Keshav Kini

Class – XI

MANAVA BHARATI INDIA INTERNATIONAL SCHOOL

MID TERM EXAMINATION (2015-16)
CLASS – XI PHYSICS

TIME : 3 HOURS MAX.MARKS:60

GENERAL INSTRUCTIONS:

- All questions are compulsory.
- Q.No. 1-6 carry one mark each.
- Q. No. 7-11 carry two marks each.
- Q. No. 12-19 carry three marks each.
- Q. No. 20-23 carry five marks each.
- Draw diagrams wherever necessary.

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1. Write the dimensional formula for torque.

2. A ball is thrown upwards with an initial speed. It reaches a highest point and then comes back to the thrower. Plot a speed-time graph to show this.

3. What provides the required centripetal force for an electron to maintain its circular path around the nucleus?

4. What is the energy equivalence of 1 gram?

5. Find the value of (a) $\hat{j} \cdot \hat{j}$ (b) $\check{k} \times \hat{j}$

6. Why does a body weigh more at the poles than at equator?

7. Write the dimension of 'a' and 'b' in the equation $P = (a - t^2) / bx$ Where 'P' is pressure, 't' is time and 'x' is distance.

8. Two forces whose magnitudes are in the ratio 3:5 give a resultant of 35N. If the angle between them is 60^0, find the magnitude of each force.

9. A horse is pulling a cart. Draw various forces acting on the horse.

10. Derive a relation between torque and angular momentum.

11. The distances of two planets from the sun are 10^{13}m and 10^{12}m respectively. Find the ratio of their time periods of revolution.

12. A physical quantity 'X' is given by $X = a^2b^3/c\sqrt{d}$ .If the percentage error in a,b,c,d are 4% , 2% , 3% , 1% respectively, find the percentage error in X.

13. On a foggy day two drivers spot each other when they are just 80m apart. They are travelling at 72km/hr and 60km/hr respectively. Both of them applied breaks retarding their cars at the rate of $5m/s^2$. Will they avert collision or not?

14. The velocity 'v' of water waves depends on the wavelength 'λ' density of water 'ρ' and the acceleration due to gravity 'g'. Deduce by the method of dimensions, the relation between these quantities.

15. A man of mass 'm' is standing on the floor of a lift. Derive an expression for his apparent weight when (i)the lift is stationary (ii) the lift is moving upwards with a constant acceleration 'a' (iii) moving downwards with a constant acceleration 'a'.

16. If the momentum of a body is increased by 50%, then by what % will the kinetic energy of the body increase?

17. A car is moving with a speed of 72km/hr. The diameter of its wheel is 0.5m. If the wheels are stopped in 20 rotations by applying brakes, calculate (i) the angular speed. (ii) the angular displacement in 20 rotations (iii) the angular retardation.

18. Derive an expression for variation of 'g' with depth 'h' below the earth surface.

19. An object of mass 'm' is placed on an inclined plane, inclined at an angle 'θ' with the horizontal. Derive an expression for the acceleration of the object, if it is sliding down the plane.

20. A projectile is fired horizontally with a velocity 'u' . (a) Show that its trajectory is a parabola. (b) Obtain an expression for the following (i) time of flight (ii) horizontal range (iii) velocity at any instant.

21. Two particles of m_1 and m_2 are moving in the same direction with initial velocity u_1 and u_2 ($u_1 > u_2$). The particles collide with each other and move in the same direction after collision with velocity v_1 and v_2. If the collision is perfectly elastic, derive an expression for the final velocities v_1 and v_2 in terms of their initial velocities.

22. Derive an expression for the moment of inertia of a disc of radius R and mass M about an axis perpendicular to the plane of disc and passing through its centre of mass. Also find its MI about (i) an axis along the edge of the disc and parallel to the axis passing through the centre of mass. (ii) an axis passing through the diameter of the disc.

23. Derive an expression for the orbital velocity of a satellite orbiting at a height 'h' above the earth's surface. Hence derive an expression for its (i) time period of revolution and (ii) angular momentum.