PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SAMPLE PAPER -4

Part I

1. A force F is applied on a square plate of side

L. If percentage erroe in determine of L is 2%

and that in F 4% the permissible error in pressure is.....

A. 0.02

B. 0.04

C. 0.06

D. 0.08

Answer: D

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2. The potential energy of a system increases, if work is done

A. upon the system by a non conservative force

B. by the system against a conservative force

C. by the system against a non conservative force

D. upon the system by a conservative force

Answer: B

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3. If $x = at^2 + bt + c$ where x is displacement as a function of time. The dimension of 'a' and 'b' are respectivily ....

A. LT^{-1} and LT^{-2}

B. LT^{-2} and LT^{-1}

C. L and LT^{-2}

D. LT^{-1} and L

Answer: B

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4. A satellite in its orbit around the earth is weight less on account of its .....

A. momentum

B. acceleration

C. speed

D. none

Answer: B

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5. the displacment of a particle long x-axis is given by $x = 7t^2 + 8t + 3$. Its acceleratiton anf velocity at $t = 2s$ respectively....

A. $36ms^{-1}, 14ms^{-2}$

B. $14ms^{-2}, 36ms^{-1}$.

C. $47ms^{-2}, 21ms^{-1}$

D. $2ms^{-1}, 47ms^{-2}$.

Answer: B

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6. A sphere of a radius r cm falls from rest in a viscous liquid. Head is produced due to viscous force. The rate of production of heat when the sphere attians its terminal velocity is proportional to .....

A. r^2

B. r^3

C. r^4

D. r^5

Answer: D

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7. A body of weight mg is hanging on string which extends its length l. The workdone in extending the sring is.....

A. mgl

B. $\frac{mgl}{2}$

C. 2 mgl

D. none of these

Answer: B

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8. If S_P and S_V denote the specific heats of nitrogen gas per unit mass at constant pressure and constant volume respectively, then

A. $S_pS_v = 28R$

B. $S_pS_v = \frac{R}{28}$

C. $S_p - S_v = 14R$

D. $S_p - S_v = R$

Answer: B

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9. A particle is moving eastwards with a velocity of 5 m/s. In 10s the velocity changes to

5 m/s northwards. The average acceleration in this time is

A. zero

B. $\frac{1}{\sqrt{2}}\frac{m}{s^2}$ towards north-west

C. $\frac{1}{\sqrt{2}}\frac{m}{s^2}$ towards north-east

D. $\frac{1}{2}\frac{m}{s^2}$ towards north-west

Answer:

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10. In an isochoric process we have

A. $W \neq 0, U = 0, Q = 0, T = 0$

B. $W \neq 0, U \neq 0, Q = 0, T = 0$

C. $W = 0, U = 0, Q \neq 0, T \neq 0$

D. $W = 0, U \neq 0, Q \neq 0, T \neq 0$

Answer: D

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11. The efficiency of a carnot engine oprerations between boiling freezing points of water is ....

A. 0.1

B. 100

C. 1

D. 0.27

Answer: D

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12. Bernoulli's equation is applicable in the case of ..... .

A. energy

B. linear momentum

C. angular momentum

D. mass

Answer: A

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13. A body is projected vertically up. What is the distance covered in its last second of upward motion? $\left(g = 10m/s^2\right)$

A. $19.6ms^{-1}$

B. $58.8ms^{-1}$

C. $49ms^{-1}$

D. $65ms^{-1}$

Answer: D

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14. SI unit of Stefan's constant is ____ .

A. watt m^2k^4

B. watt $\frac{m^2}{k^4}$

C. watt k^4m^2

D. watt/m^2k^4

Answer: D

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Part Ii

1. Get an expression for stopping distance of a vehicle in terms of intial velocity v_a and deceleration "a"...

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2. A cornot engine has the same eficincy , when operated (i) between 100K and 500K (ii) between TK and 900K. Find the value of T.

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3. A block at rest explodes into 3 parts are $-2p\hat{j}$ and $p\hat{j}$. Calculate the magnitude of the momentum of third part.

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4. Discuss the possibilities of work done to be zero.

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5. Define the SI unit of length.

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6. A solid cylinder of mass 20kg rotates about it axis with anguler speed $100s^{-1}$ the radius of the cylinder is 0.25m, Calculate moment of intertia of the solid cylinder.

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7. Why moon has no atmosphere?

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8. A referigertor has COP of 3 . How much work must be supplied to a refrigertor in order to remove $200J$ of heart from its interior?

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9. What is the effect of gravitational force of attraction acting on the person be indise the satellite and stand on moon?

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Part Iii

1. State and prove Archimedes principle.

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2. State Kepler's three laws.

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3. Mention the properties of dot product of two vectors.

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4. Let the two springs A and B be such that $K_A > K_B$, On which spring will more work

has to be done if they are stretched by the same force ?

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5. What is the difference between sliding and slipping ?

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6. Jupiter is at a distance of 824.7 million km from the Earth. Its angular diameter is

measured to be 35.72". Calculate the diameter of Jupiter.

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7. A wire 10 m long has a cross-sectional area $1.25 \times 10^{-4} m^2$. It is subjected to a load of 5 kg. If Young's modulus of the material is $4 \times 10^{10} Nm^{-2}$, calculate the elongation produced in the wire. Take $g = 10 ms^{-2}$

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8. State the law of equipartition of energy.

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9. A cylindrical tank of height 0.4m is open at the top and has a diameter 0.16m. Water is filled in it uo to height of 0.16m. Find the time taken to empty the tank through a hole of radius $5 \times 10^{-3} m$ in its bottom.

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Part Iv

1. At the highest point of oblique projection, which of the following is correct?

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2. Explain the motion of blocks connected by a string in (i) vertical motion (ii) horizontal motion .

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3. Derive the expression for Carnot engine efficiency.

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4. Explain the concepts of fundamental frequency, harmonics and overtones in detail.

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5. Give any two salient features of static Friction and Kinetic Friction.

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6. Describe the vertical oscillations of a spring.

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7. State Bernoulli's theorem.

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8. Write down the postulates of kinetic theory of gases.

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

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10. Explain the formula of stationary waves.

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