

CLASS – XI**General Instructions :**

1. This question paper contains three sections.
2. Section A has 25 questions. Attempt any 20 questions.
3. Section B has 24 questions. Attempt any 20 questions.
4. Section C has 6 questions. Attempt any 5 questions.
5. All questions carry equal marks.
6. There is no negative marking.

SECTION-A

This section consists of 25 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

1. The working of an aeroplane is based on
 - (A) Newton's third law of motion
 - (B) Bernoulli's principle
 - (C) Newton's law of gravitation
 - (D) Law of conservation of momentum
2. Neutrons were discovered by
 - (A) Fermi
 - (B) Yukawa
 - (C) Dirac
 - (D) Chadwick
3. If $A = (12.0 \pm 0.1)$ cm and $B = (8.5 \pm 0.5)$ cm, then the value of $(A + B)$ is :
 - (A) 20.5 ± 0.4
 - (B) 20.5 ± 0.5
 - (C) 20.5 ± 0.6
 - (D) 20.5 ± 0.1
4. Which of the following represents the correct dimensions of the coefficient of viscosity?
 - (A) $[ML^{-1}T^{-2}]$
 - (B) $[ML^{-2}T^{-2}]$
 - (C) $[ML^{-1}T^{-1}]$
 - (D) $[MLT^{-2}]$
5. If the length and time period of an oscillating pendulum have errors

of 1% & 2% Respectively, what is the error in the estimate of 'g'?

- (A) 5%
- (B) 6%
- (C) 4%
- (D) 3%

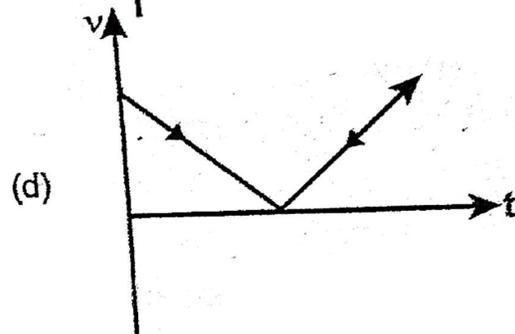
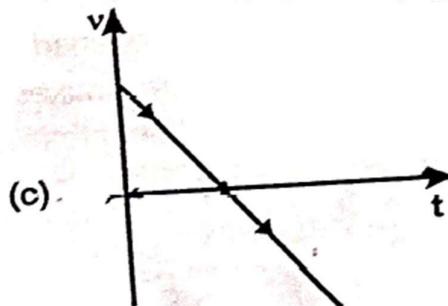
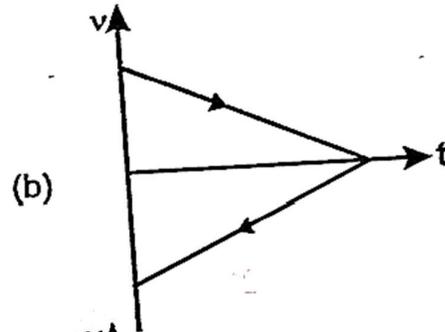
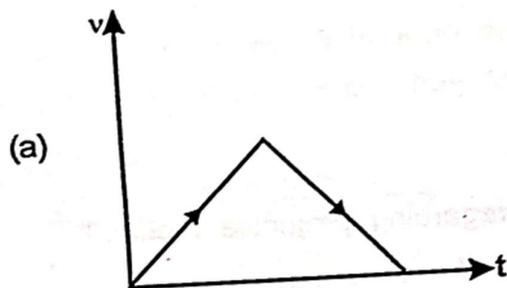
6. Which of the following is not a unit of length ?

