INTERNATIONAL INDIAN SCHOOL -DAMMAM

FIRST TERMINAL EXAMINATION- ... 2015

Class XI **SUBJECT - PHYSICS** MAXMARKS:70

SET - A MAX TIME:3 HOURS

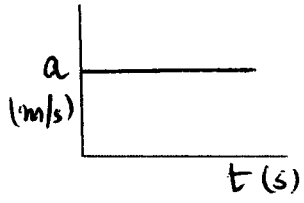
GENERAL INSTRUCTIONS

1. *All questions are compulsory.*
2. *There are 26 questions in total.Questions 1 to 5 carries one mark each.Questions 6 to 10 carry two markseach;questions 11 to 22 carry three marks each,question 23 carry four marks(value based question),24 to 26 carry five marks each.*
3. *There is no overall choice. However, an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks weightage. Attempt only one of the choices in such questions.*

1. A body is thrown vertically upwards from the surface of the earth.What is the direction of its velocity and acceleration on its way up?
2. What is the angle between $\vec{A} \times \vec{B}$ and $\vec{B} \times \vec{A}$?
3. Action and reaction forces do not balance each other.Why?
4. State the number of significant figures.
   (a) 1.90×10^{11} kg (b) 0.009 m^2
5. In the equation y=a sin(ωt-kx),t and x stands for time and distance respectively.Obtain the dimensional formula for ω.
6. State Newton's second law and deduce Newton's first law from it.

   OR

   Why do athletes run some distance before taking a long jump?
7. Justify the statement that uniform circular motion is accelerated motion.
8. State law of conservation of momentum and prove it using the third law of motion.
9. Acceleration – time graph of a moving object is shown in the figure. Draw the velocity – time graph and displacement – time graph corresponding to it.



10. Name the four fundamental forces in nature.

11. Suppose you have two forces F and F.How would you combine them in order to have resultant force of magnitude (a) zero (b) 2F (c)F

12. Draw the following graphs for an object projected upward with a velocity v_0,which comes back to the same point after some time.
    (i) Acceleration versus time graph
    (ii) Speed versus time graph
    (iii) Velocity versus time graph

13. What is limiting friction?State the laws of limiting friction.

14. A car accelerates from rest at a constant rate α for some time,after which it decelerates at constant rate β to come to rest.If 't' is the total time elapsed,then calculate
    (i) The maximum velocity attained by the car.
    (ii) The total distance travelled by the car.

15. Assuming that the escape velocity for a planet depends upon gravitational constant G,radius 'r' of the planet and also its density 'ρ ',derive the formula for escape velocity from dimensional considerations.

16. What is centripetal acceleration?Show that centripetal acceleration acts towards the center of the circle.Also derive an expression for the centripetal acceleration.

17. The velocity of a particle is given by the equation $v=2t^2+5$ cms^{-1}.find (i)the change in velocity of the particle during the time interval between $t_1=2s$ and $t_2=4s$ (ii)average acceleration during the same interval (iii) the instantaneous acceleration at $t_2=4s$

18. State the parallelogram law of vector addition.Show that the resultant of two vectors A and B inclined at an angle θ is $\sqrt{A^2+B^2+2AB\cos\theta}$

19. An explosion blows a rock into three parts.Two pieces go off at right angles to each other,a 100 kg piece at 12 m/s and a 200 kg piece at 8 m/s.The third piece flies off with velocity at 25 m/s.Calculate the mass of the third piece.

20. The centripetal force is given by $F=mv^2/r$.The mass,velocity and radius of the circular path of an object are 0.5kg,10m/s and 0.4m respectively.Find the percentage error in the force.Given m,v and r are measured to the accuracies of 0.005kg,0.01m/s and 0.01m respectively.

21. State Newton's third law of motion. Derive an expression for the recoil velocity of a gun.

22. A batsman deflects a ball by an angle of 45° without changing its initial speed,which is equal to 54km/hr.What is the impulse imparted to the ball?Mass of the ball is 0.15kg

    OR

    A cricket ball of mass 0.2 kg moving with a velocity of 20m/s is brought to rest by a player in 0.1s.Find the impulse imparted to the ball and the average force applied by the player.

23. Mrs.Raj was playing the game of carom board with her son.She decided to give him an idea of different types of motion.She told him that the motion of the carom coin is a two dimensional motion.She asked her son to observe the motion of a mosquito or the motion of a kite flying on a windy day.She explained that these motions are three dimensional motion .She gave her the example of a ball thrown vertically up as the example of one dimensional motion.
    (a)What according to you are the values displayed by Mrs.Raj?
    (b)Define one dimensional,two dimensional and three dimensional motions.

24. (a) Derive an expression for the maximum height and horizontal range and time of flight for a body in projectile motion.

(b) At what angle of projection, the horizontal range of the projectile is maximum.

OR

(a) Explain projectile motion. Obtain the expression for the path of a projectile

(b) A cricketer can throw a ball to a maximum horizontal distance of 100m. How high above the ground can the cricketer throw the same ball?

25. (a) A person of mass 'm' is standing in a lift.Find his apparent weight when the lift is

i. Moving upward with a uniform acceleration 'a'

ii. Moving downward with uniform acceleration a<g

iii. Falls freely.

(b) Explain why is it easier to pull a lawn mower than to push it.

OR

(a)What is meant by banking of roads?

(b) What is the need for banking a road?

(c) Obtain an expression for the maximum speed with which a vehicle can safely negotiate a curved road banked at an angle θ.The coefficient of friction between the vehicle and road is μ.

26. (a) Draw velocity time graph of uniformly accelerated motion of a body. By using this graph, deduce the three equations of motion.

(b) A body covers half of its journey with a speed of 40 m/s and other half with a speed of 60 m/s. What is the average speed during the whole journey?

OR

(a) Define relative velocity of one object with respect to another object.

(b) Draw position time graphs for two objects moving along a straight line when their relative velocities is (i) zero (ii) positive

(c) Two trains 120m and 80m in length are running in opposite directions with velocities 42km/hr. and 30km/hr. In what time will they cross each other?

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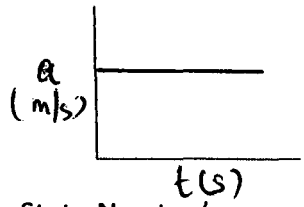
1. State the number of significant figures.
   (a) 1.40×10^{14} kg (b) 0.007 m^2
2. If $\vec{A}$,$\vec{B}$ and $\vec{C}$ are mutually perpendicular vectors,then what is the value of $\vec{A}.(\vec{B}+\vec{C})$?
3. A body is thrown vertically upwards from the surface of the earth.What is the direction of its velocity and acceleration on its way down?
4. In the equation y=a sin(ωt-kx),t and x stands for time and distance respectively. Obtain the dimensional formula for k.
5. Action and reaction forces are equal and opposite.Why cannot they cancel each other?
6. Acceleration – time graph of a moving object is shown in the figure. Draw the velocity – time graph and displacement – time graph corresponding to it.



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