Standard 11
PHYSICS
PART - I

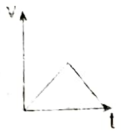
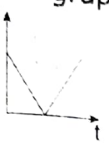
Time: 3.00 Hrs. Marks: 70

Choose the correct answer: **15×1=15**

1) The work done by the conservative force for a closed path is
a) always positive b) zero c) always negative d) not defined

2) A rigid body rotates with an angular momentum L. If the kinetic energy is doubled, the angular momentum becomes
a) L b) L/2 c) 2L d) $L/\sqrt{2}$

3) When a car takes a sudden left turn in the curved road, passengers are pushed towards the right due to
a) inertia of direction b) inertia of motion
c) inertia of rest d) absence of inertia

4) A ball is projected vertically upwards with a velocity v. It comes back to ground in time t. Which v-t graph shows the motion correctly?
a)  b)  c)  d) 

5) If the error in the measurement of radius is 2% then the error in the determination of area of the sphere will be
a) 4% b) 8% c) 2% d) 6%

6) Which of the following is an example of dimensional constant?
a) Euler's number b) Relative density c) Velocity d) Planck's constant

7) A body of mass 10g is moving with a speed of $10ms^{-1}$, the magnitude of momentum is
a) 0.1 kg ms^{-1} b) 1 kg ms^{-1} c) 10 kg ms^{-1} d) 100 kg ms^{-1}

8) A mango of mass 400g is hanging from a tree. Tension force acting on the mango is
a) 40N b) 9.8N c) 3.92N d) 1N

9) When an object is kept on a surface, the direction of frictional force is
a) Perpendicular to the surface b) Parallel to the surface
c) at an angle to the surface d) all of these

10) If the linear momentum of the object is increased by 0.1% then the Kinetic energy is increased by
a) 0.1% b) 0.2% c) 0.4% d) 0.01%

11) A couple produces
a) pure rotation b) pure translation
c) rotation and translation d) no motion

12) If the measurement is made with a meter scale whose end is worn out, the result obtained will have error known as
a) Least count error b) Personal error
c) Instrumental error d) All the above

13) The centrifugal force appears to exist
a) only in inertial frames b) only in rotating frames
c) in any accelerated frame d) both in inertial and non-inertial frames

14) A uniform force of $(2\hat{i}+\hat{j})N$ acts on a particle of mass 1 kg. The particle displaces from position $(3\hat{j}+\hat{k})M$ to $(5\hat{i}+3\hat{j})M$. The work done by the force on the particle is
a) 9J b) 6J c) 10J d) 12J

15) The speed of a solid sphere after rolling down from rest without sliding on an inclined plane of vertical height h is
a) $\sqrt{\frac{4gh}{3}}$ b) $\sqrt{\frac{10gh}{7}}$ c) $\sqrt{2gh}$ d) $\sqrt{\frac{gh}{2}}$

PART - II

Answer ANY SIX questions. Answer the question 24 compulsorily: **6×2=12**

16) State the law of conservation of angular momentum.
17) What do you mean by power?
18) State Newton's III law. Give one example.
19) A particle moves in a circle of radius 10m. Its linear speed is given by v = 3t where t is in second. Find the centripetal acceleration at t = 2 second.
20) What are fundamental and derived quantities?
21) Define the term coefficient of restitution.
22) When you walk on the tiled floor where water is spilled, you are likely to slip. Why?
23) What are scalar quantities? Give examples.
24) An object is thrown with initial speed 10 ms^{-1} at an angle $\pi/4$ with the horizontal. What is the range covered?

PART - III

Answer ANY SIX of the following questions. **6×3=18**
Answer the question 33 compulsorily.

25) What are the limitations of dimensional analysis?
26) Define angular displacement. Write down the Kinematic equations for angular motion.
27) What is impulse? Derive the impulse - momentum equation.
28) Mention the differences between elastic and inelastic collisions.
29) Obtain the relation between angular momentum and angular velocity of a rotating rigid body.
30) State Newton's II law of motion. Derive an expresison for force.
31) An object of mass 2 kg attached to a spring is moved to a distance of x = 10m from the equilibrium position. If the spring constant is K = 1Nm^{-1}, what is the speed when the mass crosses the mean position?
32) State and explain Lami's theorem.
33) A uniform disc of mass 100g has a diameter of 10 cm. Calculate the total energy of the disc when rolling along a horizontal table with a velocity of 20 cm s^{-1}.

PART - IV

Answer the following questions in detail: **5×5=25**

34) Write about Triangulation method and Radar method to measure larger distances.
(OR)
Discuss rolling on inclined plane and arrive at the expression for the acceleration.
35) Derive the equation of range and maximum height reached by the particle thrown at an oblique angle 'θ' with respect to the horizontal direction.
(OR)
Derive equations for velocity of two bodies in one dimensional elastic collision.
36) a) Write about inertia at rest and inertia in motion.
b) A stone of mass 2 kg is attached to a string of length 1m. The string can with stand a maximum tension 200N. What is the maximum speed that stone can have during the whirling motion?
(OR)
Derive an expression for moment of inertia of a rod about its centre and perpendicular to the rod.
37) State and explain Work - Energy principle.
(OR)
a) Using free body diagram, show that it is easy to pull an object than to push it.
b) Suggest few methods to reduce friction.
38) Discuss the properties of scalar product of two vectors.
(OR)
Assuming the frequency 'γ' of a vibrating string may depend upon (i) applied force (F) (ii) length (ℓ) (iii) mass per unit length (m). Prove that $\gamma \propto \frac{1}{\ell}\sqrt{\frac{F}{m}}$.