PHYSICS • CLASS 9 • CHAPTER 4

Turning Effects of Force

Complete Solved MCQs Practice Book

76	100%	11
MCQs	Solved	Topics

Chapter Topics Covered:

Like & Unlike Parallel Forces | Addition of Forces | Turning Effect of a Force

Moment of Force (Torque) | Couple | Resolution of Vectors

Centre of Gravity & Centre of Mass | Equilibrium & its Conditions

States of Equilibrium | Stability & its Applications | Centripetal Force

Every question includes the correct answer highlighted and a full explanation for concept clarity.

Question 1

If two parallel forces act on a body in the same direction, they are called

A Unlike parallel forces

B **Like parallel forces** ✔

C Centripetal forces

D Couple forces

✅ **Correct Answer: B. Like parallel forces**

💡 **Explanation**

When parallel forces point in the same direction, they are known as like parallel forces. If their directions are opposite, they are called unlike parallel forces.

Question 2

Two parallel forces acting on a rigid body in opposite directions are called

A Like parallel forces

B Resultant forces

C **Unlike parallel forces** ✔

D Centripetal forces

✅ **Correct Answer: C. Unlike parallel forces**

💡 **Explanation**

Parallel forces having opposite directions are called unlike parallel forces, as opposed to like parallel forces which act in the same direction.

Question 3

A force is a physical quantity that has

A Magnitude only

B Direction only

C **Both magnitude and direction** ✔

D Neither magnitude nor direction

✅ **Correct Answer: C. Both magnitude and direction**

💡 **Explanation**

A force is a vector quantity, meaning it possesses both magnitude and a specific direction of action.

Question 4

The resultant of two like parallel forces of 30 N and 20 N acting on a body is

A 10 N

B **50 N** ✔

C 600 N

D 0 N

✅ **Correct Answer: B. 50 N**

💡 **Explanation**

Like parallel forces act in the same direction, so their magnitudes simply add up: 30 N + 20 N = 50 N.

Question 5

Vectors are added by using the

A Multiplication rule

B Head-to-tail rule ✔

C Division rule

D Subtraction rule

✅ **Correct Answer: B. Head-to-tail rule**

💡 **Explanation**

Since forces are vector quantities, two or more forces can be added using the head-to-tail rule to find their resultant.

Question 6

If three force vectors are added by the head-to-tail rule, the resultant is represented by

A The first vector drawn

B The last vector drawn

C **The line joining the tail of the first vector to the head of the last vector** ✔

D None of these

✅ **Correct Answer: C. The line joining the tail of the first vector to the head of the last vector**

💡 **Explanation**

In the head-to-tail method, the resultant vector is drawn from the tail of the first vector to the head of the last vector in the chain.

Question 7

The resultant of two or more vectors does NOT depend upon

A Their magnitudes

B Their directions

C **The order in which they are added** ✔

D The angle between them

✅ **Correct Answer: C. The order in which they are added**

💡 **Explanation**

The resultant of vectors added by the head-to-tail rule is the same regardless of the order in which the vectors are added.

Question 8

The turning effect of a force about an axis of rotation is called

A Momentum

B **Torque** ✔

C Impulse

D Work

✅ **Correct Answer: B. Torque**

💡 **Explanation**

The rotational or turning effect produced by a force about an axis is known as torque or moment of force.

Question 9

A rigid body is one in which

A. The distance between any two particles changes with rotation

B. The distance between any two particles remains the same during rotation ✔

C. Particles collide with each other

D. Mass keeps changing

✅ **Correct Answer: B. The distance between any two particles remains the same during rotation**

💡 **Explanation**

A rigid body is defined as a body in which the distance between any two of its particles remains constant while it rotates or moves.

Question 10

The straight line joining the centres of the circular paths followed by particles of a rotating rigid body is called

A Line of action

B **Axis of rotation** ✔

C Moment arm

D Radius vector

✅ **Correct Answer: B. Axis of rotation**

💡 **Explanation**

All particles of a rotating rigid body move in circles whose centres lie on a common straight line, called the axis of rotation.

Question 11

The perpendicular distance between the axis of rotation and the line of action of a force is called

A Torque

B **Moment arm** ✔

C Resultant force

D Centre of mass

✅ **Correct Answer: B. Moment arm**

💡 **Explanation**

The perpendicular distance from the axis of rotation to the line along which a force acts is known as the moment arm of that force.

