PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SAMPLE PAPER -6 (SOLVED)

Part I

1. A cyclist moving on a circular track of radius 40 m completes half a revolution in 40 sec

average velocity is ..... .

A. 0

B. $2m/s$

C. $4m/s$

D. $2\pi m/s$

Answer: B

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2. A wheel has angular acceleration of $3.0\mathrm{rad}/s^2$ and an initial angular speed of $2.00\mathrm{rad}/s$. In a time of 2 seconds it has rotated through an angle of (in radian) ..... .

A. 10

B. 12

C. 4

D. 6

Answer: A

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3. The sum of moments of masses of all the particles in a system about the center of mass is

A. may be greater than zero

B. may be less than zero

C. may be equal to zero

D. always zero

Answer: D

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4. The dimensional formula of coefficient of viscosity is ..... .

A. $ML^{-2}T^{-2}$

B. $ML^{-2}T^{-1}$

C. $ML^{-1}T^{-1}$

D. $M^{-1}L^{-1}T^{-1}$

Answer: C

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5. Action and reaction

A. acts on same object

B. acts on two different objects

C. have resultant not zero

D. acts on the same direction

Answer: B

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6. A spring is stretched by applying load to its free end. The strain produced in the spring is ..... .

A. volumetric

B. shear

C. longitudinal

D. longitudinal and shear

Answer: D

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7. A rope is wound round a hollow cylinder of mass 3 kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force of 30 N.

A. $0.25 \text{rad} s^{-2}$

B. $25 \text{rad} s^{-2}$

C. $5 m s^{-2}$

D. $25 m s^{-2}$

Answer: B

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8. The potential energy of a simple harmonic oscillator when the particle is halt way to its end point is (E is total energy) ..... .

A. $\frac{2}{3}E$

B. $\frac{1}{3}E$

C. $\frac{1}{4}E$

D. $\frac{1}{2}E$

Answer: C

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9. A particle executes simple harmonic motion with an angular velocity and maximum acceleration of $3.5rad/s$ and $7.5m/s^2$ respectively. Amplitude of the oscillation is ..... .

A. 0.36

B. 0.28

C. 0.61

D. 0.53

Answer: C

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10. If the tension and diameter of a sonometer wire of fundamental frequency n is doubled and density is halved, then its fundamental frequency will become ..... .

A. $\frac{n}{4}$

B. $\sqrt{2}n$

C. n

D. $\frac{n}{\sqrt{2}}$

Answer: C

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11. Universal time is based on :

A. Joule-Thomson effect

B. Newton's particle theory

C. Joule's effect

D. None of the above

Answer: D

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12. Work done by 0.1 mole of a gas at 27°C to double its volume at constant pressure is (R = 2 cal/mol/K)

A. 54 cal

B. 60 cal

C. 546 cal

D. 600 cal

Answer: B

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13. When a lift is moving upwards with acceleration a, then time period of simple pendulum in it will be ..... .

A. $2\pi\sqrt{\frac{l}{g+a}}$

B. $2\pi\sqrt{\frac{g+a}{l}}$

C. $\frac{1}{2\pi}\sqrt{\frac{l}{g+a}}$

D. $\frac{1}{2\pi}\sqrt{\frac{g+a}{l}}$

Answer: A

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14. As disc is rotating with angular speed ω. If a child sits on it, what is conserved?

A. linear momentum

B. angular momentum

C. kinetic energy

D. potential energy

Answer: B

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15. The vectors $\vec{A}$ and $\vec{B}$ are such that $\left|\vec{A}+\vec{B}\right|=\left|\vec{A}-\vec{B}\right|$. The angle between the two vector is ..... .

A. 45°

B. 60°

C. 75°

D. 90°

Answer: D

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Part Ii

1. Velocity - time graph of a moving object is shown below. What is the acceleration of the

object? Also draw displacement - time graph for the motion of the object?

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2. Can a body subjected to a uniform acceleration always move in a straight line.

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3. Calculate the viscous force on a ball of radius Imm moving through a liquid of

viscosity $0.2Nsm^{-2}$ at a speed of $0.07ms^{-1}$.

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4. Calculate the work done by a force of 30 N in lifting load of 2g to a height of 10 m $(g = 10ms^{-2})$.

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5. Why are shockers used in automobiles like car?

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6. Assuming the earth to be a sphere of uniform mass density, how much would a body weigh half way down to the centre of the earth if it weighed 250 N on the surface ?

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7. How do you deduce that two vectors are perpendicular?

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8. An air bubble of radius r in water is at a depth h below the water surface at some instant if P is atmospheric pressure and d & T are the density and surface tension of water, what is the pressure inside the bubble ?

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9. Define beats.

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Part Iii

1. Centripetal acceleration is given by

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2. Write any five properties of vector product of two vectors.

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3. Show that pressure exerted by the gas is two - thirds of average kinetic energy per unit volume of the gas molecules.

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4. Derive the expression for gravitational potential energy.

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5. Calculate the value of g in the following two cases:

(a) If a mango of mass $\frac{1}{2}$ kg falls from a tree from a height of 15 metres, what is the acceleration due to gravity when it beigns to fall?

(b) Consider a satellite orbiting the Earth in a circular orbit of radius 1600 km above the surface of the Earth. What is the acceleration experienced by the satellite due to Earth's gravitational force?

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6. Explain the variation of 'g' with latitude.

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7. A bullet of mass 50 g is fired from below into a suspended object of mass 450 g. The object rises through a height of 1.8 m with bullet remaining inside the object. Find the speed of the bullet. Take $g = 10ms_{-2}$

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8. If the piston of a container is pushed fast inward .Will the ideal gas equation be valid in the intermediate stage ? If not, Why ?

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9. Calculate how many times more intense is 90 dB sound compared to 40 dB sound?

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Part Iv

1. Obtain an expression for the time period T of a simple pendulum. [The time period T depend upon (i) mass l of the bob (ii) length m of the pendulum and (iii) acceleration due to gravity g at the place where pendulum is suspended.

Assume the constant $k = 2\pi$]

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2. Derive an expression for escape speed.

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3. Derive an expression for kinetic energy in pure rolling.

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4. A shell of mass 200 gm is ejected from a gun of mass 4 kg by an explosion that

generates 1.05 kJ of energy. Calculate the initial velocity of the shell

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5. State and prove parallel axis theorem

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6. Moment of inertia of a circular wire of mass M and radius R about is its diameter is

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7. Prove the law of conservation of linear momentum use it to find the recoil velocity of a gun when a bullet is fired from it

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8. Derive an expression for escape speed.

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9. State Newton's II law of motion.

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10. Gas exerts pressure on the walls of the container

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11. Explain with graphs the difference between work done by a constant force and by a

variable force.

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12. State Newton's II law of motion.

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