

W-1-B

Roll No.....

Total No. of Questions : 26]

[Total No. of Printed Pages : 4

XIAP/BIKD22

7101-B

PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

(Very Very Short Answer Type Questions)

1 each

1. Find :

if $x = at^2$ and $y = 2at$.

$\frac{dy}{dx}$
JK Study Materials

2. What do you mean by the term Accuracy ?
3. Why a gun recoils back when it is being fired ?
4. At what temperature, gas loses all its energy ?
5. At what point in its trajectory does a projectile has minimum speed ?

XIAP/BIKD22-7101-B

W-1-B

Turn Over

(Very Short Answer Type Questions)

6. Convert 10 Newton into dyne using dimensional analysis.
7. Define dimensions and dimensional formula.
8. Derive $v = u + at$ using Calculus.
9. Define the term strain. What are the various types of strain ?
10. State streamline flow and turbulent flow.

(Short Answer Type Questions)

11. State Newton's 2nd law of motion. Prove that :

$$\vec{F} = m \vec{a}$$

where the symbols have their usual meanings.

12. Explain any *three* methods of reducing friction.
13. Differentiate e^{ax} by ab-initio method.
14. Derive an expression for potential energy of a body.
15. What are elastic and inelastic collisions ?

16. Two theorems of moment of inertia.
17. Derive the relation between torque and moment of inertia of a body.
18. What is Gravitational Potential Energy ? Derive an expression for it.
19. The acceleration due to gravity at a depth ' d ' reduces to 25% from the value at the surface. Calculate the value of ' d ' if radius of earth is 6400 km.
20. Show that surface tension is numerically equal to the surface energy.
21. What are the limitations of First Law of Thermodynamics ?
22. Define reversible and irreversible processes with at least one example each.

(Value Based Questions)

23. What do you mean by relative velocity ? Show that when two trains move in the opposite directions, then one train appear to move faster than its actual speed of the other train.

(Long Answer Type Questions)

24. Derive an expression for pressure exerted by an Ideal gas.

Or

What do you understand by degrees of freedom ? Give a general relation to find degrees of freedom. Find degrees of triatomic gases.

25. Distinguish between periodic and oscillatory motion. Give two examples in each case.

Or

What is a Simple Pendulum ? Derive an expression for time period of a simple pendulum.

26. What are Beats ? Explain the formation of beats analytically.

Or

State and explain principle of superposition of waves. Name the phenomenon explained by this principle.

C-1-C

Roll No.....

Total No. of Questions : 26]

[Total No. of Printed Pages : 4

XIARKD21

5801-C

PHYSICS

Time : 2.30 Hours]

[Maximum Marks : 70

Section-A

(Very Very Short Answer Type Questions)

1 each

1. Evaluate :

$$\int x^3 . dx$$

2. What is meant by "Point object in Physics" ?

3. What do you mean by an isolated system ?

4. How many watts are in one horse power ?

5. Is a Torque scalar or vector quantity ?

Section-B

(Very Short Answer Type Questions)

2 each

6. What is the difference between angstrom unit and astronomical unit (A.U.) ?

XIARKD21 – 5801-C

C-1-C

Turn Over

7. Define average velocity and instantaneous velocity.
8. Define Kinetic energy and potential energy.
9. Define elasticity and elastic limit.
10. Define Simple Harmonic Motion. What are the two basic characteristics of S.H.M.

Section-C

(Short Answer Type Questions)

3 each

11. Differentiate $\sin x$ by ab-initio method.
12. Check the correctness of the relation $F = \frac{mu^2}{r}$ using dimensional analysis.
13. A stone weighing 3 kg and tied to a string is being rotated in a horizontal circle of 120 cm with a velocity of 500 m/s. Find the total force which tries to break the string.
14. State and explain the law of conservation of linear momentum.
15. State and explain Zeroth Law of Thermodynamics.
16. What are reversible and irreversible processes ? Give one example of each.
17. What is the kinetic interpretation of Temperature ?
18. What do you understand by "mean free path" ?

