

2100+

MCQs With Explanatory Notes

For

General Science

General Studies

Must For :

UPSC/ State PCS/
SSC/ Banking/
Railways/ Defence
& Other
Competitive exams



3rd
Edition



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For

General
Science

Corporate
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Physical Quantities & Mechanics

1. China wares are wrapped in straw of paper before packing. This is the application of concept of
- (a) impulse (b) momentum
(c) acceleration (d) force

Ans. (a) As a certain impulse applied for a short time will give a large force so the chinaware breaks into pieces. Therefore, chinaware is wrapped in straw of paper while packing so that the event of fall (impact) will take a longer time to reach the chinaware through straw of paper and hence the average force exerted on the chinaware is small and chances of its breaking reduce.

2. When a body is stationary, then
- (a) there is no force acting on it
(b) the body is in vacuum
(c) the force acting on it is not in contact with it
(d) the net forces acting on it balances each other

Ans. (d) For both stationary and moving objects with unchanging speed and direction, all the forces acting on the objects are in balance with each other, i.e. they all cancel each other.

3. What happens when a heavy object and a light object are allowed to fall from the certain height in the absence of air
- (a) heavy object reaches the ground later than the lighter object
(b) lighter object reaches the ground later than the heavier object
(c) both heavy and light objects reach the ground simultaneously
(d) None of these

Ans. (c) If no air resistance is present, the rate of descent depends only on how far the object has fallen, no matter how heavy the object is. This means that two objects will reach the ground at the same time if they are dropped simultaneously from the same height. This statement follows from the law of conservation of energy. However, if air resistance is present, then the shape of the object becomes important.

4. An artificial satellite orbiting the earth does not fall down because the earth's attraction
- (a) is balanced by the attraction of the moon
(b) vanishes at such distances
(c) is balanced by the viscous drag produced by the atmosphere
(d) produces the necessary acceleration of its motion in a curved path

Ans. (d) An artificial satellite orbiting around the Earth does not fall down. This is so because the attraction of earth provides the necessary acceleration for its motion. This acceleration is "constant" in magnitude but "changing in direction". By the launch rocket, immediately before the satellite is established in the predetermined orbit, the speed given to it is 30,000 km/hr. The speed must be great enough so gravity brings the satellite back to Earth but not so great that the satellite escapes gravity out into space.

5. When a ship floats on water
- (a) it displaces no water
(b) the mass of water displaced is equal to the mass of the ship
(c) the mass of water displaced is lesser than the mass of the ship
(d) the mass of water displaced is greater than the mass of the ship

Ans. (b) According to Archimede's principle when a body is immersed fully or partially in a liquid, it experiences an upward force that is equal to the weight of the fluid displaced by it therefore the mass of water displaced is equal to the mass of the ship.

6. A long jumper runs before jumping because he
- (a) covers a greater distance
(b) maintains momentum conservation
(c) gains energy by running
(d) gains momentum

Ans. (b) A long jumper runs before jumping to maintain momentum. This helps in jumping higher and longer because of inertia of motion gained due to the motion.

7. A body is thrown vertically upwards and then falls back on the ground. Its potential energy is maximum
- (a) on the ground
(b) at the maximum height
(c) during the return journey
(d) both on the ground and at the maximum height

Ans. (b) We know that
Potential energy = mgh
Hence potential energy is maximum at the maximum height.

8. A jet engine works on the principle of conservation of
- (a) linear momentum (b) angular momentum
(c) energy (d) mass

Ans. (a) A jet engine works on the principle of conservation of linear momentum. In jet engines, a large volume of gases produced by the combustion of fuel is allowed to escape through a jet in the backward direction. Due to the very high speed or velocity, the backward rushing gases have a very large momentum.

9. One feels heavier in a lift when the lift
- (a) is going down steadily (b) just begins to go up
(c) is moving up steadily (d) descends freely

Ans. (b) One feels heavier in a lift when the lift just begins to go up because our body gains inertia from the position of rest and pushes up against the gravity so here the weight becomes zero and our mass makes us feel heavier.