Question 12

The turning effect of a force depends on

A Only the magnitude of the force

B Only the point of application

C **Both the magnitude of force and its perpendicular distance from the axis** ✔

D Only the mass of the body

✅ **Correct Answer: C. Both the magnitude of force and its perpendicular distance from the axis**

💡 **Explanation**

Torque depends on both the magnitude of the applied force and the perpendicular distance (moment arm) from the axis of rotation to its line of action.

Question 13

Moment of a force (torque) is mathematically defined as

A Force / moment arm

B **Force x moment arm** ✔

C Force x mass

D Force / mass

✅ **Correct Answer: B. Force x moment arm**

💡 **Explanation**

Torque (tau) is defined as the product of the force and the moment arm: tau = F x l.

Question 14

The SI unit of torque is

A Newton (N)

B **Newton metre (Nm)** ✔

C Joule (J)

D Watt (W)

✅ **Correct Answer: B. Newton metre (Nm)**

💡 **Explanation**

Since torque is the product of force (Newton) and distance (metre), its SI unit is the newton metre (Nm).

Question 15

A torque that tends to rotate a body anticlockwise is taken as

A Negative

B Zero

C **Positive** ✔

D Undefined

✅ **Correct Answer: C. Positive**

💡 **Explanation**

By convention, torque producing anticlockwise rotation is considered positive, while torque producing clockwise rotation is considered negative.

Question 16

A torque that produces clockwise rotation about an axis is taken as

A Positive

B **Negative** ✔

C Zero

D Infinite

✅ **Correct Answer: B. Negative**

💡 **Explanation**

By the standard sign convention, a clockwise turning effect is assigned a negative torque value.

Question 17

The torque of a force about an axis becomes zero when

A The force is maximum

B **The line of action of the force passes through the axis of rotation** ✔

C The force acts perpendicular to the moment arm

D The body is at rest

✅ **Correct Answer: B. The line of action of the force passes through the axis of rotation**

💡 **Explanation**

If the line of action of a force passes directly through the axis of rotation, its moment arm becomes zero, and hence its torque is also zero.

Question 18

Door handles are fixed far away from the hinges because

A It looks attractive

B It reduces the force needed to produce a given moment ✔

C It increases the weight of the door

D It reduces friction

✅ **Correct Answer: B. It reduces the force needed to produce a given moment**

💡 **Explanation**

Placing the handle at a larger distance from the hinge (axis) increases the moment arm, so a smaller force is needed to produce the same turning effect (torque).

Question 19

A spanner of length 20 cm is used to tighten a nut by applying a force of 50 N perpendicular to it. The torque produced is

A **10 Nm** ✔

B 70 Nm

C 2.5 Nm

D 1000 Nm

✅ **Correct Answer: A. 10 Nm**

💡 **Explanation**

Torque = Force x moment arm = 50 N x 0.20 m = 10 Nm.

Question 20

It is easier to open a door by pushing it near the handle rather than near the hinge because

A **The moment arm is larger near the handle, producing greater torque for the same force** ✔

B The door is lighter near the handle

C Friction is less near the handle

D The hinge exerts less force

✅ Correct Answer: A. The moment arm is larger near the handle, producing greater torque for the same force

💡 Explanation

Since torque = force x moment arm, pushing farther from the hinge (near the handle) increases the moment arm and hence produces a greater torque for the same applied force.

Question 21

A couple is formed when

A. A single force acts on a body

B. **Two equal and opposite parallel forces act at two different points of a body** ✔

C. Two unequal forces act at the same point

D. A force acts through the centre of mass

✅ **Correct Answer: B. Two equal and opposite parallel forces act at two different points of a body**

💡 **Explanation**

A couple consists of two equal, opposite, and parallel forces acting at two different points on the same body, producing a pure turning effect.

Question 22

Which of the following is an everyday example of a couple?

A Lifting a box straight up

B **Turning a steering wheel or a key in a lock** ✔

C A ball rolling on the ground

D A book resting on a table

✅ **Correct Answer: B. Turning a steering wheel or a key in a lock**

💡 **Explanation**

Turning a steering wheel, opening a jar lid, and turning a key in a lock are common examples where a couple (two equal, opposite parallel forces) is applied.