XIARKD21-5801-C

C-1-C

19. Find the amount of work done by a labourer who carries 10 bricks of 1 kg each to the roof of a house 5 metres high by climbing a ladder.
20. Explain how acceleration due to gravity varies with altitude.
21. State Kepler's laws of planetary motion.
22. What do you mean by the terms wavelength frequency and amplitude of a wave motion ? <http://www.jkboseonline.com>

Section-D

(Value Based Questions)

4

23. A vector has both magnitude and direction. Does that mean anything that has magnitude and direction is necessarily a vector ? The rotation of a body can be specified by the direction of axis of rotation and the angle of rotation about the axis. Does that makes any rotation a vector.

Section-E

(Long Answer Type Questions)

5 each

24. Define Capillarity. Derive an expression for the rise of liquid in a capillary tube of uniform diameter.

Or

Define Terminal Velocity. Derive an expression for it.

25. Define centre of mass. Calculate the centre of mass of a system of two particles.

Or

What is the physical significance of moment of inertia ? On what factors the moment of inertia depends ?

26. Distinguish between periodic and oscillatory motion. Give two examples in each case.

Or

What is a Progressive Wave ? Derive an expression which represents progressive wave.

A-1-C

Roll No.

Total No. of Questions : 26]

[Total No. of Printed Pages : 4

XIARKDD20

2701-C

PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

(A-1-C)

Roll No.....

Total No. of Questions : 26

Total No. of Printed Pages : 4

XIARKDD20

2701-C

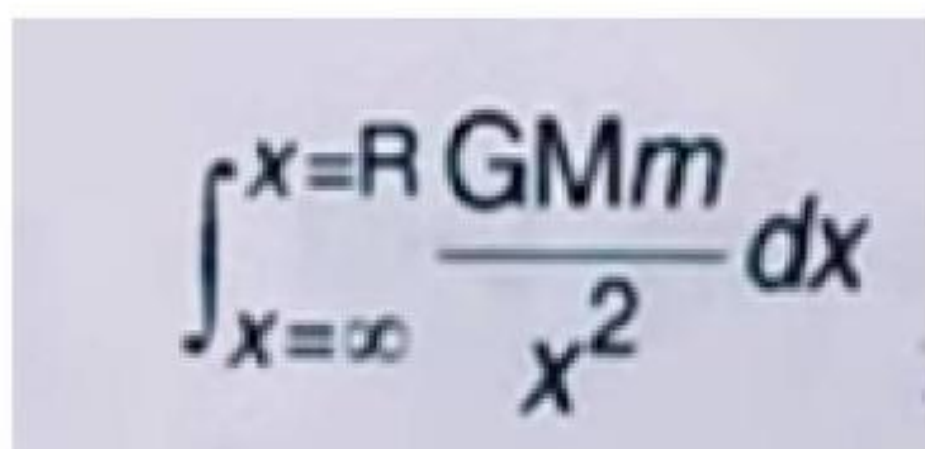
PHYSICS

Time : 3 Hours

Maximum Marks : 70

(Very Very Short Answer Type Questions)

1. Integrate :


$$\int_{x=\infty}^{x=R} \frac{GMm}{x^2} dx$$

2. Write the dimensions of :

(a) Torque

(b) Impulse

3. Density of a substance is $\rho = M/V$, where $M = (20 \pm 0.2) \text{ kg}$ and $V = (10 \pm 0.1) \text{ m}^3$. Calculate percentage error in ' ρ '.

4. On what factors does the efficiency of heat engine depend ?

5. Does the moment of inertia of a body changes with the speed of rotation ?

(Very Short Answer Type Questions)

6. State and explain Newton's Third Law of Motion.

OR

Friction is a necessarily as well as evil. Explain.

7. Two bodies of masses 1 kg and 2 kg are located at points (1, 2) and (-1, 3) respectively. Calculate the co-ordinates of the centre of mass.

8. State Pascal law. Give its one practical application.

9. Define isothermal process and adiabatic process.

10. The velocity of a particle executing SHM is maximum at a particular instant. What can be said about the acceleration at that instant ?

(Short Answer Type Questions)

11. The frequency ν of vibration of a stretched string depends upon

(i) its length l

(ii) its mass per unit length m and

(iii) the tension T in the string.

Obtain an expression for frequency ν by using method of dimensions.

OR

Convert 1 joule of energy into erg.

