



M.E.S. INDIAN SCHOOL, DOHA – QATAR
FIRST TERMINAL EXAMINATION – JUNE - 2015

SUBJECT : PHYSICS

Class : XI (CBSE)

Time : 3 Hrs.

Max. Marks: 70

SET : A

General Instructions :

- All questions are compulsory.
- There are **26** questions in total. Questions **1 to 5** are very short answer type questions and carry **one** mark each.
- Questions **6 to 10**, carry **two** marks each, questions **11 to 22** carry **three** marks each, Question **23** is value based question carries **4** marks and questions **24 to 26** 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.
- Take value of $g = 10\text{m/s}^2$
- Use of calculators is not permitted. However, you may use log tables if necessary.

Questions 1 – 5 carry 1 mark each.

- Which of the following measurements is the most accurate and why ?
i) 500.0 cm (ii) 0.0005cm (iii) 6.00 cm (iv) 6.1 cm
- Find the odd one out and justify.
i) angle (ii) torque (iii) strain (iv) relative density
- In case of a motion the displacement is directly proportional to the square of time taken. Name the type of motion.
- Can bodies have momentum without energy. Justify.
- A bullet of mass **a** and velocity **b** is fired into a large block of mass **c**. What will be the final velocity of the system.

F 195, Rev O, Dated 16th March 2010

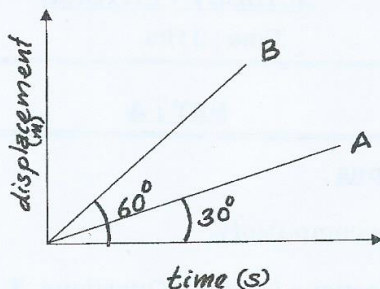
(This question paper contains 04 pages)

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Questions 6 – 10 carry 2 marks each.

6. i) If $x = a + bt + ct^2$ where x is in metre and t in seconds, what is the dimensional formula of a & c .
7. Two displacement-time graphs are given. Which line represents greater velocity? What is the ratio of the velocity of body A to the velocity of the body B.



8. State Newton's third law of motion. While catching a ball, a cricket player draws his hands backwards. Why?
9. Define work. Earth moves around the sun in circular orbit. Does the sun do any work on the earth. Justify.
10. Distinguish between conservative and non-conservative forces. (2 points)

OR

State and prove work - energy theorem.

Questions 11 – 22 carry 3 marks each.

11. A physical quantity p is related to four observables a , b , c and d as follows :

$$p = \frac{a^3 b^2}{\sqrt{c} d}$$

The percentage errors of measurement in a , b , c & d are 1%, 3%, 4% and 2% respectively. What is the percentage error in the quantity p ? If the value of P calculated using the above relation turns out to be 3.763, to what value should you round off the result?

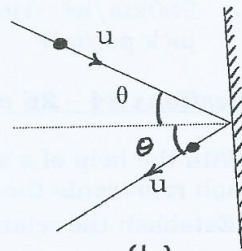
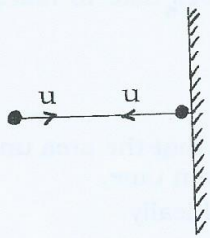
OR

- i) State the principle of homogeneity of dimensions.
- ii) Show dimensionally that the frequency n of transverse waves in a string of length l and mass per unit length m under a tension T is given by $n = \frac{K}{l} \sqrt{\frac{T}{m}}$.
12. i) Convert 1 joule into erg using dimensions.
ii) Write any two limitations of dimensional analysis.
13. Find the magnitude and direction of the resultant of two forces \vec{P} and \vec{Q} in terms of their magnitudes and angle θ between them.

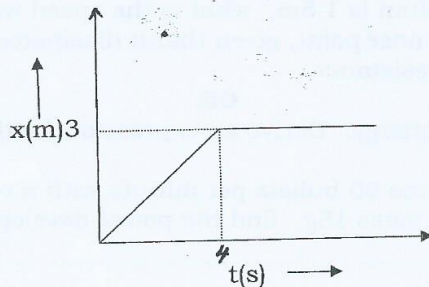
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14. A body is projected with velocity u making an angle θ with horizontal direction. Find
- time of flight
 - horizontal range
15. i) Define scalar product of two vectors.
ii) The angle between \vec{A} and \vec{B} is 60° . What is the ratio of $\vec{A} \cdot \vec{B}$ and $|\vec{A} \times \vec{B}|$.
16. With the help of a labelled diagram derive an expression for the acceleration of a body of mass m , moving with a uniform speed v in a circular path of radius r .
17. A billiard ball of mass m moving with a velocity u strikes a rigid wall and gets reflected without any loss of speed as shown in figure. Calculate the impulse imparted to the ball if it ;
- strikes normally on the wall.
 - strikes at an angle θ with the normal to the wall.