Question 23

The net translational (linear) effect of a couple acting on a body is

A Maximum

B **Zero** ✔

C Equal to the sum of the forces

D Doubled

✅ **Correct Answer: B. Zero**

💡 **Explanation**

Since the two forces of a couple are equal in magnitude but opposite in direction, their resultant force is zero, so a couple produces no linear (translational) motion, only rotation.

Question 24

A couple always produces

A Pure translational motion

B Pure rotational motion ✔

C No motion at all

D Both translational and rotational motion equally

✅ **Correct Answer: B. Pure rotational motion**

💡 **Explanation**

Because the net force of a couple is zero while the net torque is non-zero, a couple produces pure rotational motion without translation.

Question 25

Splitting a single vector into two or more vectors is called

A Addition of vectors

B **Resolution of a vector** ✔

C Multiplication of vectors

D Subtraction of vectors

✅ **Correct Answer: B. Resolution of a vector**

💡 **Explanation**

The process of dividing a vector into two or more component vectors, whose combined effect equals the original vector, is called resolution of a vector.

Question 26

The components of a vector that are perpendicular to each other are called

A Resultant components

B Equal components

C **Rectangular components** ✔

D Scalar components

✅ **Correct Answer: C. Rectangular components**

💡 **Explanation**

When a vector is resolved into two components that are mutually perpendicular, they are called rectangular (or perpendicular) components.

Question 27

If a force F acts at angle theta with the x-axis, its x-component is given by

A F sin(theta)

B F cos(theta) ✔

C F tan(theta)

D F / cos(theta)

✅ **Correct Answer: B. F cos(theta)**

💡 **Explanation**

The x-component (horizontal component) of a force F acting at angle theta with the x-axis is Fx = F cos(theta).

Question 28

If a force F acts at angle theta with the x-axis, its y-component is given by

A F cos(theta)

B **F sin(theta)** ✔

C F / sin(theta)

D F tan(theta)

✅ **Correct Answer: B. F sin(theta)**

💡 **Explanation**

The y-component (vertical component) of a force F acting at angle theta with the x-axis is Fy = F sin(theta).

Question 29

A force of 60 N acts at 30 degrees with the horizontal. Its horizontal component is approximately

A 30 N

B **51.9 N** ✔

C 60 N

D 103.8 N

✅ **Correct Answer: B. 51.9 N**

💡 **Explanation**

Fx = F cos(theta) = 60 N x cos30 degrees = 60 x 0.866 = 51.9 N.

Question 30

A force of 60 N acts at 30 degrees with the horizontal. Its vertical component is

A 51.9 N

B 60 N

C **30 N** ✔

D 0 N

✅ **Correct Answer: C. 30 N**

💡 **Explanation**

Fy = F sin(theta) = 60 N x sin30 degrees = 60 x 0.5 = 30 N.

Question 31

If Fx and Fy are the perpendicular components of a force F, then the magnitude of F is given by

A Fx + Fy

B **square root of (Fx^2 + Fy^2)** ✔

C Fx - Fy

D Fx x Fy

✅ **Correct Answer: B. square root of (Fx^2 + Fy^2)**

💡 **Explanation**

By the Pythagorean theorem applied to the right-angled triangle of components, F = square root of (Fx^2 + Fy^2).

Question 32

The direction (angle) of a force F with respect to the x-axis, given its components Fx and Fy, is found using

A theta = Fx / Fy

B theta = tan^-1(Fy / Fx) ✔

C theta = Fx + Fy

D theta = sin(Fx)

✅ **Correct Answer: B. theta = tan^-1(Fy / Fx)**

💡 **Explanation**

The angle that the resultant force makes with the x-axis is given by theta = tan^-1(Fy / Fx).

Question 33

The point where the total weight of a body appears to act is called

A Centre of mass

B Centre of gravity ✔

C Moment arm

D Axis of rotation

✅ **Correct Answer: B. Centre of gravity**

💡 **Explanation**

The centre of gravity is defined as that point of a body where its entire weight is considered to act.

Question 34

The centre of gravity of a uniform square or rectangle lies at

A One of its corners

B The midpoint of one side

C **The point of intersection of its diagonals** ✔

D Outside the shape

✅ **Correct Answer: C. The point of intersection of its diagonals**

💡 **Explanation**

For regular shapes like a square or rectangle, the centre of gravity lies at the geometric centre, which is the point where the diagonals intersect.