12. Differentiate x by ab-initio method.

13. A projectile is fired with a velocity v making an angle with the horizontal. Derive expression for its time of flight and maximum height.
14. A particle moves along x-axis from $x = 0$ to $x = 5$ m under the influence of force $F = 5 - 4x + 3x^2$. Find work done in this process.
15. Prove that power is the dot product of force and velocity
16. Define torque and angular momentum and derive a relation between them.
17. Discuss the variations of 'g' with depth. What happens to 'g' at the centre of earth.
18. Derive an expression for orbital velocity of a satellite.
19. State Zeroth Law of Thermodynamics. How does this law gives the definition of temperature ?
20. Define degrees of freedom. Calculate the degree of freedom of monoatomic, diatomic and triatomic gas molecules.
21. Discuss the kinetic interpretation of temperature. Hence define absolute zero of temperature.
22. Distinguish between transverse and longitudinal waves.

(Value Based Questions)

23. A man arrived at Delhi Railway Station and wanted to go to his relative's house 10 km away from the station. He hired a taxi to reach the destination. The driver follow a long path 25 km to reach the destination in 1 hour and charged from the man for 25 km :
- (1) Comment on the behaviour of taxi driver.
 - (ii) Calculate the average speed of the taxi.
 - (iii) Calculate the average velocity of the taxi.

(Long Answer Type Questions)

24. Why are curved road banked ? Obtain an expression for angle of banking of a curved road.

OR

State and prove the principle of conservation of linear momentum. Give examples

25. Derive an expression for excess pressure

(i) inside a liquid drop

(ii) inside a soap bubble.

OR

State Bernoulli's theorem in different forms. Name its two applications.

26. Define plane progressive wave. Derive expressions for the displacement of a plane progressive wave in different forms.

OR

What is Simple Pendulum ? Show that motion of the pendulum is SHM and hence deduce an expression for its time period.

XIARPLKGN20
2501
PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

(Very Very Short Answer Type Questions) 1 each

1. If $y = \sqrt{x}$, find $\frac{dy}{dx}$.
2. Carts with rubber wheels are easier to ply than those with iron wheels. Why ?
3. Define forced vibration.
4. Can we use pendulum watch in an artificial satellite ?
5. If door of a refrigerator is kept open, will the room become cool or hot ?

(Very Short Answer Type Questions) 2 each

6. Write the dimensions of a and b in the relation $E = \frac{b - x^2}{at}$, where
E, x , t are energy distance and time respectively.

(2)

Or

A physical quantity (X) is given by $X = a^2 b^3 c^{-1} d^{-1/2}$. If the percentage errors of measurement in a , b , c and d are 4%, 2%, 3% and 1%, then calculate the percentage error in (X).

7. A man of mass 60 kg runs up a flight of 30 steps in 40 seconds. If each step is 20 cm high, calculate the power of man.
8. State first law of thermodynamics in mathematical form.
9. Define surface tension and surface energy. Give their S.I units.
10. The moment of inertia of a hollow sphere about its diameter is $\frac{2}{3}MR^2$. What is its radius of gyration about that axis.

(Short Answer Type Questions)

3 each

11. State Newton's three law of motion.
12. Differentiate 'sin x' by ab-initio method.
13. Derive expression for centripetal force acting upon a body of mass (m) moving with a speed (v) in a circle of radius (r) on the basis of dimensional analysis. <https://www.jkboseonline.com>
14. State and explain law of conservation of linear momentum.
15. Define Potential Energy. Derive expression for gravitational potential energy.

- (2)
16. If electron and proton have same linear momentum, which has more kinetic energy ? Explain.
 17. Define degree of freedom. Write the formula for finding number of degrees of gas molecules. What is the number of degrees of freedom in monoatomic, diatomic and triatomic gas molecule ?
 18. Write six postulates of kinetic theory of gases.
 19. At what distance from the mean position is kinetic energy equal to potential energy. Briefly explain.
 20. State and explain Newton's law of gravitation. Hence define 'G'.
 21. The escape speed of the earth is 11.2 km/s. Find the escape speed of another planet having mass 1000 times and radius 10 times that of earth.
 22. A refrigerator is to remove heat from the eatables kept inside at 9°C . Since if room temperature is 36°C , calculate the coefficient of performance.

(Value Based Questions)

23. Energy of 484 Joule is spent in increasing the speed of a flywheel from 60 rpm to 360 rpm. Find moment of inertia of flywheel.

