

TEST NO. 4
CH – 4

PHYSICS
Time Allowed: 15 Minutes

CLASS 9TH – 019

Paper: (Objective Type)
Maximum Marks: 12

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is Correct, fill that circles in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

Q. 1	QUESTIONS	(A)	(B)	(C)	(D)
1.	A force of 10 N is making an angle of 30° with the horizontal. Its horizontal component	4 N	5 N	7N	8.7 N
2.	The formula to find resultant force 'F' is	$\sqrt{F_x^2 + F_y^2}$	$\sqrt{F^2 + F_1^2}$	$\sqrt{F_x^2 + F_y^2}$	$\sqrt{F_x + F_y}$
3.	The unit of torque is.	Nm ⁻²	N cm	Nm ⁻¹	Nm
4.	Sin 45° is	0.707	0.5	0.80	0.2
5.	$\frac{\text{BASE}}{\text{Hypotenuse}} = \text{is called}$	sin θ	cos θ	tan θ	cot θ
6.	The number of perpendicular components of a vector is.	1	2	3	4
7.	The turning effect of a force is called.	Momentum	Torque	Pressure	Work
8.	Racing cars are made stable by	Increasing their speed	Decreasing their mass	Lowering their centre of gravity	Decreasing their width
9.	In right angle triangle, length of base is 4 cm and is hypotenuse is 5 cm, the length of perpendicular is	1 cm	3 cm	20 cm	9 cm
10.	The value of tan 45° is	0.5	1.732	0.5777	1
11.	Centre of gravity of sphere is	Centre of sphere	Outside sphere	Radius sphere	None of these
12.	The centre of gravity of irregular shaped body can be found with the help of.	Wedge	Meter rod	Plumb line	Screw gauge

A B C D

A B C D

A B C D

A B C D

A B C D

1	☐ A ☐ B ☒ C ☐ D	4	☒ A ☐ B ☐ C ☐ D	7	☐ A ☒ B ☐ C ☐ D	10	☐ A ☐ B ☒ C ☐ D	13	☐ A ☐ B ☐ C ☐ D
2	☒ A ☐ B ☐ C ☐ D	5	☐ A ☒ B ☐ C ☐ D	8	☐ A ☐ B ☒ C ☐ D	11	☒ A ☐ B ☐ C ☐ D	14	☐ A ☐ B ☐ C ☐ D
3	☐ A ☐ B ☒ C ☐ D	6	☐ A ☒ B ☐ C ☐ D	9	☐ A ☒ B ☐ C ☐ D	12	☐ A ☐ B ☒ C ☐ D	15	☐ A ☐ B ☐ C ☐ D

نوٹ: معروضی سوال نامے کو توجہ سے پڑھیں اور ہر MCQ کی درست آپشن A, B, C, D کو پین کی سیاہی یا مارکر سے اس طرح پُر کریں کہ سیاہی دائرے سے باہر نہ نکلے۔ ایک سے زیادہ دائروں کو پُر کرنے یا کاٹ کر پُر کرنے کی صورت میں مذکورہ جواب غلط تصور ہوگا۔

TEST NO.4**CH - 4****PHYSICS****CLASS 9TH – 019****Time Allowed: 1:45 hours****Maximum Marks: 48****(PART – I)****2. Write short answers to any Five (5) questions:****10**

- (i) Define Resultant vector.
- (ii) Give an example of a moving body which is in equilibrium?
- (iii) Think of a body which is at rest but not in equilibrium?
- (iv) Define Parallel forces and types.
- (v) What is meant by addition of forces?
- (vi) What is meant by resolution of forces?
- (vii) What is meant by rigid body and axis of rotation?
- (viii) What is meant by torque and unit of torque.

3. Write short answers to any Five (5) questions:**10**

- (i) Define line of action of force and moment arm.
- (ii) Difference between Centre of mass and Centre of Gravity?
- (iii) Difference between like and unlike forces?
- (iv) Define plumb line.
- (v) Define couple and couple arm.
- (vi) Define First condition of equilibrium.
- (vii) Define Second condition of equilibrium.
- (viii) Define stable equilibrium and Unstable equilibrium.

4. Write short answers to any Five (5) questions:**10**

- (i) Different between torque and couple.
- (ii) Define Neutral equilibrium.
- (iii) Why a vehicle is made heavy at its bottom to keep its centre of gravity as low as possible?
- (iv) How is wheel of bicycle rotated?
- (v) Why there is a need of second condition for equilibrium if a body satisfies first condition for equilibrium.
- (vi) Write Head to tail rule.
- (vii) Write Clockwise and anticlock wise torque?
- (viii) Why door is easy to open or close by pushing or pulling at handle?