Question 35

The centre of gravity of a triangular lamina lies at the

A **Point of intersection of its medians** ✔

B Midpoint of its longest side

C One of its vertices

D Point outside the triangle

✅ **Correct Answer: A. Point of intersection of its medians**

💡 **Explanation**

For a triangle, the centre of gravity is located at the point where the three medians intersect (the centroid).

Question 36

The centre of gravity of a uniform sphere lies at

A Its surface

B Its centre ✔

C Its topmost point

D Its base

✅ **Correct Answer: B. Its centre**

💡 **Explanation**

For a uniform sphere, the centre of gravity coincides with the geometrical centre of the sphere.

Question 37

The position of the centre of gravity of an irregular plane lamina can be found experimentally by using a

A Spring balance

B Plumb line ✔

C Protractor

D Measuring cylinder

✅ **Correct Answer: B. Plumb line**

💡 **Explanation**

By suspending the irregular lamina freely from different points and drawing vertical lines using a plumb line, the point where these lines intersect gives the centre of gravity.

Question 38

The centre of mass of a body is the point where

A Only half the mass is concentrated

B **The entire mass of the body is assumed to be concentrated** ✔

C No mass exists

D The weight becomes zero

✅ **Correct Answer: B. The entire mass of the body is assumed to be concentrated**

💡 **Explanation**

The centre of mass is defined as the point at which the whole mass of a body or system is assumed to be concentrated for analyzing its motion.

Question 39

On the surface of the Earth, the centre of mass of an object generally coincides with its

A Axis of rotation

B **Centre of gravity** ✔

C Moment arm

D Line of action

✅ **Correct Answer: B. Centre of gravity**

💡 **Explanation**

Since the value of g is nearly uniform over the size of ordinary objects near the Earth's surface, the centre of mass coincides with the centre of gravity.

Question 40

In the case of a rotating wrench sliding on a frictionless floor with no resultant force acting on it, its centre of mass

A Moves in a circular path

B Follows a straight line path with constant speed ✔

C Remains stationary while the wrench spins

D Accelerates continuously

✅ **Correct Answer: B. Follows a straight line path with constant speed**

💡 **Explanation**

Even though individual points of the wrench trace curved paths as it spins, its centre of mass moves in a straight line at constant speed since there is no net external force.

Question 41

A body is said to be in equilibrium if it has

A Maximum acceleration

B **No acceleration** ✔

C Uniform acceleration

D Increasing velocity

✅ **Correct Answer: B. No acceleration**

💡 **Explanation**

A body is in equilibrium when the net force (and hence acceleration) acting on it is zero, whether it is at rest or moving with constant velocity.

Question 42

A book lying at rest on a table is an example of

A Dynamic equilibrium

B Unstable equilibrium

C **Static equilibrium** ✔

D Non-equilibrium

✅ **Correct Answer: C. Static equilibrium**

💡 **Explanation**

Since the book remains at rest under the balanced effect of its weight and the normal reaction of the table, it is in static equilibrium.

Question 43

A paratrooper descending with a uniform velocity after the parachute opens is an example of

A Static equilibrium

B **Dynamic equilibrium** ✔

C Unstable equilibrium

D No equilibrium

✅ **Correct Answer: B. Dynamic equilibrium**

💡 **Explanation**

A body moving with uniform (constant) velocity, like a descending paratrooper, is said to be in dynamic equilibrium.

Question 44

Which of the following is an example of static equilibrium?

A. A car moving at a constant speed on a straight road

B. An electric bulb hanging from the ceiling ✔

C. A skydiver falling at terminal velocity

D. A ball rolling down a slope

✅ **Correct Answer: B. An electric bulb hanging from the ceiling**

💡 **Explanation**

A stationary object under balanced forces, such as a bulb hanging at rest from the ceiling, is an example of static equilibrium.

Question 45

The first condition of equilibrium states that

A The net torque about any point must be zero

B **The vector sum of all external forces acting on a body must be zero** ✔

C The body must be at rest

D The mass of the body must be zero

✅ **Correct Answer: B. The vector sum of all external forces acting on a body must be zero**

💡 **Explanation**

The first condition of equilibrium requires that the vector sum of all external forces acting on a body equals zero, ensuring no translational (linear) acceleration.

