

INTERNATIONAL INDIAN SCHOOL - DAMMAM
FIRST TERMINAL EXAMINATION 2014
Subject – Physics

Class - XI

SET – A

Time: 3 hours

Max Marks: 70

General Instructions:

- a) All questions are compulsory.
- b) There is no overall choice. However an internal choice has been provided in one question of two marks, one question of three marks, all three questions of five marks.
- c) Question no 1 to 5 are very short answer type questions carrying 1 mark each.
- d) Question no 6 to 10 are short answer type questions carrying 2 marks each.
- e) Question no 11 to 22 are short answer type questions carrying 3 marks each.
- f) Question no 23 is a value based question carrying 4 mark.
- g) Question no 24 to 26 are long type questions carrying 5 marks each.
- h) Use of calculator is not permitted. However you may use log table if necessary.

1. Why passengers are thrown outward when a bus in which they are travelling suddenly takes a turn around a circular road?
2. If $S = bt^2 + ct$, where S is displacement and t is the time. What is the dimension of b and c?
3. A bullet P is fired from a gun when the angle of elevation of the gun is 30° . Another bullet Q is fired from the gun when the angle of elevation is 60° . Which of the two bullets would have a greater horizontal range?
4. Action and reaction are equal in magnitude and opposite in direction. Then why do they not balance each other.
5. A ball is thrown straight up. What is its velocity and acceleration at the top?
6. What will be maximum percentage error in estimation of density of the material of a cube, if the percentage error in the measurement of mass and length are 3% and 4% respectively?
7. Draw the velocity – Time graph for following cases when
 - i) Object is moving in positive direction with positive acceleration
 - ii) An object is under free fall.
8. Name four fundamental forces of nature. Out of the four which one is
 - a) strongest and b) weakest?

9. What is impulse? Why is it dangerous to jump on a hard surface than on a soft surface?

OR

Explain why a horse cannot pull a cart and run in empty space.

10. Show that the vectors $3\hat{i} - 2\hat{j} + \hat{k}$ and $2\hat{i} + 6\hat{j} + 6\hat{k}$ are perpendicular to each other.
11. Show that Newton's second law is the real law of motion.
12. The motion of a particle along x-axis is given by the equation $x = 9 + 2t + 5t^2$, where x is in centimeters and t is time in second. Find i) the displacement after 3s and 5s ii) average velocity during the interval from t = 3s to t = 5s iii) instantaneous velocity at t = 3s.
13. State the three uses and three limitation of dimensional analysis.
14. A projectile is fired with an initial speed of 500 m/s horizontally from the top of a cliff of height 19.6m. At what distance from the foot of the cliff does it strike the ground.
15. Prove the law of conservation of momentum from Newton's third law of motion.
16. a) Define relative velocity in two dimensions.
b) Rain is falling with a speed of 20 m/s. A boy rides a bicycle with a speed of 15m/s in north to south direction. What is the direction in which she should hold her umbrella?
17. A man weighs 60kg. He stands on a weighting machine in a lift, which is moving
(a) Upwards with a uniform velocity of 8m/s.
(b) Downwards with a uniform acceleration of 6m/s^2 .
(c) Upwards with a uniform acceleration of 2m/s^2 . Take $g = 10\text{m/s}^2$.
What would be the readings on the scales in each case? What would be the reading if the lift mechanism failed and it came down freely under gravity?

OR

A body of mass 0.25 Kg moving with velocity 12 m/s is stopped by applying a force of 0.6N. Calculate the time taken to stop the body. Also calculate the impulse of this force.

18. List the SI base quantities and find their units with symbol
19. Prove that the maximum horizontal range is four times the maximum height attained by the projectile, when fired at an inclination so as to have maximum range.
20. What are concurrent forces? Obtain a condition for the equilibrium of three concurrent forces. Show graphically that they are in equilibrium.

21. The velocity (v) of water waves may depend upon their wave length (λ), the density of water (ρ) and the acceleration due to gravity (g). Find the relation between these quantities by the method of dimensions.
22. Define angle of repose and angle of friction. Show that both are numerically equal.
23. Mrs. Baita Kumari's royal estate had many sprawling lawns. Her grandson Saurabh was visiting her in his summer holidays. One day, just for fun, he started pushing and pulling lawn roller. He felt that it was easier to pull a lawn roller than to push it. He asked Mr. Thomas, the estate officer, the reason of easier pull and difficult push. Mr. Thomas was surprised at this observation of Saurabh. He talked to the gardener but they knew nothing. Finally he approached a physics teacher. The teacher explains to Thomas the reason. Thomas explains this fact to Saurabh. Saurabh was overjoyed and thanked Thomas.
- a) What according to you are the values displayed by Thomas?
 b) Explain why is it easier to pull a body than to push it?
24. a) State parallelogram law of vector addition. Find the magnitude and direction of the resultant of two given vector inclined at an angle θ .
 b) Discuss the special cases (i) $\theta = 0^\circ$ and (ii) $\theta = 90^\circ$.

OR

- a) What is rectangular resolution of a vector? Resolve a vector into its two rectangular components.
- b) With the help of vector diagram show i) $\mathbf{A} + \mathbf{B} = \mathbf{B} + \mathbf{A}$ and
 ii) $\mathbf{A} + (\mathbf{B} + \mathbf{C}) = (\mathbf{A} + \mathbf{B}) + \mathbf{C}$.
25. a) What is meant by banking of roads? Obtain an expression for the maximum speed, which a vehicle can safely negotiate a curved road banked at an angle θ .
 b) Calculate the maximum speed with which a car can be driven safely along a curved road of radius 30m and banked at 30° with the horizontal.
 Given, $g = 9.8 \text{ m/s}^2$.

OR

- a) Explain the terms kinetic friction and limiting friction. Justify the statement that friction is a necessity and an evil.
- b) Two billiard balls each of mass 30 g moving in opposite directions with speed 8 m/s collide and rebound with the same speed. What is the impulse imparted to each ball due to the other?

26. a) Define centripetal acceleration and derive its expression. Also deduce its direction.
b) Establish a relation between linear velocity and angular velocity in a uniform circular motion.

OR

a) Derive the following relations using the velocity- time graphs.

i) $v^2 - u^2 = 2as$

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

b) A motor cyclist goes from station A to B at 40 Km/h and returns from B to A at 120 Km/h. Calculate i) average speed ii) average velocity during the trip.