(Long Answer Type Questions)

5 each

24. Derive an expression for the time of flight, maximum height and horizontal range of projectile fired at an angle with the horizontal.

Or

State parallelogram law of addition of vectors. Write expression for magnitude and direction of two inclined vectors. When is resultant maximum and minimum ?

25. Find an expression for displacement, velocity and acceleration of a particle executing SHM.

Or

What is Organ pipe ? How different modes of vibration are formed in open organ pipe ?

26. Define terminal velocity. Derive expression for it.

Or

What are the various modes of transfer of heat ? Discuss them.

K-1-X

Roll No.

Total No. of Questions : 26]

[Total No. of Printed Pages : 4

XIKDRO/N19

25501-X

PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

Section-A

(Very-Very Short Answer Type Questions)

1 each

1. Evaluate :

$$\int_0^1 x \cdot dx$$

2. What is the number of significant digits in 0.005 m^2 ?

3. What is longitudinal strain ?

4. Define free oscillations.

5. At what position, the velocity of a particle executing S.H.M. is maximum ?

Section-B

(Very Short Answer Type Questions)

2 each

6. Define the following :

(i) Astronomical unit (AU)

(ii) One Angstrom (Å) = m

- 7/ Convert 5 joule into erg using dimensional analysis.
- 8/ Using Calculus method, derive $v = u + a.t$.
9. Define limiting force of friction and state laws of friction.
10. What is gravitational force ? State Newton's law of gravitation.

Section-C

(Short Answer Type Questions)

3 each

11. Differentiate x^n by ab-initio method.
12. Show that the mechanical energy (= K.E + P.E) of a falling body remains constant.
13. What is relation between power and energy ?
Show that $1 \text{ kWh} = 3.6 \times 10^6 \text{ J}$.
14. State and prove the principle of conservation of angular momentum.
15. Define radius of gyration and derive a relation for it.
16. Derive relation between surface tension and surface energy.
17. Define :
 - (i) Coefficient of linear expansion
 - (ii) Coefficient of superficial expansion
 - (iii) Coefficient of volume expansion.

18. ✓ State and explain Zeroth law of Thermodynamics.
19. ✓ What is reversible and irreversible process ? Give example.
20. ✓ Give postulates of kinetic theory of an Ideal gas.
21. ✓ Define degrees of freedom. Find degrees of freedom for diatomic gas.
22. ✓ Distinguish between transverse and longitudinal waves.

Section-D

(Value-Based Questions)

23. ✓ Suppose there existed a planet that went around the sun twice as fast as the earth. What would be its orbital size as compared to that of the earth ?

Section-E

(Long Answer Type Questions)

5 each

24. State Parallelogram law of vector addition. Find the magnitude of the resultant vector of two vectors $\vec{P}$ and $\vec{Q}$ inclined at an angle ' θ ' with each other.

Or

~~Define~~ Projectile. Derive an expression for range of a projectile fired at an angle ' θ ' with horizontal.

25. State and explain Newton's second law of motion.

Or

Define Centripetal force. Derive an expression for it..

26. What is Doppler's effect ? Write down expression for apparent frequency when source is in motion and listener is at rest.

Or

Find the relation for ~~time~~ period of a simple pendulum executing S.H.M.

XILKGRPO/N19

25401
PHYSICS
(New/Old Design)

Time : 3 Hours]

[Maximum Marks : 70

NOTE :— The questions in the question paper are based on **Two Patterns** marked as "**New Design**" and "**Old Design**".

"NEW DESIGN (This is based on CBSE Pattern)" and **"OLD DESIGN** (This is based on Previous Pattern)" respectively and candidates are advised to appear in the relevant design meant for them. Candidates who may attempt the questions partly from "**New Design**" and partly from "**Old Design**" will not be awarded. Candidates are also advised to record "**New Design**" or "**Old Design**" as the case may be, on the front page of the answer-book.

(New Design)

(Very Short Answer Type Questions)

1 each

1. If $y = 3x^2 + 4x + 5$, find $\frac{dy}{dx}$, at $x = 1$.

XILKGRPO/N19–25401 (New)

Turn Over

J–1

(2)

2. Why are wheels made circular?
3. Define free vibrations.
4. A pendulum is taken to moon. Will it go faster or slower in comparison to earth?
5. Can temperature of a gas be increased by keeping its pressure and volume constant.