Question 46

The second condition of equilibrium is concerned with

A Translational equilibrium

B **Rotational equilibrium** ✔

C Thermal equilibrium

D Chemical equilibrium

✅ **Correct Answer: B. Rotational equilibrium**

💡 **Explanation**

The second condition of equilibrium deals with rotational equilibrium, requiring that the net torque about any point be zero so the body does not rotate.

Question 47

Mathematically, the first condition of equilibrium can be written as

A **Sum of F = 0** ✔

B Sum of torque = 0

C Sum of F = ma

D F = 0 only along x-axis

✅ **Correct Answer: A. Sum of F = 0**

💡 **Explanation**

The first condition of equilibrium is expressed as sum of F = 0, meaning both sum of Fx = 0 and sum of Fy = 0.

Question 48

Mathematically, the second condition of equilibrium can be written as

A Sum of F = 0

B **Sum of tau = 0** ✔

C F = ma

D v = constant

✅ **Correct Answer: B. Sum of tau = 0**

💡 **Explanation**

The second condition of equilibrium is expressed as sum of tau = 0, meaning the net torque about any point on the body must be zero.

Question 49

For a body to be in complete equilibrium, which conditions must be satisfied simultaneously?

A Only the first condition

B Only the second condition

C **Both the first and second conditions** ✔

D Neither condition is required

✅ **Correct Answer: C. Both the first and second conditions**

💡 **Explanation**

A body is in complete equilibrium only when both the first condition (sum of F = 0) and the second condition (sum of tau = 0) are satisfied together.

Question 50

A picture of weight 5 N is suspended by two vertical strings, each 20 cm from the centre. The sum of the tensions in both strings must equal

A Zero

B 2.5 N

C **5 N** ✔

D 10 N

✅ **Correct Answer: C. 5 N**

💡 **Explanation**

By the first condition of equilibrium, sum of Fy = 0, so T1 + T2 must equal the weight of the picture, which is 5 N.

Question 51

A body is said to be in a state of stable equilibrium if, after a slight tilt, it

A Falls over completely

B Comes back to its original position ✔

C Stays in the tilted position

D Moves to a new equilibrium position

✅ **Correct Answer: B. Comes back to its original position**

💡 **Explanation**

Stable equilibrium occurs when a body, after being slightly displaced, experiences a restoring torque that brings it back to its original position.

Question 52

A body is in unstable equilibrium if, after a slight tilt, it

A Returns to its original position

B Remains in the new position

C **Moves further away from its original position** ✔

D Oscillates forever

✅ **Correct Answer: C. Moves further away from its original position**

💡 **Explanation**

In unstable equilibrium, a slight disturbance causes the body to move further away from its original position rather than returning to it.

Question 53

A body is in neutral equilibrium if, after being disturbed, it

A Returns to the original position

B Comes to rest in a new position without any change in the height of its centre of mass ✔

C Falls down completely

D Starts rotating continuously

✅ **Correct Answer: B. Comes to rest in a new position without any change in the height of its centre of mass**

💡 **Explanation**

In neutral equilibrium, a body settles into a new position after disturbance, but the height of its centre of mass remains unchanged, such as a cylinder rolling on a flat surface.

Question 54

A cone resting on its base is an example of

A Unstable equilibrium

B Neutral equilibrium

C **Stable equilibrium** ✔

D No equilibrium

✅ **Correct Answer: C. Stable equilibrium**

💡 **Explanation**

A cone standing on its wide base has a low centre of gravity above a large base area, so it returns to position after a small tilt, making it stable equilibrium.

Question 55

A cone balanced on its pointed tip is an example of

A Stable equilibrium

B Unstable equilibrium ✔

C Neutral equilibrium

D Dynamic equilibrium

✅ **Correct Answer: B. Unstable equilibrium**

💡 **Explanation**

Balancing a cone on its tip is unstable equilibrium, since even a slight tilt moves the centre of gravity outside the base and the cone topples over.

Question 56

A ball or cylinder resting and free to roll on a flat horizontal surface is in a state of

A Stable equilibrium

B Unstable equilibrium

C **Neutral equilibrium** ✔

D No equilibrium

✅ **Correct Answer: C. Neutral equilibrium**

💡 **Explanation**

A ball or cylinder on a flat surface is in neutral equilibrium since rolling it to a new position does not change the height of its centre of mass.