(PART – II)**Note:- Attempt any TWO questions.**

- 5. (a) What is meant by torque or moment of a force? Explain the factors on which it depend **4**
(b) A mechanic tightens the nut of a bicycle using a 15 cm long spanner by exerting a force **5**
of 200 N. Find the torque that has tightened it.
- 6. (a) What is meant by principle of moments? Explain clockwise torque and anticlock **4**
wise torque. **5**
(b) The steering of a car has a radius 16 cm. Find the torque produced by a couple of 50 N.
- 7. (a) Define parallel forces. Also explain its types or what is the difference between Like and **4**
Unlike parallel forces? **5**
(b) A force is acting on a body making an angle of 30° with the horizontal. The horizontal **5**
component of the force is 20 N. Find the force.



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Physics

Test no:- 4

(Part-I)

Question no:- 2

(i) Define Resultant vector?

Ans A resultant vector is a single force that has the same effect as the combined effect of all the forces to be added.

(ii) Give an example of a moving body which is in equilibrium?

Ans A paratrooper coming down with terminal velocity is in equilibrium. This type of equilibrium is known as dynamic equilibrium.

(iii) Think of a body which is at rest but not in equilibrium?

Ans A ball thrown upward becomes at rest at the top. At this state it is not in equilibrium although it

is at rest.

(iv) Define parallel forces and types?

Ans In a plane, if number of forces act on a body such that their points of action are different but lines of action are parallel to each other, then these forces are called parallel forces.

These are two types of parallel forces

- 1) Like parallel forces
- 2) Unlike parallel forces

(v) What is meant by addition of forces?

Ans Force is a vector quantity. It has magnitude as well as direction; therefore forces are not added by ordinary arithmetic rules. They are added by a method known as head to tail rule.

(vi) What is meant by resolution of forces?

Ans The decomposition or division of a vector into its component is called resolution of a vector or force.

(vii) What is meant by rigid body and axis of rotation?

Ans Rigid body:

A body is composed of large number of particles. If the distance between all these pairs of particles of the body do not change by applying a force.

Axis of rotation:

During rotation, the particles of the rigid body move in a circle with their centres all lying on a line.

This straight line is called the axis of rotation.

(viii) What is meant by torque and unit of torque?

Ans The rotational effect of a force is measured by a quantity, known as torque.

The unit of torque is Newton meter (Nm).

Question no: 3

(i) Define line of action of force and moment arm?

Ans Line of action of force:

The line along which a force acts is called the line of action of force.

Moment arm:

The perpendicular distance between the line of action of the force and the axis of rotation.

(ii) Difference between Centre of mass and centre of gravity?

Ans Centre of mass:

Centre of mass of a system is such a point where an applied force causes the system to move without rotation.

Centre of gravity:

A point where the whole weight of the body appears to act vertically downward.

(iii) Difference between Like and Unlike forces?

Ans Like forces:

Like forces are the forces that are parallel to each other and have the same direction.

Unlike forces:

Unlike forces are the forces that are parallel but have direction opposite to each other.

(iv) Define Plumb line?

Ans A plumb line is a piece of string with a weight attached to the end that is used to check that something such as wall is vertical.

(v) Define couple and couple arm?

Ans Couple:

A couple is formed by two unlike parallel forces of the same magnitude but not along the same line

Couple arm:

The perpendicular distance " x " between the two forces of the couple.

(vi) Define First Condition of equilibrium?

Ans A body will be in equilibrium if the resultant of all the forces acting on it is zero. This is first condition of equilibrium.

(vii) Define second condition of equilibrium?

Ans A body satisfies second condition of equilibrium when the resultant torque acting on it is zero.

(viii) Define stable equilibrium and Unstable equilibrium?

Ans Stable:

A body is said to be in stable equilibrium if after a slight tilt it returns to its previous position.

Unstable:

If a body does not return to its previous position when set after a slightest tilt is said to be in unstable equilibrium.

Question no:- 4

(i) Different between torque and Couple?

Ans Torque:

The rotational effect of a force is measured by a quantity.

Couple:

A couple is formed by two unlike parallel forces of the same magnitude but not along the same line.

(ii) Define Neutral equilibrium?

Ans

If a body remains in its new position when disturbed from its previous position, it is said to be in a state of neutral equilibrium.