- (A) Angstrom
- (B) Fermi
- (C) Barn
- (D) Parsec

7. A car A moving at 10 ms^{-1} on a straight road, is ahead of car B moving in the same direction at 6 ms^{-1} . The velocity of A relative to B is:

- (A) 16 ms^{-1}
- (B) -4 ms^{-1}
- (C) 4 ms^{-1}
- (D) None of the above

8. A body is thrown vertically upwards. Which one of the following graphs correctly represents the velocity versus time?



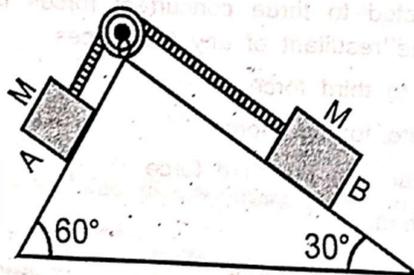
9. Which of the following is not a scalar quantity?

- (A) Temperature
- (B) Coefficient of friction
- (C) Charge
- (D) Impulse

10. Which of the following is true regarding projectile motion?
- (A) Horizontal velocity of projectile is constant.
 - (B) Vertical velocity of projectile is constant.
 - (C) Acceleration is not constant.
 - (D) Momentum is constant.
11. Centripetal acceleration is
- (A) A constant vector
 - (B) A constant scalar
 - (C) A magnitude changing vector
 - (D) Not a constant vector
12. A stone tied to the end of a string 100 cm long is whirled in a horizontal circle with a constant speed. If the stone makes 14 revolutions in 22 seconds, then the acceleration of the stone is
- (A) 16 ms^{-2}
 - (B) 4 ms^{-2}
 - (C) 12 ms^{-2}
 - (D) 8 ms^{-2}
13. The displacement of a body is given to be proportional to the cube of time elapsed. The magnitude of the acceleration of the body is (A)
- (A) Increasing with time
 - (B) Decreasing with time
 - (C) Constant but not zero
 - (D) Zero
14. A person moves 30 m north then 30 m east, then $30\sqrt{2}$ m south- west. His displacement from the original position is
- (A) Zero
 - (B) 28 m towards south
 - (C) 10 m towards west
 - (D) 15 m towards east.
15. Velocity vector and acceleration vector in a uniform circular motion are related as
- (A) Both in same direction
 - (B) Perpendicular to each other
 - (C) Both in opposite direction
 - (D) Not related to each other
16. A body is projected at an angle θ with the horizontal. At what value of θ , the body will cover maximum horizontal range?

- (A) 60°
(B) 90°
(C) 45°
(D) 0°
17. A projectile is projected at an angle (θ) with the horizontal ($0^\circ < \theta < 90^\circ$). Then the path followed by the projectile is
(A) Circular path
(B) Jig-Jag path
(C) Parabolic path
(D) None of the above
18. The time taken by a particle to complete one revolution along its circular path is called its
(A) Frequency
(B) Time Period
(C) Angular velocity
(D) Angular displacement
19. A large force acting for a short time to produce a finite change in momentum is called an
(A) Impulsive force
(B) Attractive force
(C) Repulsive force
(D) None of these
20. When a bicycle is in motion, the force of friction exerted by ground on the two wheels is such that it acts
(A) In backward direction on front wheel and in the forward direction on the rear wheel.
(B) In the forward direction on the front wheel and in the backward direction on the rear wheel.
(C) In the backward direction on both the front and the rear wheel.
(D) In the forward direction on both the front and the rear wheel.
21. A force required to make a body move along a circular path with uniform speed is called
(A) Centripetal force
(B) Impulsive force
(C) Both (A) and (B)
(D) None of the above.
22. Can a body in linear motion be in equilibrium?

- (A) No, it can not be in equilibrium.
(B) Yes, provided the vector sum of the forces acting upon the body is zero.
(C) Neither (A) nor (B).
(D) None of the above.
23. A cyclist bends while taking turn to
(A) Reduce friction
(B) Generate required centripetal force
(C) Reduce apparent weight
(D) Reduce speed
24. A car accelerates on a horizontal road due to the force exerted by
(A) the engine of the car
(B) the driver of the car
(C) the car on earth
(D) the road on the car
25. Two blocks each of mass M are resting on a frictionless inclined plane as shown in figure. Then



- (A) The block A moves down the plane.
(B) The block B moves down the plane
(C) Both the blocks remains at rest
(D) Both the blocks move down the plane

SECTION-B

This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

26. We can derive Newton's
(A) Second law and third law from the first law.
(B) First law and second law from the third law.
(C) Third law and first law from the second law.