Question 57

The stability of an object can be improved by

A Raising its centre of mass and narrowing its base

B **Lowering its centre of mass and increasing its base area** ✔

C Removing its base entirely

D Increasing its height only

✅ **Correct Answer: B. Lowering its centre of mass and increasing its base area**

💡 **Explanation**

Stability improves when the centre of mass/gravity is lowered and the base area of an object is increased, making it harder to topple over.

Question 58

A double-decker bus is more likely to overturn when

A It is empty

B Heavy loads are placed on its floor

C **Heavy loads are placed on its upper deck/roof** ✔

D It is moving slowly

✅ **Correct Answer: C. Heavy loads are placed on its upper deck/roof**

💡 **Explanation**

Placing heavy loads on the roof or upper deck of a bus raises its centre of gravity, moving it closer to unstable equilibrium and increasing the risk of overturning.

Question 59

A low armchair is more stable than a high chair because it has a

A Higher centre of gravity

B **Lower centre of gravity** ✔

C Smaller base area

D Greater weight

✅ **Correct Answer: B. Lower centre of gravity**

💡 **Explanation**

A lower centre of gravity, as found in a low armchair, gives greater stability compared to objects with a higher centre of gravity.

Question 60

Racing cars are designed with a low centre of mass and wheels outside the main body mainly to

A Increase their weight

B Enhance their stability at high speeds ✔

C Reduce fuel consumption

D Make them look attractive

✅ **Correct Answer: B. Enhance their stability at high speeds**

💡 **Explanation**

A low centre of mass combined with a wide wheelbase increases the base area relative to the height of the centre of mass, enhancing the stability of racing cars during sharp turns at high speed.

Question 61

Balancing toys remain stable because their

A Centre of gravity is always above the pivot point

B **Centre of gravity always remains below the pivot point** ✔

C Weight is negligible

D Base area is very small

✅ **Correct Answer: B. Centre of gravity always remains below the pivot point**

💡 **Explanation**

Balancing toys are designed so that their centre of gravity lies below the pivot point, which keeps them in stable equilibrium even when slightly disturbed.

Question 62

Widening the base of a ship or boat is done to

A Increase its speed

B **Improve its stability** ✔

C Reduce its weight

D Increase its centre of gravity

✅ **Correct Answer: B. Improve its stability**

💡 **Explanation**

A wider base increases the stability of ships and boats by making it harder for them to tip over, similar to widening the base of any object to improve stability.

Question 63

The rotational counterpart of linear velocity is

A Torque

B **Angular velocity** ✔

C Angular momentum

D Force

✅ **Correct Answer: B. Angular velocity**

💡 **Explanation**

In rotational motion, angular velocity plays the same role that linear (translational) velocity plays in straight-line motion.

Question 64

The rotational counterpart of force in translational motion is

A Angular velocity

B Angular acceleration

C **Torque (moment of force)** ✔

D Momentum

✅ **Correct Answer: C. Torque (moment of force)**

💡 **Explanation**

Just as force causes linear acceleration in translational motion, torque (moment of force) causes angular acceleration in rotational motion.

Question 65

According to the rotational analogue of Newton's first law, a rotating object will continue to rotate with constant angular velocity unless

A It loses mass

B **A resultant torque acts on it** ✔

C It stops due to gravity

D Its axis changes color

✅ **Correct Answer: B. A resultant torque acts on it**

💡 **Explanation**

Analogous to Newton's first law for straight-line motion, a rotating body continues with uniform angular velocity unless a net (resultant) torque acts upon it to change its rotational state.

Question 66

When a body moves along a circular path with uniform speed, its velocity at any point is directed

A Towards the centre of the circle

B Away from the centre of the circle

C **Along the tangent to the circle at that point** ✔

D Opposite to the direction of motion

✅ **Correct Answer: C. Along the tangent to the circle at that point**

💡 **Explanation**

The instantaneous velocity of a body moving on a circular path is always directed along the tangent to the circle at that particular point.

Question 67

A force that keeps a body moving with uniform speed in a circular path is called

A Centrifugal force

B Gravitational force

C **Centripetal force** ✔

D Frictional force

✅ **Correct Answer: C. Centripetal force**

💡 **Explanation**

The centripetal force is defined as the force that causes an object to move in a circle at constant speed, always directed towards the centre of the circle.