18. Define angle of repose. Deduce its relation with coefficient of static friction.
19. Establish the fact that the first and third laws of motion are there in Second law.
20. i) Distinguish between static friction, limiting friction and kinetic friction.
ii) A body of mass 50kg is kept on a horizontal surface of coefficient of static friction 0.5. Find the least horizontal force required to start motion.
21. i) State and prove Impulse-momentum theorem.
ii) Figure shows position-time graph of a particle of mass 4 kg. What is the force on the particles for a) $0 < t < 4s$ (b) $t > 4s$.



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22. i) Define power. Obtain an expression for it in terms of force and velocity.
ii) A light body and a heavy body have the same momentum. Which one will have greater KE.

Question 23 is value based and carries 4 marks.

23. An old woman crossing the road was holding a money purse. A pick pocket snatches away her purse and flies on a bike. Amal, a school student of class XI having seen this incident tries to help that old lady. He informs the Police Inspector who stands nearby. After a long chase with his jeep the Inspector catches the pick pocket, collects the purse and hands it over to the lady.
- i) What values do you find in Amal (Any two).
ii) While chasing, the pick pocket was riding the bike at a constant speed of 80km/h. When he just passed the police jeep the Inspector accelerated his jeep uniformly from rest at the rate of 960km/h^2 . How long the Inspector does take to reach the riding pick pocket?

Questions 24 - 26 carry 5 marks each.

24. i) With the help of a suitable $v-t$ graph show that the area under the graph represents the displacement over a given time.
ii) Establish the relation $S = ut + \frac{1}{2} at^2$ graphically.
- OR**
- i) Derive the third equation of motion graphically.
ii) A car moving with a speed of 126km/h is brought to stop within a distance of 200m. Calculate the retardation of the car and the time required to stop it.
25. i) State Newton's second law of motion. Express it mathematically.
ii) Prove the law of conservation of momentum using third law of motion.
- OR**
- i) State the laws of static friction. Define coefficient of static friction.
ii) Derive an expression for the optimum speed with which a car can negotiate a banked curve without friction.
26. i) State the principle of conservation of energy and prove it for a freely falling body.
ii) The bob of a pendulum is released from a horizontal position. If the length of the pendulum is 1.5m, what is the speed with which the bob arrives at the lowermost point, given that it dissipated 5% of its initial energy against air resistance.
- OR**
- i) Define work and energy. Derive an expression for the kinetic energy of a moving body.
ii) A machine gun fires 90 bullets per minute with a velocity of 800m/s. If each bullet has a mass 15g, find the power developed by the gun.

THE END



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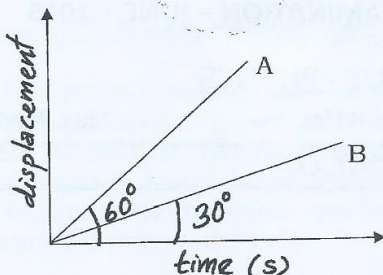
Questions 1 – 5 carry 1 mark each.

- Name the physical quantities whose dimensions are given below :
a) $ML^{-1}T^{-2}$ (b) ML^2T^{-3} .
- If the percentage error in the measurement of radius R of sphere is 0.2%, then what is the percentage error in its volume ?
- Can a body have constant speed but a varying velocity. If yes give an example.
- Can a sail boat be propelled by air blown at the sails from a fan attached to the same boat ? Why ?
- A bullet of mass b and velocity c is fired into a large block of mass a . What will be the final velocity of the system.

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Questions 6 – 10 carry 2 marks each.

6. Two displacement-time graphs are given. Which line represents greater velocity? What is the ratio of the velocity of body A to the velocity of the body B.



7. i) If $x = a + bt + ct^2$ where x is in metre and t in seconds, what is the dimensional formula of b & c .
8. Why does a gun recoil? Derive the recoil velocity of a gun.
9. Distinguish between conservative and non-conservative forces. (2 points)
- OR**
- State and prove work – energy theorem.
10. Define work. Earth moves around the sun in circular orbit. Does the sun do any work on the earth. Justify.

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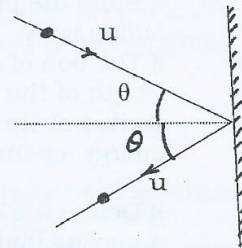
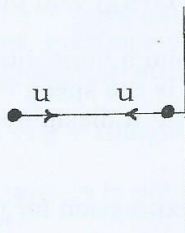
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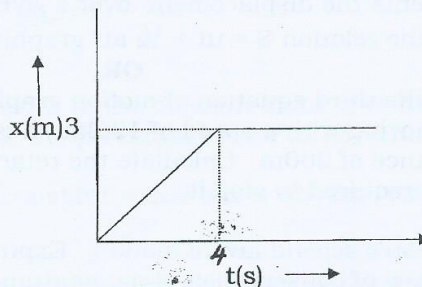
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