PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SAMPLE PAPER -3 (SOLVED)

Part I

1. The parallax of a heavenly body measured from two points diametrically opposite on

equator of Earth is 2^1. Calculate the distance of the heavenly body. [Given radius of the Earth = 6400 km][1" = 4.85×10^{-6} rad]

A. $8.8 \times 10^{10} m$

B. $4.4 \times 10^{10} m$

C. 0.29×10^{-10}m

D. $8.6 \times 10^{-10} m$

Answer: B

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2. A particle is thrown vertically upwards its velocity at half of the height is 10 m/s then the maximum height attained by it is $(g = 10m/s^2)$

A. $8m$

B. $20m$

C. $10m$

D. $16m$

Answer: C

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3. If the velocity is $\vec{v} = 2\hat{i} + t^2\hat{j} - 9\vec{k}$, then the magnitude of acceleration at t = 0 . 5 s is :

A. $1ms^{-2}$

B. $2ms^{-2}$

C. zero

D. $-1ms^{-2}$

Answer: A

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4. A uniform force of $\left(2\hat{i}+\hat{j}\right)$ N acts on a particle of mass 1 kg. The particle displaces from position $\left(3\hat{j}+\hat{k}\right)$ m to $\left(5\hat{i}+3\hat{j}\right)$ m. The work done by the force on the particle is

A. 9J

B. 6J

C. 10 J

D. 12J

Answer: C

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5. A couple produces _____ motion.

A. pure rotation

B. Pure translation

C. rotation and translation

D. No motion

Answer: A

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6. What is the shape , when - wetting liquid is placed in a capillary tube ?

A. convex upward

B. Concave upwards

C. concave downwards

D. convex downwards

Answer: A

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7. An ideal gas heat engine operators in a carnot's cycle between $227^{\circ}C$ and $127^{\circ}C$. It absorbs $6 \times 10^4 J$ at high temperature. The amount of heat converted into work is ..... .

A. $2.4 \times 10^4 J$

B. $4.8 \times 10^4 J$

C. $1.2 \times 10^4 J$

D. $6 \times 10^4 J$

Answer: C

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8. four round objects namely a ring , a disc ,a hollow sphere and a sphere with same radius R start to roll down an incline at the same time .find out the order of objects reaching the bottom first ?

A. Solid sphere , disc , hollow , sphere , ring

B. ring , hollow sphere ,disc, solid sphere

C. disc, ring , solid , sphere , hollow sphere

D. Hollow sphere , disc , ring , solid sphere

Answer: A

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9. Two forces of magnitude F having a resultant of the same magnitude of ,F the angle between the two forces is _____

A. 45°

B. 60°

C. 120°

D. 150°

Answer: C

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10. If y_0 and v denote the sound velocity and the rms velocity of the molecules in a gas, then .....

A. $V_0 = v\left(\frac{3}{r}\right)^{\frac{1}{2}}$

B. $V_0 = 0$

C. $V_0 = v\left(\frac{r}{3}\right)^{\frac{1}{2}}$

D. V_0 nad v are not related

Answer: C

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11. The internal energy of an ideal gas depends on

A. Pressure

B. Volume

C. temperature

D. Size of molecules

Answer: C

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12. The internal energy of an ideal gas depends on

A. expanded by adding more molecules to it

B. expended by adding more that heat to it

C. Expanded against zero pressure

D. Compressed by doing work on it

Answer: A

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13. A particle executing simple harmonic motion of amplitude 5 cm has maximum speed of 31.4 cm/s. The frequency of its oscillation is.....

A. 3Hz

B. 2 Hz

C. 4Hz

D. 1 Hz

Answer: D

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14. A hollow sphere is filled with water . It is hung by a long thread . As the water flows out

of a hole at the bottom , the period of oscillation will

A. First increase and then decrease

B. first decrease and then increase

C. increase continuously

D. decrease continuously

Answer: A

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15. A wave travels in a medium according to the equation of displacement given by y (x , t) = 0.03 sin $\{\pi(2t - 0.01x)\}$ where y and x are in metres and t in seconds . The wavelength of the wave is ..... .

A. 200 m

B. 100 m

C. 20 m

D. 10 m

Answer: A

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Part Ii

1. Distinguish scalar and vector .

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2. Calculate the total number of degress of freedom possessed by the molecules in one cm^3 of H_2 gas at NTP .

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3. A stone tied to the end of a string 80 cm long is whirled in a horizontal circle with a constant speed. If the stone makes 14 revolutions in 25 seconds, what is the magnitude and direction of acceleration of the stone?