Question 68

The centripetal force acting on an object always acts

A Along the tangent to the circle

B Away from the centre of the circle

C **Towards the centre of the circle** ✔

D In the direction of velocity

✅ **Correct Answer: C. Towards the centre of the circle**

💡 **Explanation**

Centripetal force is always directed towards the centre of the circular path, perpendicular to the object's velocity.

Question 69

The formula for centripetal force is given by

A Fc = mv

B Fc = mv^2 / r ✔

C Fc = m / v^2

D Fc = mr / v

✅ **Correct Answer: B. Fc = mv^2 / r**

💡 **Explanation**

The centripetal force required to keep an object of mass m moving with speed v in a circle of radius r is given by Fc = mv^2 / r.

Question 70

A 0.15 kg stone is whirled in a horizontal circle of radius 1.2 m at a constant speed of 8 m/s. The centripetal force acting on it is

A 1 N

B **8 N** ✔

C 9.6 N

D 0.8 N

✅ **Correct Answer: B. 8 N**

💡 **Explanation**

Fc = mv^2 / r = (0.15 kg x (8 m/s)^2) / 1.2 m = (0.15 x 64) / 1.2 = 9.6 / 1.2 = 8 N.

Question 71

If the speed of an object moving in a circle is doubled while the radius stays the same, the centripetal force required

A Remains the same

B Doubles

C **Becomes four times** ✔

D Becomes half

✅ **Correct Answer: C. Becomes four times**

💡 **Explanation**

Since Fc is proportional to v^2, doubling the speed increases the required centripetal force by a factor of 2^2 = 4.

Question 72

In the case of the Moon orbiting the Earth, the necessary centripetal force is provided by

A Air resistance

B **The gravitational pull of the Earth** ✔

C The Moon's own engine

D Magnetic force

✅ **Correct Answer: B. The gravitational pull of the Earth**

💡 **Explanation**

The Earth's gravitational attraction on the Moon acts as the centripetal force that keeps the Moon moving in its nearly circular orbit around the Earth.

Question 73

In a washing machine dryer, the centripetal force needed to keep water molecules moving in a circular path with the drum is provided by

A Gravity

B **Friction between the clothes and the drum wall** ✔

C Magnetic force

D Air pressure

✅ **Correct Answer: B. Friction between the clothes and the drum wall**

💡 **Explanation**

As the drum rotates, friction between the wet clothes and drum wall supplies the centripetal force; since loose water molecules cannot get this force, they fly off through the holes, drying the clothes.

Question 74

In a cream separator, lighter cream particles gather near the centre because they

A Require more centripetal force than heavier particles

B **Require less centripetal force than heavier milk particles** ✔

C Are heavier than milk particles

D Do not experience any force

✅ **Correct Answer: B. Require less centripetal force than heavier milk particles**

💡 **Explanation**

Lighter cream particles need less centripetal force to stay in a circle of smaller radius, so they remain closer to the centre, while heavier milk particles move outward towards the walls.

Question 75

A force acting on an object moving in uniform circular motion does no work on the object because

A The force has zero magnitude

B **The force is always perpendicular to the velocity (displacement)** ✔

C The object is not moving

D The force acts along the direction of motion

✅ **Correct Answer: B. The force is always perpendicular to the velocity (displacement)**

💡 **Explanation**

Since the centripetal force is always perpendicular to the object's velocity, the angle between force and displacement is 90 degrees, so cos90 degrees = 0 and no work is done.

Question 76

If the string holding a whirling stone in a circle is suddenly released, the stone will

A Continue moving in the same circle

B Fly off along the tangent to the circle at that point ✔

C Fall straight down immediately

D Move directly towards the centre

✅ Correct Answer: B. Fly off along the tangent to the circle at that point

💡 Explanation

Once the centripetal force (tension) is removed, there is no force to keep the stone on the curved path, so it moves off in a straight line along the tangent to the circle at the point of release.

Well Done!

You have completed all 76 solved MCQs from Chapter 4: Turning Effects of Force. Revise the highlighted answers and explanations regularly to master concepts like torque, centre of gravity, equilibrium, and centripetal force.