(iii) Why the height of vehicles is kept as low as possible?

Ans We know that smaller the height of center of gravity of a body, greater will be its stability. The height of vehicles is kept low to lower their centre of gravity and as a result their stability increases.

(iv) How is wheel of bicycle rotated?

Ans When the pedal of a bicycle is rotated the wheel starts rotating. A bicycle wheel is a wheel, most commonly a wire wheel designed for a bicycle. A pair is often called wheelset, especially in the context of ready built "off shelf" performance-oriented wheels.

(v) Why there is a need of second condition for equilibrium if a body satisfies first condition of equilibrium?

Ans When two equal and opposite forces act on a body along the same line, it will be in equilibrium and no linear acceleration is produced in it. But when two equal and opposite forces act on a body not along the same line, the body is not in equilibrium because rotational acceleration is produced in the body although first condition is still satisfied.

(vi) Head to tail rule explain?

Ans Draw the representative lines of all the vectors to be added in such a way that head of first vector coincides with the tail of second vector, head of second vector coincides with the tail of third vector and on so.

(vii) Write Clockwise and anticlockwise torque?

Ans A force that turns a spanner in the clockwise direction is generally used to tighten a nut. The torque or moment of the force so produced is called clockwise moment. On the other side, to loosen a nut, the force is applied such that it turns the nut in the anticlockwise direction. The torque or moment of the force so produced is called anticlockwise moment.

(viii) Why door is easy to open or close by pushing or pulling at handle?

Ans We open or close a door by pushing it. Here push or pull turns the door about its hinge or axis of rotation. The door is opened or closed due to the turning effect of the force acting on it.

(Part-II)

Question no:- 5(a)

Ans

The rotational effect of a force is measured by a quantity known as torque.

Dependence of torque:

Rotation produced in a body depends on the following two factors

- 1) Force
- 2) Moment Arm

⇒ **Force:**

Greater is the force; greater is the moment of the force

⇒ **Line of action of force:**

The line along which a force acts is called the line of action of force.

⇒ **Moment Arm:**

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

as moment arm. Longer is the moment arm greater is the moment of force.

Mathematical form:

$$\text{Torque} = \text{Moment arm} \times \text{Force}$$
$$\tau = F \times L$$

Unit:

The unit of torque is Newton meter (Nm)

Question no: 5(b)

$$F = 200 \text{ N}$$

$$L = 15 \text{ cm} = 0.15 \text{ m}$$

$$\tau = ?$$

$$\tau = F \times L$$

$$\tau = 200 \times 0.15$$

$$\tau = 30 \text{ Nm Ans}$$

Question no:- 6(a)

Ans Principle of Moments:

A body is balanced if the sum of clockwise moments acting on the body is equal to the sum of anticlockwise moments acting on it.

Explanation:-

A force that turns a spanner in the clockwise direction is generally used to tighten a nut. The torque or moment of the force so produced is called clockwise moment. On the other hand, to loosen a nut, the force is applied such that it turns the nut, the force is applied such that it turns the nut in the anticlockwise direction. The torque or moment of the force so produced is called anticlockwise moment.

Question no:- 6(b)

$$F = 50 \text{ N}$$

$$r = 16 \text{ cm}$$

$$d = AB = 32 \text{ cm} = 0.32 \text{ m}$$

$$\tau = ?$$

As we know that

$$\tau = F \times AB$$

$$\tau = 50 \times 0.32$$

$$\tau = 16 \text{ Nm}$$

Question no:- 7(a)

We often come across objects on which many forces are acting. In many cases, we find all or some of the forces acting on a body in the same direction. For example, many people push a bus to start it. Why all of them push it in the same direction? All these forces are applied in the same direction so these are all parallel to each other. Such forces which are parallel to each other are

called parallel forces.

Types

There are two types of parallel forces.

- 1) Like parallel forces
- 2) Unlike parallel forces

1) Like parallel forces:

Like parallel forces are those forces that are parallel to each other and have the same direction.

2) Unlike parallel forces:-

Unlike parallel forces are the forces that are parallel but have directions opposite to each other.

Question no:- 7(b)

$$F_x = 20 \text{ N}$$

$$\theta = 30^\circ$$

$$F = ?$$

As we know that

$$F_x = F \cos \theta$$

$$F = \frac{F_x}{\cos \theta}$$

$$F = \frac{20}{\cos 30^\circ}$$

$$F = \frac{20}{0.866}$$

$$F = 23.09 \text{ N}$$

$$F = 23.1 \text{ N}$$