GULF SAHODAYA (SAUDI CHAPTER) EXAMINATION -2013

GRADE: XI **MAX.MARKS:70**

SUBJECT: PHYSICS (THEORY) **TIME: 3 HOURS**

Total pages: 04

SET - A

GENERAL INSTRUCTIONS

1 **All questions are compulsory.**
2 **There are 29 questions in total.**
Questions 1 to 8 carry one mark each, Questions 9 to 16 carry 2 marks each, Questions 17 to 25 carry three marks each, Question number 26 is a value based question which carries four marks and Questions 27 to 29 carry five marks each. There is no overall choice. However an internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks each. You have to attempt only one of the choices in such questions.
3 **Use of calculators is not permitted. However you may use log table if necessary.**

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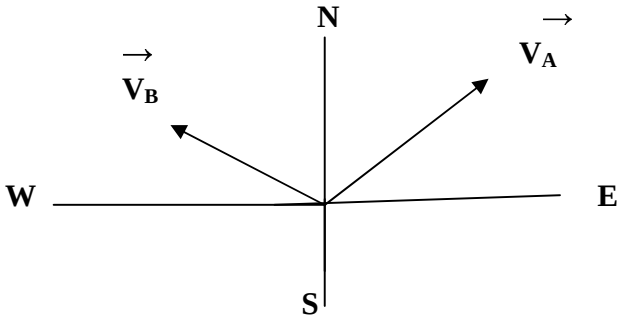
1. **Write the dimensions of a and b in the relation F = a + bx where F is the force and x is the distance?** **(1)**

2. **The velocities $\vec{V}_A$ and $\vec{V}_B$ of two bodies A and B respectively are as given in the vector diagram. Show the relative velocity of B with respect to A using vector diagram.** **(1)**



3. **While catching a cricket ball, the player lowers his hands. Why?** **(1)**

4. **What is the work done by earth's gravitational force in keeping the moon in the orbit?** **(1)**

5. **Can a body possess acceleration when its velocity is zero ? Give an example to support your answer.** **(1)**

6. **The bob of an oscillating pendulum is made of ice. How will the time period of the pendulum change when ice starts melting?** **(1)**

7. **Is it possible to open a pen cap with one finger? Why?** **(1)**

8. **What is meant by free oscillations of a body?** **(1)**

9. **The displacement of a body S = (200 $\pm$ 5) meters and time taken by it is t= (20 $\pm$ 0.2) seconds, then find the percentage error in the calculation of velocity.** **(2)**

OR

The time of oscillation ' t' of a small drop of a liquid under surface tension depends upon the density d , radius r and surface tension S , prove dimensionally that $t \alpha \sqrt{\frac{dr3}{S}}$ **(2)**

10. **State law of conservation of linear momentum. Prove the law from Newton's second law of motion.** **(2)**

11. **A body weighs 63 N on the surface of the earth. What is the gravitational force on it due to the earth at a height equal to half the radius of the earth? (Radius of earth = 6400km)** **(2)**

12. **(a) Distinguish between elastic and inelastic collisions.**
(b)Does the total energy conserved in either of the collisions? **(2)**

13. **(i) Define centre of mass.**
(ii) A 2 kg body and a 3 kg body are moving along X – axis. At a particular instant, the 2 kg body is 1m away from the origin and the 3 kg body is 2 m away from the origin.Find the position of the centre of mass of the two bodies. **(2)**

14. **A steel wire of 6m is stretched through $3x10^{-3}$ m. The cross sectional area of the wire is 2 x $10^{-6}m^2$. If the Young's modulus of the steel is 2.0 x $10^{11}N/m^2$, find the elastic energy density of the wire.** **(2)**

15. What is meant by Heat engine ? Write an expression for its efficiency. (2)

16. State law of equipartition of energy. Use it to find the molar specific heat capacity at constant volume of a mono atomic gas. (2)

17. (a) Define limiting friction.
(b) Determine the maximum acceleration of a train in which a box lying on its floor will remain stationary . Co-efficient of static friction between the box and train's floor is 0.15. (3)

18. A particle starts from origin at t=0 s with a velocity of 10.0 ĵ m/s and moves in the x-y plane with a constant acceleration of $(8.0\hat{i} + 2.0\hat{j})$ m s^{-2} .
(a) At what time is the x- coordinate of the particle 16 m? What is the y – coordinate of the particle at that time?
(b) What is the speed of the particle at the time ? (3)

19. What do you understand by gravitational potential at a point due to a point mass M. Derive an expression for it. (3)
OR
Define escape velocity of a body. Derive an expression for escape velocity of a body from the surface of earth. (3)

20. A stone is dropped from a height h. Prove that the total mechanical energy at any point in its path is mgh. (3)

21. State parallel axes theorem? Find the moment of inertia of a ring about an axis tangential to the plane of the ring. (3)

22. State Pascal's law. Explain how the law is applicable in hydraulic lifts. (3)

23. (a) Define root mean square speed of a gas molecules .
(b) Calculate the temperature at which the root mean square speed of a gas doubles its value at STP. (standard temperature is taken as 273K) (3)

24. (1) Define first law of thermodynamics.
(ii) What thermodynamic variable is defined by Zeroth law of thermodynamics?
(iii) Adiabatic expansion produces cooling. Why? (3)

25. (a) Show that the motion of a simple pendulum is simple harmonic.
(b) If the amplitude of a simple harmonic motion is doubled, (3)
What happens to the total energy of the motion?

26. Sumesh found that the road to his school is very pathetic. Most of the time accidents occur on the road. He took this as an issue and discussed with his

friends and teachers. They planned to reconstruct the road with the help of their society, by raising the outer edge of the road a little above the inner edge. With a great effort they were able to do it and thus accidents were reduced.

(a) What according to you, are the moral values displayed by Sumesh and his friends to solve the above problem? **(2)**

(b) A curve from the highway to the road forms an arc of radius 100m. If the road is 10 m wide and its outer edge is 1m higher than the inner edge, for what speed the road is banked ?(Given that g = 10m/s^2) **(2)**

27. (i) Draw velocity – time graph of uniformly accelerated motion. By using this graph deduce all three equations of motion. **(5)**

(ii) The displacement – time graph of two bodies P and Q make angles of 60^0 and 30^0 with time axis. What is the ratio of their velocities.

OR

(i) Obtain the expression for the path of a projectile.

(ii) Its maximum height and horizontal range .

(iii) At what angle of projection, the horizontal range of the projectile is maximum. **(5)**

28. (a) State and prove Bernoulli's theorem.

(b) Why is it dangerous to stand on the edge of platform near the line , when the train is passing by? **(5)**

OR

(i) Define coefficient of viscosity. Write its SI unit.

(ii) Derive an expression for the terminal velocity attained by a spherical body falling through a viscous medium. **(5)**

29. (a) What is Doppler effect in sound? Derive an expression for the apparent frequency of sound heard by a listener when listener moves towards a stationary source.

(b) A wave is represented by the equation y = a sin (0.01 x -2t) where a and x are in cm & t in seconds. What is the velocity of the wave? **(5)**

OR

(a) Give two points of difference between a standing wave and a progressive wave.

(b) Obtain an expression for the frequency of the fundamental mode of the standing wave on a stretched string.

(c) An open end organ pipe is 0.50 m long. If the velocity of sound is 320ms^{-1} , find the frequency of the fundamental mode. **(5)**

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