$ m



17) A man and a boy carry a light pole of length 5 m at either end. A load of 100 kg is hung from the pole in such a way that the boy bears $\frac{1}{4}$ th of the total load. The position of the load from the end of the pole being carried by the boy is

- a) 1.25 m
- b) 3.75 m
- c) 4.5 m
- d) 2.5 m



18) The force of 10 N acting on a body at a distance 2 m from the axis of rotation, the torque produced is

- | | |
|-------------|--------------|
| a) 10 N – m | b) 2 N – m |
| c) 20 N – m | d) 0.2 N – m |



- 19) A torque applied to the rigid body always tends to produce
- a) linear acceleration
 - b) rotational inertia
 - c) rotational equilibrium
 - d) angular acceleration



20) The rotatory effect produced by a force acting on a rigid body which is free to rotate about an axis is called

- a) pure rotation
- b) momentum of force
- c) moment of momentum
- d) moment of force



21) A gate of 6 m wide requires a force of 5.2 Kg – Wt to be applied at one end to open it. The force to be applied at a 1.5 m distance from the hinges to open it is

- a) 20.8 Kg – Wt b) 10.4Kg – Wt
c) 15.3 Kg – Wt d) 6 Kg – Wt



- 22) The resultant of two forces is
- a) always a constant
 - b) always unique
 - c) a non zero force
 - d) none of these



23) Two equal forces act at a point. The square of their resultant is equal to three times the product of the forces. The angle between the forces is

- a) 30°
- b) 45°
- c) 60°
- d) 90°



24) The resultant of two forces $3P$ and $2P$ is R . If the first force is doubled then, the resultant is also doubled. The angle between the two forces is

a) 120°

b) 60°

c) 180°

d) 90°



25) The resultant of two forces, one doubled the other in magnitude, is perpendicular to the smaller of the two forces.

The angle between the two forces is

- a) 90°
- b) 150°
- c) 120°
- d) 60°



26)The resultant of a set of concurrent forces acting on a rigid body can be found out using

- a) parallelogram law of forces
- b) triangle law of forces
- c) Lami's theorem
- d) All these



- 27) A couple acting on a body causes
- a) rotational motion only
 - b) translational motion only
 - c) both translational and rotational motion
 - d) vibrational motion



28) Two unequal forces F_1 and F_2 acting at an angle of 120° have their resultant perpendicular to the smaller of the two forces. If the greater force has the magnitude 10 N, the magnitude of their resultant is

a) $10\sqrt{2}$ N

b) $5\sqrt{3}$ N

c) $10\sqrt{5}$ N

d) 5 N



29) A block of mass 20 kg is suspended using an inextensible rope from a rigid support. The block is pulled aside by a horizontal force H such that the rope makes an angle 60° with the vertical. The horizontal force acting on the block is

a) 10 Kg – Wt

b) $20\sqrt{3}$ Kg – Wt

c) $20/\sqrt{3}$ Kg – Wt

d) $10/\sqrt{3}$ Kg – Wt



30) Of the following sets of concurrent forces, the one which may be in equilibrium is

a) $F_1 = 3 \text{ N}$, $F_2 = 5 \text{ N}$, $F_3 = 1 \text{ N}$

b) $F_1 = 3 \text{ N}$, $F_2 = 5 \text{ N}$, $F_3 = 9 \text{ N}$

c) $F_1 = 3 \text{ N}$, $F_2 = 5 \text{ N}$, $F_3 = 6 \text{ N}$

d) $F_1 = 3 \text{ N}$, $F_2 = 5 \text{ N}$, $F_3 = 15 \text{ N}$



31) Earth's atmosphere extends to about -----
from the surface of the earth.

a) 56 km

b) 560 km

c) 5600 km

d) 56000 km



32) Atmospheric pressure

- a) decreases with elevation
- b) increases with elevation
- c) first increases and then decreases with elevation
- d) does not depend on elevation