SHARJAH INDIAN SCHOOL
FIRST TERM EXAMINATION JUNE - 2013

Class:XI (Boys Wing)
Subject:Physics **Time Allotted:2 Hrs.**
Day & Date: Wednesday, 19/06/2013 **Max. Marks: 50**

General Instructions:

1. *All the questions are compulsory.*
2. *Q.No. 1-6 are very short answer questions carrying 1 mark each.*
3. *Q.No. 7-14 carry 2 marks each, Questions 15 to 20 carry 3 marks each, Questions 21 and 22 carry five marks each.*
4. *Use of calculator not permitted.*

1. Name two vector quantities which have the same dimension. (1)
2. Average velocity of a body is equal to its instantaneous velocity. Draw the displacement-time graph. (1)
3. Write two characteristics of a unit. (1)
4. Can a body possess acceleration without change of speed? Write with example. (1)
5. The weight of a man in a lift appears to increase when the lift moves up with an acceleration. Why? (1)
6. What is the angle made by the velocity vector of a moving body with the horizontal if the vertical component is half of the actual velocity? (1)
7. Find the dimensions of `a' and `b' in the relation $P = \frac{a - t^2}{bx}$ where `p' is the pressure, `x' is the distance and `t' is the time. (2)
8. On a 60km track, a train travels the first 30km with a speed of 30 km/hr. How fast must the train travel the next 30km, if the average speed of the entire trip is 40km/hr? (2)
9. a) What is meant by recoil of gun? (2)
   b) Why does a heavy rifle not recoil strongly as a light rifle using identical bullets?
10. The time period of a simple pendulum is given $T = 2\pi\sqrt{\frac{l}{g}}$. What is the percentage error in `g', if the percentage error in the measurement of length `l' is 2% and time period `T' is 5% ? (2)
11. The resultant of two vectors acting at an angle 150° is perpendicular to the smaller vector. If the larger vector has magnitude 10 units, find the smaller vector and the resultant. (2)
12. a) State Newton's second law of motion. (2)
    b) An athlete runs forward further even after reaching the finishing point. Write reason.
13. A boat is moving with a velocity $5\hat{i} + 3\hat{j}$ with respect to ground. The water in the river is moving with a velocity $3\hat{i} + 2\hat{j}$ with respect to ground. What is the relative velocity of the boat with respect to water? (2)
14. What is impulse? Why is it dangerous to jump from a height to marble floor than to a heap of sand? (2)

15. a) State and illustrate Polygon law of vectors. (3)

b) Is $\vec{A} = \hat{i} + \hat{j}$ is a unit Vector? Explain.

16. a) Derive the relation ($S = ut + \frac{1}{2} at^2$) by calculus method. (3)

b) A player throws a ball with an initial velocity 29.4 m/s vertically upwards. After how long does the ball return to the players hands ($g=9.8\ m/s^2$).

17. Derive an expression for the centripetal force acting on a body executing uniform circular motion. (3)

18. Obtain by dimensional analysis an expression for surface tension of liquid rising in a capillary tube. Assume that surface tension 'S' depends on mass 'm' of the liquid, pressure 'p' of the liquid and radius 'r' of the capillary tube. (3)

19. a) State parallelogram law of vectors.

b) Two equal forces are acting on a body such that their resultant is zero. What is the angle between them? (3)

20. a) Give an example of a body possessing zero velocity and still accelerating. (3)

b) Derive an expression for the distance covered by a uniformly accelerated body in the n^{th} second of its motion.

21. a) Two masses m_1 and m_2 are connected vertically by a light string passing over a frictionless pulley. Derive expressions for acceleration and tension of the system. ($m_1 > m_2$) (5)

b) What are concurrent forces? Obtain a condition for the equilibrium of 3 concurrent forces.

22. a) A particle is projected with a velocity 'u' in a direction making an angle 'θ' with the horizontal. (5)

Find: (1) Maximum height (2) Time of flight (3) Horizontal Range.

b) The range of a projectile when launched at an angle 15^o with the horizontal is 1.5 km. What is the range of the projectile when launched at an angle of 45^o to the horizontal?