10. The lift of an air plane is based on
- (a) Torricelli's theorem
(b) Bernoulli's theorem
(c) Law of gravitation
(d) Conservation of linear momentum

Ans. (b) Bernoulli's theorem

11. The working principle of a washing machine is
 (a) centrifugation (b) dialysis
 (c) reverse osmosis (d) diffusion

Ans. (a) Washing machine works on the principle of centrifugation. Centrifugation is a process that involves the use of the centrifugal force for the separation of mixtures with a centrifuge, used in industry and in laboratory settings. More-dense components of the mixture migrate away from the axis of the centrifuge, while less-dense components of the mixture migrate towards the axis.

12. Consider the following statements in respect of a jet engine and a rocket:

1. A jet engine uses the surrounding air for its oxygen supply and so is unsuitable for motion in space.
2. A rocket carries its own supply of oxygen in the gas form as a fuel.

Which of the above statement(s) is/are correct?

- (a) 1 only (b) 2 only
 (c) Both 1 and 2 (d) Neither 1 nor 2

Ans. (c) In respect of a jet engine and a rocket, both the given statements are correct.

13. Match List-I with List-II and select the correct answer using the codes given below the lists:

List-I	List-II
A. Wavelength	1. Hertz
B. Energy	2. Angstrom
C. Intensity of sound	3. Joule
D. Frequency	4. Decibel

Codes:

	A	B	C	D
(a)	2	3	4	1
(b)	1	2	3	4
(c)	2	3	1	4
(d)	2	1	3	4

Ans. (a) Wavelength is the distance between two consecutive crests or troughs and 1 angstrom = 10^{-10} m, joule is the unit of energy. Intensity of sound is measured in decibel. Frequency is measured in hertz (Hz).

14. Match List-I with List-II and select the correct answer with the help of codes given below:

List-I	List-II
A. Temperature	1. Kelvin
B. Power	2. Watt
C. Pressure	3. Pascal
D. Force	4. Newton

Codes:

	A	B	C	D
(a)	2	1	3	4
(b)	1	2	4	3
(c)	1	2	3	4
(d)	2	1	4	3

Ans. (c) The unit of temperature is kelvin, power is measured in watt, pressure in pascal and force in newton.

15. Match List-I with List-II and select the correct answer from the codes given below:

List-I	List-II
A. Acceleration	1. Joule
B. Electric current	2. Newton second
C. Work done	3. Ampere
D. Impulse	4. Metre per sec ² .

Codes:

	A	B	C	D
(a)	1	2	3	4
(b)	2	3	4	1
(c)	4	3	1	2
(d)	3	4	1	2

Ans. (c) The unit of acceleration is metre per sec². The unit of electric current is ampere. The unit of work done is joule. The unit of impulse is newton second.

16. Match List-I with List-II and select the correct answer using the codes given below:

List-I	List-II
A. Joule	1. Henry-ampere/sec
B. Watt	2. Farad-volt
C. Volt	3. Coloumb-volt
D. Coulomb	4. Orested-cm
	5. Amp-gauss
	6. Amp ² -ohm

Codes:

	A	B	C	D
(a)	1	6	5	4
(b)	3	6	1	2
(c)	3	6	1	5
(d)	2	6	1	3

Ans. (b) Joule denoted by coulomb-volt. Watt denoted by amp²-ohm. Volt denoted by henry-amp/sec. Coulomb denoted by farad-volt.

17. A liquid drop tends to assume a spherical shape because of

- (a) surface tension (b) viscous force
 (c) gravitational force (d) centrifugal force

Ans. (a) The liquid surface always acquires minimum surface area due to surface tension so, the small droplet of any liquid is always spherical.