- (D) All the three laws are independent of each other.
27. The driver of a car suddenly sees a broad wall in front of him. He should
- (A) Break sharply
 - (B) Turn sharply
 - (C) Both (A) and (B)
 - (D) None of these
28. A body subjected to three concurrent forces is found to be in equilibrium. The resultant of any two forces
- (A) is equal to third force
 - (B) is opposite to third force
 - (C) is collinear with the third force
 - (D) All of these.
29. Identify the correct statement.
- (A) Static friction depends on the area of contact.
 - (B) Kinetic friction depends on the area of contact.
 - (C) Coefficient of static friction does not depend on the surfaces in contact.
 - (D) Coefficient of kinetic friction is less than the coefficient of static friction.
30. A body is being raised to a height h from the surface of earth. What is the sign of work done by applied force and gravitational force respectively?
- (A) Positive, positive
 - (B) Positive, negative
 - (C) Negative, positive
 - (D) Negative, Negative
31. The work done by a body against friction always results in
- (A) Loss of kinetic energy.
 - (B) Loss of potential energy.
 - (C) Gain of kinetic energy.
 - (D) Gain of potential energy.
32. A 120g mass has a velocity $v = 2i + 5j$ ms at a certain instant. Its kinetic energy is:
- (A) 3J
 - (B) 4J
 - (C) 5J
 - (D) 1.74J

33. The area under force displacement curve represents
- (A) Velocity
 - (B) Acceleration
 - (C) Impulse
 - (D) Work done
34. When two spheres of equal masses undergo glancing elastic collision with one of them at rest, after collision they will move
- (A) Opposite to one another
 - (B) In the same direction
 - (C) Together
 - (D) At right angle to each other
35. The centre of mass of a body
- (A) lies always at the geographical centre
 - (B) Lies always inside the body
 - (C) Lies always outside the body
 - (D) May lie within or outside the body.
36. Which of the following is the correct relation between linear velocity and angular velocity of a particle?
- (a) $v = r \times \omega$
 - (b) $v = \omega \times r$
 - (c) $\omega = r \times v$
 - (d) $\omega = v \times r$
37. A rigid body is said to be in partial equilibrium, when it is in
- (A) Translational equilibrium only
 - (B) Rotational equilibrium only
 - (C) Either (A) or (B)
 - (D) Neither (A) nor (B)
38. Moment of couple is called
- (A) Angular momentum
 - (B) Force
 - (C) Torque
 - (D) Impulse
39. A person is standing on a rotating table with metal spheres in his hands. If he withdraws his hands to his chest, then the effect on his angular velocity will be
- (A) Increase
 - (B) Decrease

- (C) Remain same
(D) None of the above
40. An astronaut experiences weightlessness in a space satellite. It is because
(A) the gravitational force is small at that location in space
(B) the gravitational force is large at that location in space
(C) the astronaut experiences no gravity
(D) the gravitational force is infinitely large at that location in space.
41. Black hole is...
(A) Super surface of atmosphere
(B) Ozone layer
(C) Super dense planetary material
(D) None of these
42. The escape velocity of a body from the earth depends on
(i) The mass of the body.
(ii) The location from where it is projected
(iii) The direction of projection
(iv) The height of the location from where the body is launched.
(A) (i) and (ii)
(B) (ii) and (iv)
(C) (i) and (iii)
(D) (iii) and (iv)
43. Value of g is
(A) Maximum at poles
(B) Maximum at equator
(C) Same everywhere
(D) Minimum at poles
44. Which of the following statement is correct
(A) Acceleration due to gravity increases with increasing altitude
(B) Acceleration due to gravity increases with increasing depth
(C) Acceleration due to gravity increases with increasing latitude
(D) Acceleration due to gravity is independent of the mass of the earth.
45. Given below are two statements labelled as Assertion (A) and Reason (R)
Assertion (A): Friction opposes relative motion and thereby dissipates power in the form of heat.

