

GOVIND VIDYALAY TAMULIA
SAMPLE PAPER - II (2014-2015)
STD- XI
PHYSICS
SET-A

Time : 3 hours

Maximum Marks : 70

General Instruction :

- (i) All questions are compulsory.
- (ii) There are **30** questions in total. Questions **1** to **8** are very short answer type questions and carry **one** mark each.
- (iii) Questions **9** to **18** carry **two** marks each, questions **19** to **27** carry **three** marks each and questions **28** to **30** carry **five** marks each.
- (iv) One of the questions carrying three marks weightage is value based question
- (v) There is not overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three question of five marks each weightage. You have to attempt only one of the choices in such questions.
- (vi) Use of calculators is **not** permitted. However, you may use log tables if necessary.
- (v) Please write down the serial number of question before attempting it.
- (vi) You may use the following values of physical constant wherever necessary.

Boltzmann's constant $K = 1.38 \times 10^{-23} \text{ JK}^{-1}$

Avogadro's number $N_A = 6.022 \times 10^{23}/\text{mol}$

Radius of Earth $R = 6400 \text{ km}$.

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|---|---|
| 1. Write the dimensional formula of torque. | 1 |
| 2. Draw velocity-time graph for an object, starting from rest. Acceleration is constant and remains positive. | 1 |
| 3. If the net force acting upon the particle is zero show that its linear momentum remains constant? | 1 |
| 4. Why there is lack of atmosphere on the surface of moon? | 1 |
| 5. The triple point of carbon dioxide is 216.55 K. Express this temperature on Fahrenheit scale. | 1 |
| 6. In an open organ pipe, third harmonic is 450 Hz. What is the frequency of fifth harmonic? | 1 |
| 7. Which type of substances are called elastomers? Give one example | 1 |

8. A simple harmonic motion is described by $a = -16x$ where a is acceleration, $x \rightarrow$ displacement in m. What is the time period? 1

9. Magnitude of force experienced by an object moving with speed v is given by $F = kv^2$. Find dimensions of k . 2

OR

The length and breadth of a rectangle are measured as $(a \pm \Delta a)$ and $(b \pm \Delta b)$ respectively. Find (i) relative error. (ii) absolute error in the measurement of area.

10. An object moving on a straight line covers first half of the distance at speed v and second half of the distance at speed $2v$. Find (i) average speed, (ii) mean speed. 2

11. An object moving on a circular path in horizontal plane. Radius of the paths is r and constant speed is v . Deduce expression for centripetal acceleration. 2

12. Find the height from the surface of earth at which weight of a body of mass m will be reduced by 36% of its weight on the surface. ($R_e = 6400\text{km}$) 2

13. Define gravitational potential. Give its S.I. unit. 2

14. An engine has been designed to work between source and sink at temperature 177°C and 27°C respectively. If energy input is 3600 J. What is the work done by the Engine? 2

15. Explain:

(i) Why does the air pressure in a car tyre during driving increase?
(ii) Why coolant used in a chemical plant should have high specific Heat? 2

16. Calculate the work done in blowing a soap bubble from a radius of 2 cm to 3 cm. The surface tension of the soap solution is 30 dynes cm^{-1} . 2

17. Show that Newton's second law of motion is the real law of motion. 2

18. A block initially at rest breaks into two parts of masses in the ratio 2: 3. The velocity of smaller part is $(8i + 6j)\text{m/s}$. Find the velocity of bigger part. 2

19. State and prove Work Energy Theorem. 3

20. Give two points of difference between elastic and inelastic collisions. Two Balls A and B with A in motion initially and B at rest. Find their velocities After collision (perfectly elastic). Each ball is of mass " m ". 3

21. A liquid is in streamlined flow through a tube of non-uniform cross-section. Prove that sum of its kinetic energy, pressure energy and potential energy per unit volume remains constant. 3

22. Give reason:

- (i) Fog particles appear suspended in atmosphere.
(ii) Two boats being moved parallel to each other attract.
(iii) Bridges are declared unsafe after long use. 3

23. State Kepler's law of planetary motion. Name the physical quantities which remain constant during the planetary motion. 3

24. Having found his mother suffering from fever, *Venkat* took her to the doctor for treatment. While checking the status, the doctor used a thermometer to know the temperature of the body. He kept the thermometer in the mouth of the patient and noted the reading as 102° F. Doctor gave the necessary medicines. After coming home, Venkat asked his mother, who is a science teacher, why mercury is used in a thermometer when there are so many liquids. Then his mother explained the reason.

(a) Comment upon the values of the mother.

(b) A newly designed thermometer has its lower fixed point and upper fixed point marked at 5° and 95° respectively. Compute the temperature on this scale corresponding to 50° C 3

25. Show that for small oscillations the motion of a simple pendulum is simple harmonic. Drive an expression for its time period. Does it depend on the mass of the bob? 3

OR

A SHM is described by $y = r \sin \omega t$. What is: (i) the value of displacement y at which speed of the body executing SHM is half of the maximum speed? (ii) The time at which kinetic and potential energies are equally shared?

26. A solid sphere of mass m and radius r is impure rolling on a horizontal surface. What fraction of total energy of rotation?

(a) Kinetic energy of rotation?

(b) Kinetic energy of translation? 3

27. Three mass points each of mass m are placed at the vertices of an equilateral triangle of side l . What is the gravitational field and potential at the centroid of the triangle due to the three masses? 3

28. A body is projected with velocity m at angle θ_0 upward from horizontal. Prove that the trajectory is parabolic. Deduce expression for (i) horizontal range, (ii) maximum height attained. 5

OR

Define terminal velocity. Obtain an expression for terminal velocity of a sphere falling through a viscous liquid. Use the formula to explain the observed rise of air bubbles in a liquid.

29. Drive an expression for maximum speed a vehicle should have, to take a Turn on a banked road. Hence deduce expression for angle of banking at which there is minimum wear and tear to the tyres of the vehicle. 5

OR

Describe briefly carnot engine and obtain an expression for its efficiency.

30. A progressive wave is given by $y(x,t) = 8 \cos(300t - 0.15x)$. Where x in metre y in cm and t in second. What is the

(i) Direction of propagation

(ii) Wavelength

(iii) Frequency

(iv) Wave speed

(v) Phase difference between two points 0.2 in apart? 5

OR

Give any three differences between progressive waves and stationary waves. A Stationary wave is $y = 12 \sin 300t \cos 2x$. What is the distance between two nearest nodes?

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