18. Consider the following statements. Work is not done, when:

1. a man is walking on a horizontal road.
2. a man is climbing up a hill.
3. a man with a load on his head is walking on a horizontal road.
4. moon is revolving round the earth.

Which of the statements given above are correct?

- (a) 1 and 3 only (b) 1 and 4 only
 (c) 2, 3 and 4 (d) 1, 3 and 4

Ans. (d) Work done is given by, $w = F s \cos \theta$ where θ is the angle between the directions of force applied and displacement.
 In cases 1 and 3,
 \therefore work done = 0
 In case 2, $w = f s \cos 0 = mgh$, h being height covered.
 In case 4, force is always perpendicular to motion
 i.e., $\theta = 90^\circ$, hence $w = 0$

19. What is the correct sequence in which the lengths of the following units increase?

1. Angstrom 2. Micron 3. Nanometer

Select the correct answer using the codes given below:

- (a) 1, 2, 3 (b) 3, 1, 2
 (c) 1, 3, 2 (d) 2, 3, 1

Ans. (c) The multiplier for the given units are as follows:

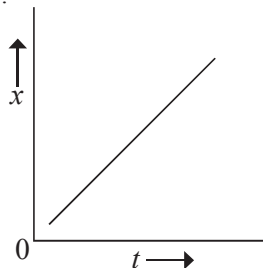
- 1 Angstrom = 10^{-10} m
- 2 Micron = 10^{-6} m
- 3 Nanometer = 10^{-9} m

Hence, the order in which the lengths of the given units increase is given by

Angstrom, Nanometer, Micron

Therefore, the correct sequence is 1, 3, 2.

20. The position– time ($x - t$) graph for motion of a body is given below:



Which one among the following is depicted by the above graph?

- (a) Positive acceleration
- (b) Negative acceleration
- (c) Zero acceleration
- (d) None of the above

Ans. (c) From the given ($x - t$) graph it is clear that velocity is constant. Therefore, acceleration is zero.

$$\text{i.e. } v = \frac{dx}{dt} = \text{constant}$$

$$\text{Now acceleration } \frac{dv}{dt} = 0.$$

21. A ball is dropped from a satellite revolving around the earth at a height of 120 km. The ball will

- (a) continue to move with same speed along a straight line tangentially to the satellite at that time
- (b) continue to move with the same speed along the original orbit of satellite
- (c) fall down to earth gradually
- (d) go far away in space

Ans. (b)

22. Consider the following statements :

- (1) A light and a heavy body, having equal momenta, have equal kinetic energies.
 - (2) The total energy of a body in motion is equal to the work it can do in being brought to rest.
 - (3) A body cannot have momentum when its energy is zero.
- Which of these statements is/are correct?
- (a) (1) and (2)
 - (b) (2) and (3)
 - (c) Only (2)
 - (d) Only (3)

Ans. (d) Because they have equal momenta, hence equal mv , the heavy body will move very slowly and the light body will move very quickly. As Kinetic energy is $\frac{1}{2}mv^2$. Thus the speed of the light body will be high giving a higher kinetic energy to it in comparison to the kinetic energy of heavy body.

23. A car is moving on a circular path and takes a turn. If R_1 and R_2 be the reaction on the inner and outer wheels respectively, then

- (a) $R_1 = R_2$
- (b) $R_1 < R_2$
- (c) $R_1 > R_2$
- (d) $R_1 \geq R_2$

Ans. (b) It has been calculated in the theory of the chapter i.e.,

$$R_1 = \frac{mg}{2} \left(1 - \frac{v^2 h}{rga} \right),$$

$$\text{and } R_2 = \frac{mg}{2} \left(1 + \frac{v^2 h}{rga} \right), \text{ so } R_1 < R_2.$$

24. Meson was discovered by

- (a) Powell
- (b) Seaburg
- (c) Anderson
- (d) Yukawa

Ans. (a) Meson are sub-atomic particles composed of a quark and an antiquark. Its existence was theoretically predicted by Japanese physicist-Yukawa Hideki, but it was first discovered by English physicist civil Frank Powell in 1947 in cosmic-ray particle interactions. All meson are unstable having lifetimes ranging from 10^{-8} to less than 10^{-22} second.