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SHARJAH INDIAN SCHOOL

FIRST TERM EXAMINATION JUNE - 2012

Class : XI (Boys Wing)
Subject: Physics **Time Allotted:2 Hrs**
Day & Date: Monday, 18.06.2012 **Max.Marks:50**

General Instructions

1.All questions are compulsory
2. Questions 1 to 6 very short answer type questions carrying one mark each.
3. Questions 7 to 14 carry two marks each, Questions 15 to 20 carry three marks each, Questions 21 and 22 carry five marks.
4. Use of calculator not permitted.

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1. What is the path of body having an acceleration constant in magnitude but varying in direction ?
2. Find the unit vector in the direction of $\vec{A} = 2\hat{\imath} - \hat{\jmath}$
3. Name any two dimensional variables.
4. M.K.S system has to be rationalized to obtain S.I system. Why ?
5. Can three concurrent forces be in equilibrium ? Explain
6. The distance travelled by a particle is directly proportional to time. What is the net force acting on the particle ?
7. A car travels half of the distance of its journey with a speed of 40 km/h and second half of the distance with a speed 'V'. If the average speed of the car is 48 km/h, What is the value of 'V' ?
8. Find the dimension of Planck's constant and hence check the correctness of equation $\lambda = \frac{h}{mv}$, where λ is the wave length, 'm' is the mass and 'v' is the velocity.
9. State the principle of conservation of linear momentum. Write one example. Where we make use of this law ?
10. Rain is falling vertically with a speed of 35m/s, wind starts blowing after some time with a speed of 12m/s in east to west direction. In which direction should a boy waiting at a bus stop hold his umbrella ?
11. Find the dimensions of 'a' and 'b' in the relation $P = \frac{b-x^2}{at}$ where P is the pressure, x is the distance and t is the time.
12. A car accelerates from rest at a constant rate α m/s^2 for some time and then decelerates at a constant rate β m/s^2 to come to rest. Find the maximum velocity attained during the motion in 't' seconds ?
13. State and illustrate Polygon law of vector addition.
14. Two masses m_1 and m_2 are connected at the two ends of an in-extensible string that passes over a frictionless pulley Find the acceleration of the masses and the tension in the string when the masses are released. ($m > m_2$)
15. a) State Newton's Second law of motion.
    b) Show that Newton's second law is the real law of motion.
16. a)Obtain an expression for the centripetal acceleration in terms of angular velocity.
    b) How is it related to frequency ?
17. A stone falls freely from rest and the total distance covered by it in last second of its motion equals the distance covered by it in the first three seconds of its motion. How long the stone remains in the air ? g = 9.8 m/s^2
18. State Parallelogram law of vectors. Find the magnitude and direction of the resultant of two vectors $\vec{A}$ and $\vec{B}$ using the law ?
19. The time of oscillation 't' of a small drop of liquid depends up on density 'd' the radius 'r' of the drop and surface tension 'S' . Using dimensions show that $t \propto \sqrt{\frac{dr^3}{S}}$

20. Give reason
    a) An athlete runs forward further even after reaching the finishing point.
    b) It is dangerous to jump from a height to marble floor than to heap of sand.
    c) When a man jumps out of a boat, the boat is pushed away.

21. a) A particle is projected with a velocity 'u' in direction making an angle θ with the horizontal.
    Find the 1. the maximum height 2. Time of flight 3. Horizontal range
    b) What are the two angles of a projectile projected with velocity 30m/s so that the horizontal range is 45m ? g = $10m/s^2$

22. a) Deduce the three equations of motion by calculus method
    b) The position of a particle is given by $\vec{x} = 3t\hat{\imath} + 2t^2\hat{\jmath} + 5\hat{k}$ where 't' is in seconds and 'x' is in metres . find the magnitude and direction of the velocity of the particle at t = 2s.