Reason (R): Friction is always an undesirable force.

Select the most appropriate answer from the options given below.

- (A) Both A and R are true and R is the correct explanation of A.
- (B) Both A and R are true but R is not the correct explanation of A.
- (C) A is true but R is false.
- (D) Both A and R are false.

46. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): The total momentum of an isolated system of particles is conserved.

Reason (R): The law of conservation of momentum follows from the second and third law of motion.

Select the most appropriate answer from the options given below:

- (A) Both A and R are true and R is the correct explanation of A.
- (B) Both A and R are true but R is not the correct explanation of A.
- (C) A is true but R is false.
- (D) Both A and R are false.

47. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): The moment of inertia of a rigid body reduces to its minimum value, when the axis of rotation passes through its centre of gravity.

Reason (R): The weight of a rigid body always acts through its centre of gravity.

Select the most appropriate answer from the options given below:

- (A) Both A and R are true and R is the correct explanation of A.
- (B) Both A and R are true but R is not the correct explanation of A.
- (C) A is true but R is false.
- (D) Both A and R are false.

48. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): Moon has no atmosphere.

Reason (R): The escape velocity for moon is less than that of earth.

Select the most appropriate answer from the options given below:

- (A) Both A and R are true and R is the correct explanation of A.
- (B) Both A and R are true but R is not the correct explanation of A.
- (C) A is true but R is false.

- (D) Both A and R are falso.
49. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): The principle of superposition is not valid for gravitational forces.

Reason (R): Gravitational forces are non-conservative.

Select the most appropriate answer from the options given below:

- (A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false.
(D) Both A and R are false.

SECTION-C

This section consists of 6 multiple choice questions with overall choice to attempt any 5 questions. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

50. In motion of an object under the gravitational influence of another object, which of the following quantities is not conserved?
- (A) Angular momentum
(B) Mass of an object
(C) Total mechanical energy
(D) Linear momentum
51. Which of the following statements is correct regarding a geostationary satellite?
- (A) A geostationary satellite goes around the earth in east-west direction.
(B) A geostationary satellite goes around the earth in west-east direction.
(C) The time-period of a geostationary satellite is 48 hours.
(D) The angle between the equatorial plane and the orbital plane of geostationary satellite is 90° .

CASE STUDY

Read the passage given below and answer the questions:

Potential energy of a body is the energy possessed by the body by virtue of its position. $P.E = mgh$ where the symbols have their usual meaning. Kinetic energy of a body is the energy possessed by the body by virtue of its velocity.

$$K.E = \frac{1}{2}mv^2$$

Energy can neither be created nor be destroyed. However energy can be changed from one form to the other, such that energy appearing in one form is equal to the energy disappearing in the other form.

With the help of above comprehension, choose the most appropriate alternative for each of the following questions.

52. A body of mass 1kg is allowed to fall freely under gravity. The momentum of the body 5 seconds after it starts falling is
- (A) 100 Kgms⁻¹
 - (B) 150 Kgms⁻¹
 - (C) 50 Kgms⁻¹
 - (D) 200 Kgms⁻¹
53. Kinetic energy of the body at the same time is
- (A) 1250 J
 - (B) 625 J
 - (C) 2500 J
 - (D) 250 J
54. The body will attain this kinetic energy when it falls freely from a height of
- (A) 125 m
 - (B) 1250 m
 - (C) 250 m
 - (D) 2500 m
55. Velocity of the body after 5 sec.
- (A) 25 m/s
 - (B) 50 m/s
 - (C) 12.5 m/s
 - (D) 100 m/s