(Very Short Answer Type Questions)

2 each

6. If $x = a + bt + ct^2$, where (x) is in metre and (t) in second, find units of a , b and c .

Or

The length and breadth of a rectangular object are 25.2 cm and 16.8 cm respectively and have been measured to an accuracy of 0.1 cm. Find the percentage error in the area of block.

7. Find the work done by a force $\vec{F} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ in displacing a body through a distance of $\vec{S} = 2\hat{i} - 3\hat{j} + 4\hat{k}$.
8. What is reversible and irreversible process?
9. Define streamline and turbulent flow.
10. The moment of inertia of a sphere about its diameter is $\frac{2}{5}MR^2$. What is its radius of gyration about that axis?

XILKGRPO/N19-25401 (New)

11

(Short Answer Type Questions)

3 each

11. Show that Newton's second law is the only real law of motion.
12. Differentiate e^{ax} by *ab-initio* method.
13. Derive expression for viscous force acting on a body of radius (r) falling with a velocity (v) through a viscous liquid, on the basis of dimensional analysis.
14. Define impulse and momentum. Write the relation between them.
15. A stone of mass 6 kg falls from rest at a place where $g = 9.8 \text{ m/s}^2$. What is its K.E. at the end of 5th seconds.
16. Define work, power and energy. Give their S.I. units.
17. Write six postulates of kinetic theory of gases.
18. State law of equipartition of energy. Also define degree of freedom.
19. What is a simple pendulum ? Derive expression for time period of simple pendulum. <https://www.jkboseonline.com>
20. State Kepler's three laws of planetary motion.
21. At what height, acceleration due to gravity is $\frac{3}{4}$ th of that at surface of earth ?
22. A Carnot's engine takes in 1000 k calories of heat from a reservoir at 627°C and exhausts it to a sink at 27°C . What is its efficiency ?

(Value Based Questions)

4

23. Calculate the K.E. of rotation of a circular disc of mass 1 kg, and radius 0.2 m rotating about an axis passing through the centre and perpendicular to its plane. The disc makes $\frac{30}{\pi}$ rotations per minute.

(Long Answer Type Questions)

5 each

24. What do you mean by scalar and vector product of vectors ? Give their four properties and two examples.

Or

Derive :

(i) $v = u + at$

(ii) $s = ut + \frac{1}{2}at^2$

where letters have their usual meanings.

25. Derive an expression for the total energy of a body executing SHM. Show that total energy is independent of displacement of body from mean position.

Or

Derive expression for the displacement of a plane progressive wave.

26. State Bernoulli's theorem in different form. Briefly explain its one application.

Or

Name the three modes of transfer of heat. Explain them.

J-1

(5)

XILKGRPO/N19

25401

PHYSICS

(New/Old Design)

Time : 3 Hours]

[Maximum Marks : 70

NOTE :— The questions in the question paper are based on **Two Patterns** marked as "New Design" and "Old Design".

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1. Derive :

(i) $v = u + at$

(ii) $s = ut + \frac{1}{2}at^2$

using graphical method, where letters have their usual meanings.

XILKGRPO/N19–25401 (Old)

Turn Over

J-1

(6)

Or

Find an expression for maximum height, horizontal range and time of flight for an oblique projectile fired at an angle with the horizontal.

2. Define friction and angle of repose. Find an expression for the coefficient of friction in terms of tangent of angle of repose.

Or

State Newton's laws of motion. Show that Newton's second law is the only real law of motion.

3. State Stokes' law of viscous force. Derive an expression for viscous force acting on a sphere falling through a viscous liquid, on the basis of dimensionless.

Or

What are three modes of transfer of heat ? Briefly discuss them.

4. Derive an expression for the total energy of a body executing S.H.M. Show that total energy in S.H.M. is conserved.

Or

What is a plane progressive wave ? Derive an expression for the a plane harmonic progressive wave.

(Short Answer Type Questions)

3 each.

5. Differentiate 'log x ' by *ab-initio* method.
6. If force (F), velocity (v) and time (T) are chosen as fundamental units, then what is the dimensional formula for mass ?
7. Define potential energy. Derive P.E. of an elastic stretched spring.
8. Derive relation between torque and moment of inertia.
9. State and explain Newton's law of gravitation.