SHARJAH INDIAN SCHOOL
FIRST TERM EXAMINATION JUNE 2011

Class :XI(Boys Wing)
Subject: Physics
Day & Date:Sunday,12-06-2011

Time Allotted:2 Hrs
Max.Marks:50

General instructions:

1.All questions are compulsory
2. Questions 1 to 4 are very short answer type questions carrying one mark each
3. Questions 5 to 13 carry two marks each,questions 14 to 19 carry three marks each and questions 20&21 carry five marks
4. Use of calculators is not permitted.

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1. The average velocity of a particle is equal to its instantaneous velocity.Draw the displacement- time graph
2. Name a physical quantity whose dimensional formula is i) $M L^{-1} T^{-2}$ ii) $M L T^{-1}$
3. A football is thrown in a parabolic path.Is there any point along its path at which acceleration is perpendicular to the velocity?
4. Two vectors of magnitudes A and $\sqrt{3}A$ are perpendicular to each other.What is the angle made by the resultant with A?
5. State and prove law of conservation of momentum from Newtons third law.
6. What is meant by unit? Give three characteristics of a unit.
7. Describe the parallax method to determine the diameter of moon from the surface of the earth.
8. With what acceleration 'a',should a box descend so that a block of mass M placed in it exerts a force Mg/4 on the floor of the box?
9. A man wants to cross a river to an exactly opposite point on the river bank.If he can row his boat with twice the velocity of the current ,then at what angle to the current he must keep the boat pointed?
10. Which of the two decides the direction of a particle: velocity or aceeleration?Give one example in support of your answer.
11. A bicyclist travelling along a straight road covers first half of the distance with a speed V_1 and second half of the distance with speed V_2. What is the average speed of the bicyclist?
12. Write the dimensions of a and b in the relation $E=b-x^2/at$ where E, x and t are energy, distance and time respectively.
13. Explain why: a) an athelete runs for some distance before taking a long jump.
    b) It is difficult to catch a cricket ball compared to a tennis ball moving with same velocity
14. Derive an expression for time of flight and horizontal range of a projectile.
15. Obtain an expression for the centripetal force acting on a body executing uniform circular motion.

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16. A body dropped from the top of a tower falls through 40m during the last 2s of its fall.What is the height of the tower?Given $g=10m/s^2$
17. Using method of dimensions derive an equation for energy of a body E executing S.H.M assuming this energy depends on mass(m),frequency (n) and amplitude of vibration (A) given $k=1/_2$
18. Two masses 8 kg and 12 kg are connected at the ends of a light inextensible string that goes over a frictioless pulley.Find the acceleration of the masses and the tension in the string when the masses are released.
19. (a) State polygon law of vector addition
    (b) Give two examples for a null vector.
20. (a) Derive an expression for work done when a body is pulled up along an inclined plane.
    (b) Obtain the equation for optimum speed with which a car can negotiate a banked curve.
21. (a) Deduce the three equations of motion by using calculus method
    (b) The position of a particle as a function of time is given by: $x=2t^3-6t^2+12t+6$ metre. At what time acceleration of the body will be zero?

FIRST TERM EXAMINATION – JUNE 2010

Class : XI (Boys Wing) **Time Allotted : 2 hrs.**
Subject : PHYSICS **Max. Marks : 50**
Day & Date: Sunday, 20.06.2010

General Instructions

1. *All questions are compulsory.*
2. *Marks for each question are indicated against it.*
3. *Questions Nos. 1 – 7 are very short answer questions carrying 1 mark each.*
4. *Questions Nos. 8 – 13 are short answer questions carrying 2 marks each.*
5. *Questions Nos. 14 – 20 are also short answer questions carrying 3 marks each.*
6. *Questions Nos. 21 & 22 are long answer question carrying 5 marks.*
7. *Use log tables, if necessary.*

Name: _____ *Roll No.* _____

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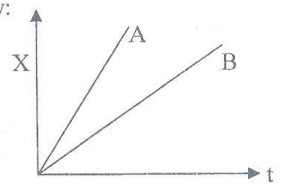
1. Is the equation $v^2 = u^2 + ½ as$, dimensionally consistent? (where the symbols have the usual meanings). 1
2. What do you mean by coherent system of units? 1
3. State triangle law of vector addition. 1
4. The acceleration–time graph of a body is shown below.