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4. there are two identical balls of same material one being solid and the other being hollow How will you distinguish them without weighting

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5. In a dark room would you be able to tell whether a given note had been produced by a Piano or a Violin?

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6. Why dams are made stronger and thicker at the bottom that at the top?

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7. Which one among a solid , liquid gas of same mass and at the same temperature has the greatest internall energy . Which one has least and why ?

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8. Is it possible if work is done by the internal force , what will be the change in kinetic energy ?

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9. Explain red shift and blue shift in Doppler effect.

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Part Iii

1. Write the difference between C and H.

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2. Write down the Kinematic equations for Angular motion.

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3. A nucleus is at rest in the labortory frame of reference show that if it disintegrates into two smaller nuclei . The products must be emitted in opposite directions .

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4. How do you classify the physical quantities on the basis of dimension ?

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5. Write shorts notes on the oscillations of liquid column in U-tube.

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6. What are the factors affecting the surface tension of a liquid?

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7. Write a note on Orlon?

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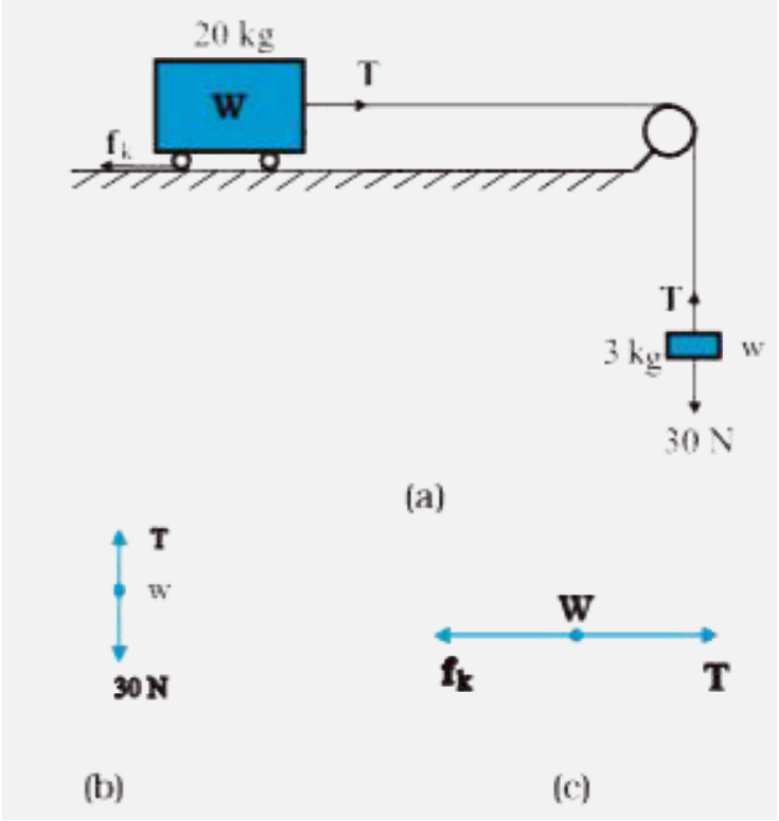
8. What is the acceleration of the block and trolley system shown in a Fig.(a), if the coefficient of kinetic friction between the trolley and the surface is 0.04? What is the tension in the string? (Take g $=10ms^{-2}$).

Neglect the mass of the string.



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9. An increase in pressure of 100 kPa causes a certain volume of water to decrease by 0.005% of its original volume .

(a) Calculate the bulk modulus of water ?

(b) Compute the speed of sound (compressional waves) in water ?

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Part Iv

1. Discuss the effect of rolling on inclined plane and derive the expression for the acceleration.

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

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3. Derive an expression for maximum speed the car can have safe turn on a leveled circular road .

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4. State and prove perpendicular axis theorem.

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5. Derive an expression for escape speed.

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6. What is capillarity? Obtain an expression for the surface tension of a liquid by capillary rise method.

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7. Explain the different types of modulus of elasticity.

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8. Discuss in detail the energy in simple harmonic motion.

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9. For a given ideal gas 6×10^5 J heat energy is supplied and the volume of gas is increased from 4 m^3 to $6m^3$ at atmospheric pressure . Calculate (a) the work done by the gas (b) Change in internal energy of the gas

(c) graph this process in PV and TV diagram

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10. Describe Newton's formula for velocity of sound waves in air.

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