25. Natural radioactivity was discovered by

- (a) Rutherford
- (b) Becquerel
- (c) Curie
- (d) Schmidt

Ans. (b) Natural radioactivity was discovered by Henri Becquerel in 1896 by using naturally fluorescent minerals to study properties of X-rays.

26. If an apple is released from an orbiting spaceship, it will

[UP-PCS 2010]

- (a) fall towards the Earth
- (b) move at a lower speed
- (c) move along with the spaceship at the same speed
- (d) move at a higher speed

Ans. (c) Due to the lack of gravitational force the apple so released will move by the same speed as the spaceship.

27. Which of the following is not scalar quantity?

[UK-PSC 2015]

- (a) Time
- (b) Volume
- (c) Density
- (d) Momentum

Ans. (d) Momentum is a vector quantity. A vector quantity possesses both a magnitude and direction.

28. Which of the following is a vector quantity?

- (a) Velocity
- (b) Speed
- (c) Temperature
- (d) Hours

Ans. (a) A vector quantity is one which has both magnitude and direction. Velocity has both magnitude and direction so it is a vector quantity.

29. Which of the following parameters does not characterize the thermodynamic state of matter?

- (a) Temperature
- (b) Pressure
- (c) Work
- (d) Volume

Ans. (c) The thermodynamic state of a system is defined by specifying values of a set of measurable properties sufficient to determine all other properties. The thermodynamic variables in case of a gas are pressure, temperature, and volume in addition to number of moles.

30. One Nanometer is equal to –

[UK-PSC 2016]

- (a) 10^{-9} m
- (b) 10^{-6} m
- (c) 10^{-10} m
- (d) 10^{-3} m

Ans. (a) One nanometre is 1×10^{-9} m. It is also defined as equal to 10 \AA .

31. The rate of change of momentum of a body equal of the resultant : [CDS 2016-I]
 (a) energy (b) power
 (c) force (d) impulse

Ans. (c) Newton's 2nd Law - The rate of Change of momentum always acts in the direction of resultant force acting on a body \Rightarrow ($F = ma$) (where $m =$ mass; $a =$ acceleration)

32. The SI unit of mechanical power is : [CDS 2016-I]
 (a) Joule (b) Watt
 (c) Newton-Second (d) Joule-Second

Ans. (b) Watt is the SI unit of mechanical power.

33. Which one of the following physical quantities is the same for molecules of all gases at a given temperature?

- [CDS 2015-II]
 (a) Speed (b) Mass
 (c) Kinetic energy (d) Momentum

Ans. (c) Kinetic energy is the same for molecules of all gases at a given temperature.

34. Newton's laws of motion do not hold good for objects [CDS 2015-II]

- (a) at rest
 (b) moving slowly
 (c) moving with high velocity
 (d) moving with velocity comparable to velocity of light

Ans. (d) Newton's laws of motion do not hold good for objects moving with velocity comparable to velocity of light because it does not follow it on this level.

35. Bar is a unit of which one of the following? [NDA/NA 2008 -II]
 (a) Force (b) Energy
 (c) Pressure (d) Frequency

Ans. (c) 1 Bar = 10^5 Pa. Both bar and Pa are the unit of pressure.

36. On which one of the following conservative laws, does a rocket work? [NDA/NA 2008 -II]
 (a) Mass (b) Energy
 (c) Linear momentum (d) Angular momentum

Ans. (c) Rocket works on the principle of conservation of linear momentum.

