PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SAMPLE PAPER - 19 (UNSOLVED)

Part I

1. A physical quantity P is given by $P = \dfrac{a^2 b^2}{cd}$.

If the percentage errors of measurement in

a,b,c,d are 1%, 2%, 3%, 4% respectively, then calculate the percentage error in the calculatioon of P.

A. 0.14

B. 0.13

C. 0.07

D. 0.04

Answer: A

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2. Which one of the following statement is true?

A. A scalar quantity is conserved in a process

B. A scalar quantity does not vary from one point to another in space

C. A scalar quantity can never take -ve values

D. A scalar quantity has only magnitude and no direction

Answer: D

3. The time period of a satellite orbiting Earth in a circular orbit is independent of

    A. radius of the orbit

    B. the mass of the satellite

    C. both the mass and radius of the orbit

D. neither the mass nor the radius of its orbit

Answer: B

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4. Two blocks A and B of masses 2m & m are corrected by a massless and inextensible string, The magnitudes of acceleration of A and B immediately after the string is cut are ....

A. $\dfrac{g}{2}$, g

B. g. g

C. g, $\dfrac{g}{2}$

D. $\dfrac{g}{2}$, $\dfrac{g}{2}$

Answer: A

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5. The work done by the conservative force for

a closed path is

A. always negative

B. zero

C. always positive

D. not defined

Answer: B

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6. Co-efficient of static friction for a pair of materials such as Rubber tyre and wet road is

....

A. 1.0

B. 7

C. 0.7

D. 0.35

Answer: C

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7. If there is change of angular momentum from J to 4J in 4S, then the torque is

A. $\dfrac{3}{4}J$

B. 1 J

C. $\dfrac{5}{4}J$

D. $\dfrac{4}{3}J$

Answer: A

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8. If the velocity is $\vec{v} = 2\hat{i} + t^2\hat{j} - 9\hat{k}$ then the magntidue of acceleration at $t = 0.5s$ is

A. $1ms^{-2}$

B. $2ms^{-2}$

C. zero

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

Answer: A

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9. A couple produces ....

A. pure rotation

B. pure translation

C. rotation and translation

D. no motion

Answer: A

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10. 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?

A. 66.00 J

B. 65.66 J

C. 66.67 J

D. 60 J

Answer: C

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11. The first law of thermodynamics is concerned with the conservation of ....

.

A. number of molecules

B. energy

C. number of moles

D. temperature

Answer: B

12. A rigid body rotates with an angular momentum L. If its kinetic energy is halved, the angular momentum becomes,

A. L

B. $\dfrac{L}{2}$

C. 2L

D. $\dfrac{1}{\sqrt{2}}$

Answer: D

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13. When a body moves with constant speed in a circular path, then ....

A. workdone will be zero

B. acceleration will be zero

C. no force acts on the body

D. its velocity remains constant

Answer: D

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14. A seconds pendulum is placed in a space laboratory orbiting around the Earth at a height 3R from the Earth's surface where R is

the radius of the Earth. The time period of the pendulum will be................

A. zero

B. $\dfrac{2}{3} s$

C. 4s

D. infinity

Answer: D

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15. In elastic collision, 100% energy transfer takes place when ....

A. $m_1 = m_2$

B. $m_1 > m_2$

C. $m_1 < m_2$

D. $m_1 = 2m_2$

Answer: a

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1. Define unit of a physial quantity.

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2. Define a radian.

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3. State Newton's second law .

4. What is the work done by the centripetal force in circular motion ?

5. State Kepler's law of period in planetory motion.

6. State Archimedes principle.

7. 500 g of water is heated from $30°C$ to $60°C$. Ignoring the slight expansion of water, calculate the change in internal energy of the water? (Specific heat of water $4184 J/kgK$).

8. The temperature at which the K.E. of a gas molecules is double its value at $27°C$ is

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9. What is resonance? Give example for it.

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Part Iii

1. Explain free oscillation with example.

2. Chennai is a distance of 500 km from Coimbatore. (A) sets out from Coimbatore at a speed of $50\,\mathrm{kmh}^{-1}$ and (B) sets out at the same time from Chennai at a speed of $40\,\mathrm{kmh}^{-1}$. When will they meet each other ?

3. What are concurrent forces? State Lami's theorem.

4. Write the differences between conservative and non-conservative forces. Give two examples each.

5. Give the expressions for linear, area and volume thermal expansions.

6. Determine gravitational potential from gravitational potential energy?

7. Draw the PV diagram for Adiabatic process

8. State the second law of thermodynamics in terms of entropy.

9. 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 $k = 2\pi$]

Part lv

1. Assuming that the frequency γ of a vibrating string may depend upon (i) applied force (F) (ii) length (l) (iii) mass per unit lengt (m), prove that $\gamma \propto \dfrac{1}{l}\sqrt{\dfrac{F}{m}}$ using dimensional analysis.

2. Derive the equation of motion, range and maximum height reached by the particle thrown at an oblique angle θ with respect to the horizontal direction.

3. What are concurrent forces? State Lami's theorem.

4. Arrive at an expression for elastic collision in Dimension and discuss various case.

5. An object of mass 100 g is thrown with initial velocity $\overrightarrow{V} = 5\left(\hat{i} + \hat{j}\right)ms^{-1}$ with respect to the ground. Neglect the effect of air on the motion of mass and take $g = 10ms^{-1}$.

What is the impulse transferred by the mass when it hits the ground.

6. A man of 50 kg is standing on the school play ground at Trichy. The latitude of Trichy is $10.8°$.

With what mimimum angular speed the earth must rotate so that the magnitude of gravitational force is equal to the magnitude of centrifugal force that he experiences?

(Radius of the earth is 6400 km and $g = 10ms^{-2}$.

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7. State and explain work energy principle. Mention any three examples for it.

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8. How will you determine the velocity of sound using resonance air column apparatus ?

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

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10. Define an adiabatic process.

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