XILKGRPO/N19–25401 (Old)

J-1

10. State and explain first law of thermodynamics.
11. State law of equipartition of energy and define degree of freedom.
12. The acceleration due to gravity on the surface of moon is 1.7 m/s^2 . What is the time period of a simple pendulum on the surface of moon, if its time period on the surface of earth is 3.5 seconds. Take value of $g = 9.8 \text{ m/s}^2$.

(Very Short Answer Type Questions)

2 each

13. The volume of a liquid flowing out per second of a pipe of length (l) and radius (r) is written as $V = \frac{\pi P r^4}{8 \eta l}$, where P is pressure difference between the two ends of pipe and η is coefficient of viscosity of the liquid. Check

the correct of the above equation on the basis of dimensions. XXXXXXXXXX

14. A particle moves in a straight line, whose displacement after time (t) is $x = t^2 + 2t + 5$. Find speed of particle after 5 seconds.
15. Define Energy. Give its S.I. units.
16. How does earth retain its atmosphere ?
17. Define gravitational potential energy and gravitational potential.
18. Define stress. Give its S.I. unit.
19. What is isothermal and isochoric process ?
20. Define degrees of freedom of a molecule. Write formula for finding degrees of freedom of a molecule.

(Objective Type Questions)

1 each

21. Do as directed :

- (i) Solve $\int_0^{\pi} \sin x \cdot dx$.
$$= (-\cos x) \text{ 0 to pie}$$
$$= -\{ \cos \text{ pie} - \cos 0 \} = -\{ -1 - 1 \}$$
$$= -\{ -2 \} = 2$$
- (ii) Aeroplanes, jets etc. are streamlined to reduce fluid friction.

(True/False)

- (iii) Newton's second law gives the measure of :
- (A) Force (B) Energy
(C) Momentum (D) Acceleration
- (iv) The momentum of a body is P and its kinetic energy is E . If momentum becomes $2P$, its K.E. will be :
- (A) $\frac{E}{2}$ (B) E
(C) $2E$ (D) $4E$
- (v) What is conservative force ?
- (vi) If no force is exerted on a system, then velocity of centre of mass is :
- (A) Constant (B) Increasing
(C) Decreasing (D) Zero
- (vii) The no. of degrees of freedom for a diatomic gas molecule is :
- (A) 2 (B) 3
(C) 5 (D) 6
- (viii) Boyle's law is an example of isothermal process. (True/False)
- (ix) What type of waves are produced in a sitar wire ?
- (A) Stationary transverse wave
(B) Stationary longitudinal wave
(C) Progressive transverse wave
(D) Progressive longitudinal wave
- (x) The change in frequency due to Doppler's effect does not depend upon the distance between the source and observer. (True/False)

A-1-B

Roll No.

Total No. of Questions 21]

[Total No. of Printed Pages 7

X1RKDO18

20801-B

PHYSICS

Time 3 Hours]

[Maximum Marks : 70

(Long Answer Type Questions)

5 each

- 1 Find an expression for the time of flight, maximum height and horizontal range of a projectile fired at an angle with the horizontal. When is horizontal range maximum?

Or

Using calculus, derive (i) $v = u + at$, (ii) $s = ut + \frac{1}{2}at^2$, where the letters have their usual meanings.

- 2 State and explain law of conservation of linear momentum. Briefly explain recoil of gun, during firing of bullet.

X1RKDO18-20801-B

Turn Over

A-1-B

(2)

Or

Define angle of banking of roads. Find an expression for the angle of banking for a vehicle on a curved banked road.

- 3 State Stokes law of viscous force. Derive the expression for viscous force acting on a sphere falling through a viscous liquid, using dimensional analysis.

Or

Define capillarity. Find an expression for the height of liquid in case of its rise in a capillary tube.

- 4 Define S.H.M. Find an expression for the displacement, velocity and acceleration of a particle executing S.H.M.

Or

Derive an expression for the time period and frequency of a simple pendulum.