Draw the corresponding velocity–time graph. 1

5. How do air-bags provide safety to the driver of a vehicle during an accident? 1
6. What do you mean by 'concurrent forces'? 1
7. What is the angle made by the velocity vector of a moving body with the horizontal, if its horizontal component is half of the actual velocity? 1
8. Find the dimensions of a/b in the equation $F = a\sqrt{x} + bt^2$, where 'F' is force, 'x' is distance and 't' is the time. 2
9. Show that Newton's second law of motion is the real law of motion and the other laws of motion are contained in it. 2
10. The x–t graphs of two cars A and B are given below:



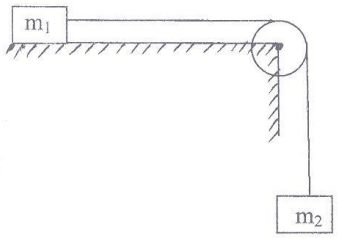
If both the cars start from rest, identify the car which travels more distance in a given time. Explain. 2

11. Rain is falling vertically with a speed of 35 ms^{-1}. Winds starts blowing after some time with a speed of 12 ms^{-1} in east to west direction. In which direction should a boy waiting at a bus stop hold his umbrella? 2
12. A man of mass 70 Kg stands on a weighing scale in a lift which is moving
    (a) upwards with a uniform speed of 10 ms^{-1}.
    (b) downwards with a uniform acceleration of 5 ms^{-1}.
    What would be the readings on the scale in each case?
    (c) What would be the reading if the lift mechanism failed and it hurtled down freely under gravity? [Given $g = 10\ ms^{-2}$] 2

P.T.O.

13. Derive the relation connecting linear and angular velocities of an object undergoing circular motion? 2

14. Two blocks of masses m_1 and m_2 ($m_2 > m_1$) are connected as shown in the figure. Obtain expressions for the acceleration and tension of the system. (the surface is frictionless) 3



15. A hammer of mass 1 Kg moving with a speed of 6 m/s strikes a wall and comes to rest in 0.1s. Calculate (i) the impulse of force (ii) the retardation of the hammer and (iii) the retarding force that stops the hammer. 3

16. The orbital velocity (v) of a satellite may depend on its mass (M), the distance (r) from the centre of the earth and the acceleration due to gravity (g). Obtain an expression for the orbital velocity, using the method of dimensions. 3

17. Use Newton's laws of motion to explain the following:
    (a) A stone, tied to a string, in uniform circular motion flies along the tangent when the string suddenly breaks.
    (b) An athlete runs forward further, even after reaching the finishing point.
    (c) A boat moves backwards, as a person from the boat jumps on to the shore. 3

18. (a) If the distance travelled by a body is directly proportional to the time taken, identify the type of motion of the body.
    (b) A car travels with uniform velocity v_1 from a town 'A' to a town 'B' and returns with a velocity v_2. Show that the average speed of motion of the car is given by $\frac{2v_1v_2}{v_1+v_2}$ 3

19. With the help of a neat vector diagram, derive an expression for the centripetal acceleration experienced by a body in uniform circular motion. How does the centripetal acceleration of a body change, when speed of the body and radius of the path both get doubled? 3

20. Obtain an expression for the distance travelled by a uniformly accelerated body in n^{th} second of its motion. Hence, find the ratio of the distance travelled by the body in the first and second seconds of its motion. 3

21. (i) Show that the path of a projectile is parabolic.
    (ii) Derive equations for the time of flight and the horizontal range of a projectile thrown at a given angle with the horizontal. 5

22. (a) Establish the relation $S = ut + \frac{1}{2}at^2$, using the method of calculus.
    (b) A particle moves along a straight line such that its displacement 's' at any time 't' is given by $S = t^3 - 6t^2 + 3t + 4$ metres. Find the velocity, when the acceleration is zero. 5