37. If a small raindrop falls through air [NDA/NA 2009 -I]
 (a) its velocity goes on increasing
 (b) its velocity goes on decreasing
 (c) its velocity goes on increasing for sometime and then becomes constant
 (d) it falls with constant speed for sometime and then its velocity increases

Ans. (c) Velocity of raindrop increases until it reaches the terminal velocity.

38. A boy throws four stones of same shape, size and weight with equal speed at different initial angles with the horizontal line. If the angles are 15° , 30° , 45° and 60° , at which angle the stone will cover the maximum horizontally? [NDA/NA 2010-I]
 (a) 15° (b) 30°
 (c) 45° (d) 60°

Ans. (c) Horizontal range $R = \frac{u^2 \sin 2\theta}{g}$

For maximum horizontal range θ should be 45°

$$R_{\max} = \frac{u^2}{g} [\because \sin 2\theta = \sin 90^\circ = 1]$$

39. An athlete diving off a high springboard can perform a variety of exercises in the air before entering the water below. Which one of the following parameters will remain constant during the fall? [NDA/NA 2010-II]
 (a) The athlete's linear momentum
 (b) The athlete's moment of inertia
 (c) The athlete's kinetic energy
 (d) The athlete's angular momentum

Ans. (d) When a athlete jumps from the spring board, he curls his body by rolling his arms and legs in. By doing so, he decreases moment of inertia of his body and hence angular speed increases to conserve the angular momentum, as $I_1 \omega_1 = I_2 \omega_2 = \text{constant}$.

40. The force acting on a particle executing simple harmonic motion is [NDA/NA 2010 -II]
 (a) directly proportional to the displacement and is directed away from the mean position
 (b) inversely proportional to the displacement and is directed towards the mean position
 (c) directly proportional to the displacement and is directed towards the mean position
 (d) inversely proportional to the displacement and is directed away from the mean position

Ans. (c) The restoring force acting on the particle is always proportional to the displacement of the particle from the equilibrium position and is always directed towards the equilibrium position.

41. When a ball drops onto the floor it bounces. Why does it bounce? [NDA/NA 2011 -II]
 (a) Newton's third law implies that for every action (drop) there is a reaction (bounce)
 (b) The floor exerts a force on the ball during the impact
 (c) The floor is perfectly rigid
 (d) The floor heats up on impact

Ans. (b) When a ball drops on to the floor then floor exerts a force for small time which is equal to change in momentum of the ball.

42. It is difficult to cut things with a blunt knife because [NDA/NA 2013 -II]
 (a) the pressure exerted by knife for a given force increases with increase in bluntness
 (b) a sharp edge decreases the pressure exerted by knife for a given force
 (c) a blunt knife decreases the pressure for a given force
 (d) a blunt knife decreases the area of intersection

Ans. (c) Pressure = $\frac{\text{force}}{\text{area}}$

Bluntness of knife increases area, hence decreases the pressure for a given force.

43. Creation of something from nothing is against the law of
 (a) constant proportions
 (b) conservation of mass-energy
 (c) multiple proportions
 (d) conservation of momentum

Ans. (b) Creation of something from nothing is against the law of conservation of mass energy.

44. A ball is thrown vertically upward from the ground with a speed of 25.2 m/s. The ball will reach the highest point of its journey in [NDA/NA 2016-II]

(a) 5.14 s (b) 3.57 s
(c) 2.57 s (d) 1.29 s

Ans. (c)

45. One kilowatt hour is equal to [NDA/NA 2016-II]

(a) 36×10^3 joule (b) 36×10^5 joule
(c) 10^3 joule (d) 10^5 joule

Ans. (b) One kilowatt hour is 3600000 joules.

46. Pressure is a scalar quantity because [NDA/NA 2016-II]

(a) it is the ratio of force to area and both force and area are vectors
(b) it is the ratio of magnitude of force to area
(c) it is the ratio of component of force (normal to area) to area
(d) none of the above

Ans. (c) Pressure is magnitude of force normal to the area.