(Short Answer Type Questions)

3 each

5 Differentiate $\sin x$ by ab-initio method

6 Find the dimensions of a and b in the equation $\left(P + \frac{a}{V^2}\right)(V - b) = RT$,

where P , V , R , T are pressure, volume, universal gas constant and thermodynamic temperature respectively

7 Derive Kinetic energy-work theorem

8 State theorem of parallel and perpendicular axis in case of a rigid body in rotational motion

9 State and explain Newton's universal law of gravitation

10 State and explain first law of thermodynamics

11 Write six postulates of Kinetic theory of gases.

12 At what temperature, will the speed of sound in air become double of its value at 0°C

(Very Short Answer Type Questions)

2 each

13. A physical quantity (X) is related to four measurable quantities a, b, c and d as $X \propto a^2 b^3 c^{1/2} d^{-2}$. The percentage error in the measurement of a, b, c and d are 1%, 2%, 3% and 4% respectively. What is the percentage error in (X) ?
14. Find the angle between $\vec{A} = \hat{i} + 2\hat{j} - \hat{k}$ and $\vec{B} = -\hat{i} + \hat{j} - 2\hat{k}$.
15. Define Kinetic energy and Potential energy. Give one example of each.
16. Find the ratio angular velocity of rotation of hour hand to that of earth's rotation about its own axis.
17. Define escape velocity. Write an expression for it.
18. Define stress, strain and elasticity.
19. State second law of thermodynamics (two statements only).
20. Define two sp. heats of a gas. Write the relation between them.

(Objective Type Questions)

1 each

21 Do as directed

(i) If $x = at^2$ and $y = bt^2$, find $\frac{dy}{dx}$

(ii) Rocket propulsion is based on law of conservation of linear momentum (True/False)

(iii) When normal reaction is doubled, the coefficient of friction is :

- (A) Doubled
- (B) Halved
- (C) Quadrupled
- (D) Unchanged

(iv) Momentum (P) and Kinetic energy (E) are related by :

(A) $E = \frac{P^2}{2m}$

(C) $E^2 = \frac{P}{2m}$

(B) $E = \frac{P}{2m}$

(D) None of these

(v) What is the physical significance of negative value of total energy of a bound system ?

(vi) Moment of inertia is rotational analogue of mass (True/False)

(vii) If door of a refrigerator is kept open, the room becomes hot

(True/False)

(viii) The degree of freedom of diatomic gas molecule is

(A) 3

(B) 5

(C) 6

(D) 7

(ix) Two tuning forks give 6 beats per second, when sounded together

The frequency of one of the tuning forks is 480 Hz. If first tuning fork

is filed a little and then the number of beats becomes 8 per second,

then the frequency of second tuning fork is

(A) 474 Hz

(B) 486 Hz

(C) 488 Hz

(D) 472 Hz

(i) The harmonics present in an open organ pipe are

(A) Odd harmonics

(B) Even harmonics

(C) Even as well as odd harmonics

(D) None of these

XIRKDO18-20001-B

A-1-B

21001 PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

(Long Answer Type Questions)

5 each

1. Explain the term relative velocity with the help of position-time graph.

Or

Explain cross product of two vectors and mention its properties.

2. Define centripetal force and obtain an expression for centripetal force.

Or

What is Inertia ? Define and explain the *three* different types of inertia.

3. State Newton's law of gravitation and define the universal gravitational constant.

Or

Define Gravitational Potential. Derive an expression for gravitational potential.

X1RPKGO18 – 21001

Turn Over

D-1

(2)

4. Find the relation for time period of simple pendulum executing S.H.M.

Or

What are the characteristics of stationary waves ? Define nodes and antinodes.

(Short Answer Type Questions)

3 each

5. Name the coherent system of units and define kilogram.
6. Show that $P = \vec{F} \cdot \vec{v}$, where the symbols have their usual meaning.
7. Derive the relation between Torque and Angular momentum.
8. Define coefficient of viscosity in liquids and define its unit.
9. Explain Young's modulus of elasticity.
10. Name the applications of first law of Thermodynamics.
11. Calculate the work done on compressing a gas at constant temperature.
12. Calculate the total energy of a body suspended with a spring of spring constant 2 Nm^{-1} , if its amplitude is 1.5 cm.

