PHYSICS

BOOKS - SURA PHYSICS (TAMIL ENGLISH)

QUARTERLY COMMON EXAMINATION - 2019

Part I

1. The significant figure of the number 0.003401 is:

A. 6

B. 3

C. 5

D. 4

Answer: D

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2. If the force is proportional to square of velocity, the the dimensional of proportionality constant is

A. $[MLT^0]$

B. $[MLT^{-1}]$

C. $\left[ML^{-2}T\right]$

D. $\left[ML^{-1}T^{0}\right]$

Answer: D

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3. If a particle has negative velocity and negative acceleration, its speed

A. increases

B. decreases

C. remains same

D. zero

Answer: A

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4. A physical quantity is given by $X = \frac{a^2\sqrt{b}}{c^3}$. If the percentage errors of measurement in a, b and c are 3%, 2% and 1% respectively, then the percentage error in X is

A. 5%

B. 10%

C. 8%

D. 6%

Answer: B

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5. If the object dropped vertically from the top of the building takes 2 second to reach the ground then the height of the building is $\left(g = 10ms^{-2}\right)$

A. 10m

B. 16m

C. 20m

D. 25m

Answer: C

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6. Consider a circular leveled road of radius 10 m having coefficient of static friction 0.81. Three cars (A, B and C) are travelling with speed 7 $ms^{-1}, 8ms^{-1}$ and $10ms^{-1}$ respectively, which car will skid when it moves in the circular level road? $(g = 10ms^{-2})$:

A. A

B. B

C. C

D. Both B and C

Answer: C

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7. The centrifugal force appears to exist

A. only in any inertial frames

B. only in rotation frames

C. in any accelerated frames

D. both in inertial and non inertial frames

Answer: B

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8. A ball of mass 1 kg and another of mass 2 kg are dropped from a tall building whose height is 80 m. After, a fall of 40 m each towards Earth, their respective kinetic energies will be in the ratio of

A. $\sqrt{2}:1$

B. $1:\sqrt{2}$

C. $2:1$

D. $1:2$

Answer: D

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9. If the linear momentum of the object is increased by 0.3% then the kinetic energy is increased by :

A. 0.1%

B. 0.2%

C. 0.4%

D. $0.6\ \%$

Answer: D

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10. What is the minimum velocity with a body of mass m must enter a vertical loop of radius R so that it can complete the loop ?

A. $\sqrt{2gR}$

B. $\sqrt{3gR}$

C. $\sqrt{5gR}$

D. $\sqrt{gR}$

Answer: C

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11. A closed cylindrical container is partially filled with water. As the container rotates in a horizontal plane about a perpendicular bisector, its moment of inertia.

A. increases

B. decreases

C. remains constant

D. depends on direction of rotation

Answer: A

12. A rigid body rotates with an angular momentums L. If its kinetic energy is reduced to one fourth (1/4) their angular momentum becomes:

A. L

B. L/2

C. 2L

D. $L/\sqrt{2}$

Answer: B

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13. The speed of the centre of a wheel rolling on a horizontal horizontal surface is v_0. A point on the rim in level with the centre will be moving at a speed of speed of:

A. 0

B. V_0

C. $\sqrt{2}V_0$

D. $2V_0$

Answer: C

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14. Which of the following is scalar quantity?

A. momentum

B. work

C. force

D. Displacement

Answer: B

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Part Ii

1. The radius of the circle is 3.12 m. Calculate the area of the circkle with regard to significant figures.

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2. Define projectile. Give two examples.

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3. What is the point mass? Give the examples.

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4. Under what condion will a car skid on a leveled circular road ?

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5. A car takes a turn with velocity 50 ms^{-1} on the circular road of radius of curvature 10 m. Calculate the centrifugal force experienced by a person of mass 60 kg inside the car?

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6. State the principle of moments .

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7. Compare conservative forces and non conservative forces.

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8. Distinguish between centre of mass and centre of gravity.

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9. Water in a bucket tied with rope whirled around in a vertical circle of radius 0.5 m. Calculate the minimum velocity at the lowest point so that the water does not spill from it in the course of motion. $\left(g = 10ms^{-1}\right)$

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Part Iii

1. How will you measure the diameter of the Moon using parallax method?

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2. Define Scalar product of two vector. Give any four properties of scalar product.

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3. Suppose an object is thrown with initial speed of 10 ms^{-1} at an angle $\pi/4$ with the horizontal, what is the range-covered? Suppose the same object is thrown similarly in the moon, will there be any change in the range? If yes, what is the change? (The acceleration due to gravity in the moon $g_{\text{moon}} = 1/6g$)

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4. Compare static friction and kinetic friction.

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5. Using free body diagram show that it is easy to pull an object than to push it

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6. Derive the relation between momentum and kinetic energy.

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7. A vehicle of mass 1250 kg is driven with an acceleration 0.25 ms^{-2} along a straight level road

against an external resistive force 500 N. Calculate the power delivered by the vehicle's engine if the velocity of the vehicle is 30 ms^{-1}.

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8. Define torque and mention it's unit. Give any two examples of torque in day-to-day life.

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9. The position vectors of two point masses 10 kg and 5 kg are

$\left(-3\vec{i}+2\vec{j}+4\vec{k}\right)m$ and $\left(3\vec{i}+6\vec{j}+5\vec{k}\right)m$

respectively. Locate the position of centre of mass.

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Part Iv

1. Obtain in expression for the time period T of a simple pendulun. The time period depend upon (i) mass 'm' of the bob (ii) length 'l' of the pendulum and (iii) acceieration due to gravity g at the place where the pendulum is suspended. (Constant k = 2π) i.e.

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2. Explain in detail the triangle law of addition.

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3. Explain in detail about systematic errors and its classification.

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4. (a) Explain perfect inelastic collision and derive an expression for loss of kinetic energy in perfect

inelastic collision.

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5. Derive the kinematic equations of motion for constant acceleration.

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6. Derive the expression for final speed of a particle moving in an inclined plane.

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7. Principle of conservation of linear momentum:

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8. Derive the expression for moment of inerita of a uniform disc about an axis passing through the centre and perpendicular to the plane.

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9. Derive the expression for gravitational potential energy.

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10. Derive the expression of Kinetic energy in rotation.

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