47. The free fall acceleration g increases as one proceeds, at sea level, from the equator toward either pole. The reason is

(a) Earth is a sphere with same density everywhere
(b) Earth is a sphere with different density at the polar regions than in the equatorial regions
(c) Earth is approximately an ellipsoid having its equatorial radius greater than its polar radius by 21 km
(d) Earth is approximately an ellipsoid having its equatorial radius smaller than its polar by 21 km

Ans. (c)

48. Which one of the following statements is correct?

[NDA/NA 2016-II]

(a) The measurement of mass taken by a spring weighing balance is correct at the place where the spring balance is calibrated for
(b) The measurement of mass taken by a spring weighing balance is correct at all places
(c) The measurement of mass taken by a spring weighing balance is correct at the places where the acceleration due to gravity is same with the place where the spring balance is calibrated for
(d) A spring balance cannot be used to measure mass at any place

Ans. (d)

49. Which one of the following is *not* a contact force?

[NDA/NA 2016-II]

(a) Push force (b) Gravitational force
(c) Frictional force (d) Strain force

Ans. (b) Gravitational force is an imaginary force pulling everything towards the earth surface without any contact to the object.

50. When a force of 1 newton acts on a mass of 1 kg which is able to move freely, the object moves in the direction of force with a/an [NDA/NA 2016-II]

(a) speed of 1 km/s (b) acceleration of 1 m/s^2
(c) speed of 1 m/s (d) acceleration of 1 km/s^2

Ans. (b) Force (F) = Mass (m) \times acceleration (a)
acceleration (a) = Force (F)/Mass (m)
= 1 newton/1 kg = 1 m/s^2

51. Along a streamline flow of fluid [NDA/NA 2016-II]

(a) the velocity of all fluid particles at a given instant is constant
(b) the speed of fluid particle remains constant
(c) the velocity of all fluid particles crossing a given position is constant
(d) the velocity of a fluid particle remains constant

Ans. (c)

52. How is the kinetic energy of a moving object affected if the net work done on it is positive? [NDA/NA 2016-II]

(a) Decrease (b) Increases
(c) Remains constant (d) Becomes zero

Ans. (b)

53. If we plot a graph between volume V and inverse of

pressure P (i.e. $\frac{1}{P}$) for an ideal gas at constant temperature T , the curve so obtained is [NDA/NA 2016-II]

(a) straight line (b) circle
(c) parabola (d) hyperbola

Ans. (a)

54. A particle executes linear simple harmonic motion with amplitude of 2 cm. when the particle is at 1 cm from the mean position, the magnitudes of the velocity and the acceleration are equal. Then its time period (in second) is [NDA/NA 2016-II]

(a) $\frac{2\pi}{\sqrt{3}}$ (b) $\frac{\sqrt{3}}{2\pi}$
(c) $\frac{\sqrt{3}}{\pi}$ (d) $\frac{1}{2\pi\sqrt{3}}$

Ans. (a)

55. Which one of the following statements is *not* correct?

[NDA/NA 2016-II]

(a) The SI unit charge is ampere-second
(b) Debye is the unit of dipole moment
(c) Resistivity of a wire of length l and area of cross-section depends upon both l and a
(d) The kinetic energy of an length of mass in kg and charge / coulomb when accelerated through a potential difference of V volt, is ev joule.

Ans. (c)

56. Two balls, A and B are thrown simultaneously, A vertically upward with a speed of 20 m/s from the ground and B vertically downward from a height of 40 m with the same speed and along the same line of motion. At what points do the two balls collide by taking acceleration due to gravity as 9.8 m/s^2 ? [NDA/NA 2016-II]

(a) The balls will collide after 3s at a height of 30.2 m from the ground
(b) The balls will collide after 2s at a height of 20.1 m from the ground.
(c) The balls will collide after 1s at a height of 15.1 m from the ground
(d) The balls will collide after 5s at a height of 20m from the ground

Ans. (c)