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D-1

(3)

(Very Short Answer Type Questions)

2 each

13. Given $s = 4t^3 + 3$ calculate :

(i) $\frac{ds}{dt}$

(ii) $\frac{d^2s}{dt^2}$

14. Evaluate :

$$\int \frac{1}{\sqrt{x-1}}.dx$$

15. What is meant by range of the projectile ?

16. Differentiate between elastic and inelastic collision.

17. State theorem of parallel axis.

18. What is a reversible process ? Give its basic requirements.

19. Using the relation between pressure and kinetic energy of gas calculate kinetic energy per unit volume.

20. Velocity of sound is greater in solids than in gases. Explain.

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Turn Over

D-1

(4)

(Objective Type Questions)

1 each

21. (i) The number 0.004 has significant figures equal to :
- (A) 1
 - (B) 2
 - ☒ (C) 3
 - (D) 4
- (ii) The dimensional formula of surface tension is :
- (A) $[MLT^{-2}]$
 - ☒ (B) $[ML^0T^{-2}]$
 - (C) $[ML^2T^{-2}]$
 - (D) $[MLT^{-1}]$
- (iii) The working of a rocket is based on the principle of :
- (A) Elasticity
 - (B) Kepler's law
 - (C) Newton's law of gravitation
 - ☒ (D) Conservation of momentum

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D-1

(5)

(iv) Which of the following is self-adjusting force :

- (A) Static friction
- (B) Limiting friction
- (C) Dynamic friction
- (D) Sliding friction

(v) If the momentum of a body is doubled, the kinetic energy in :

- (A) Halved
- (B) Unchanged
- (C) Double
- (D) Increased four times

(vi) The moment of inertia of a body does not depend upon :

- (A) The angular speed <https://www.jkboseonline.com>
- (B) Mass of body
- (C) Nature of distribution of mass
- (D) Location of the axis of rotation

(6)

(vii) Which of the following is independent of mass of earth ?

- (A) Orbital velocity
- (B) Escape velocity
- (C) Gravitational intensity
- (D) None of these

(viii) What flattens the large sized liquid drop ?

- (A) Cohesion
- (B) Adhesion
- (C) Atmospheric pressure
- (D) Gravity

(ix) Internal energy per mole of gas depends on :

- (A) Viscosity
- (B) Density
- (C) Temperature
- (D) Thermal Conductivity

(7)

(x) NTP corresponds to a temperature of :

(A) 0 K

(B) -273 K

(C) 273 K

(D) None of these

A-17

Roll No.....

Total No. of Questions : 9]

[Total No. of Printed Pages : 3

HSE1T2KN17

15517

PHYSICS

(Term-2nd)

Time : 2½ Hours]

[Maximum Marks : 25

(Long Answer Type Questions)

1. What do you mean by the term, wavelength, frequency and Amplitude of wave motion? Prove that $c = \gamma\lambda$ where c is the velocity of the wave, λ is the wavelength and v is the frequency ?

Or

Define simple Harmonic motion. Derive an expression for :

- (a) Displacement
- (b) Velocity and
- (c) Acceleration of a particle executing S.H.M.

2. What do you mean by Elasticity ? Define.

- (a) Young's Modulus of Elasticity
- (b) Bulk Modulus of Elasticity and
- (c) Modulus of Rigidity.

Or

State and prove Bernoulli's theorem.

(Short Answer Type Questions)

3. Define acceleration due to gravity (g). Discuss how the value of (g) varies with altitude.
4. What is the kinetic Interpretation of temperature ?

(Very Short Answer Type Questions)

5. What are reversible and irreversible processes?
6. State and explain 1st law of thermodynamics.
7. Human heart beats 80 times in 60 seconds what is the frequency and time period of the heart beat? <https://www.jkboseonline.com>
8. What are beats ?

(Multiple Choice Questions)

9. Choose the correct/most appropriate answer and write it in your answer book.

(i) The force of attraction between the Earth and body of mass 1 kg is :

- (a) 9.8 N
- (b) 98 N
- (c) 980 N
- (d) 0.98 N.

(ii) Stress has the dimensions same as that of :

- (a) Energy
- (b) Pressure
- (c) Torque
- (d) Power

(iii) The Pressure P of an Ideal gas and its kinetic Energy per unit volume are related as :

- (a) $P = 1/2 \text{ K.E.}$
- (b) $P = \text{K.E.}$
- (c) $P = 3/5 \text{ K.E.}$
- (d) $P = 2/3 \text{ K.E.}$