QUARTERLY EXAMINATION, 2013 –14
SUBJECT: PHYSICS
CLASS : XI

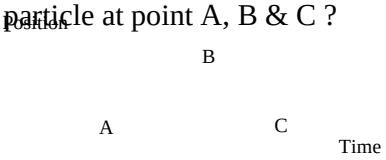
TIME : 3 hrs M.M.-70

Q1. Calculate the angle of 1^o into radian? (1)

Q2. Write the dimensions of a & b in the formula **v = a+bt**, where **v** is velocity and **t** is time? (1)

Q3. Is the time variation of position, shown, observed in nature? (1)

Q4. Displacement time graph for the motion of a particle is shown in figure. What can you say about the instantaneous velocity of the particle at point A, B & C ? (1)

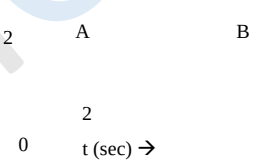


Q5. Why do the blades of an electric fan continue to rotate for same time after the current is switched off ? (1)

Q6. Why are shockers used in cars, scooters and motorcycles? (1)

Q7. A light body and a heavy body have the same momentum, which one will have greater K.E.? (1)

Q8. Position time graph of a particle of mass 2 kg is shown in figure. What is the force on the particle for $t < 0$, $t > 2$sec, $0 < t < 2$sec ? (1)



Q9. Name the quantities represented by the dimensional formula $[M^1 L^2 T^{-2}]$, $[M^1 L^{-3} T^o]$ (2)

Q10. Find the relative error in z, if $z = \frac{A^4 B^{1/3}}{CD^{3/2}}$? (2)

Q11. A particle moves 10m in 4^{th} sec. and 15m in 6^{th} sec of its motion. Calculate the distance travelled by it in 7^{th} sec if the motion of the particle is uniformally accelerated ? (2)

Q12.Under what condition the magnitude of the sum of two vector is equal to the magnitude of difference between them? (2)

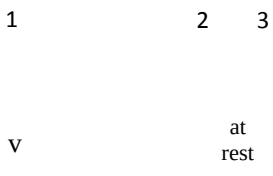
Q13. What is the angle made by vector $\vec{A} = 2\hat{i} + 2\hat{j}$ with x – axis? (2)

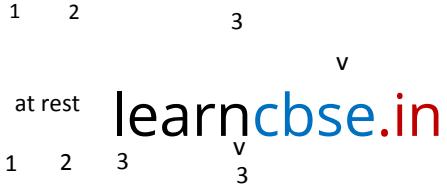
Q14. A soda water bottle is falling freely will the bubbles of the gas rise in the water of the bottle? Justify your answer . (2)

Q15. A train is moving along a horizontal track, a pendulum suspended from the roof makes an angle of 4^0 with the vertical. Calculate the acceleration of the train. [take $g=10m/sec^2$ & $\tan 4^0=.07$] (2)

Q16. Give the magnitude and direction of the net force acting on a cork of mass 10g floating on water? (2)

Q17. Two identical ball bearings in contact with each other are hit head on by another ball of the same mass moving initially with a speed V. if the collision is elastic, which of the following is a possible result after collision? (2)





Q18. A body constrained to move along the z-axis, subjected to a constant force $\vec{F} = (-\hat{i} + 2\hat{j} + 3\hat{k})\ N$. What is the work done by this force in moving the body over a distance of 4 m along z-axis? (2)

OR

A 16kg block moving with a velocity of 4 m/sec compresses an ideal spring and comes to rest. If the force constant of the spring be $100 Nm^{-1}$ than how much is the spring compressed?

Q19. Write the dimensions of **a** and **b** in the relation: $P = \frac{b - x^2}{at}$

Where P = power, x = distance, t = time

OR

Convert an energy of 1Joule into ergs. (3)

Q20. A ball is thrown vertically upwards with a velocity of 20 m/sec from the top of a building, the height of the point from where the ball is thrown is 25.0m from the ground.

a) How high the ball will rise?

b) How long will it be before the ball hits the ground? (3)

Q21. An object is in uniform motion along a straight line. What will be position time graph for the motion of the object if: (3)

(i) x_o = +ve, v = -ve (ii) x_o = -ve, v = +ve (iii) x_o = +ve, v = +ve

Q22. A particle starts from origin at **t = o** with a velocity of $5\hat{i}$ m/sec and moves in x-y plane under action of a force which produces a constant acceleration of $(3.0\hat{i} + 2.o\hat{j})$ m/sec^2.

(a) What is the y-coordinate of the particle at the instant its x-coordinate is 84m? What is the speed of the particle at this time? (3)

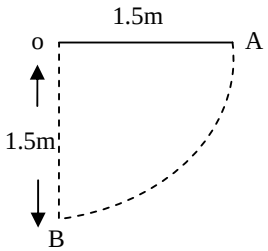
Q23. A bullet of mass .04kg moving with a speed of $90 msec^{-1}$ enters a heavy wooden block and is stopped after a distance of 60cm. What is the average resistive force exerted by the block on the bullet? (3)

Q24. A balloon with mass M is descending down with an acceleration a, where a<g, What mass m of it contents must be removed so that it starts moving up with acceleration a? (3)

Q25. Explain why?

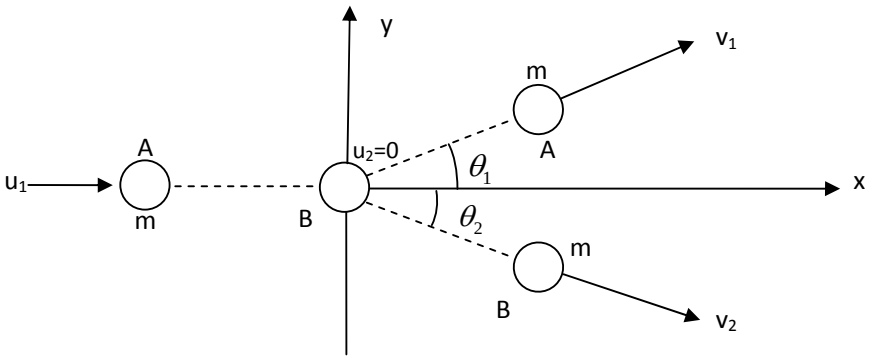
(i) It is easier to pull a lawn mower than to push it?
(with the help of diagram) (3)

Q26. The bob of a pendulum is released from a horizontal position A – if the length of the pendulum is 1.5m, What is the speed with which the bob arrives at the lower most point B, given that it dissipates 5% of its initial energy against air resistance? (3)



Q27. Consider the collision depicted in fig. between two balls with equal masses $m_1 = m_2$. The first ball is called the cue while the second ball is called the target. The player wants to sink the target ball in a corner packet which is at an angle of $\theta_2 = 37^o$. Assume that the collision is elastic obtain θ_1?

(3)



Q28. Show that for a projectile the angle between the velocity and the *x*-axis as function of time

(a) is given by $\theta(t) = \tan^{-1}\left(\frac{v_{oy} - gt}{v_{ox}}\right)$ where v_{oy} and v_{ox} are initial component of velocity in y and x direction

(b) show that the projectile angle for a projectile is given by $\theta = \tan^{-1}\left(\frac{4h}{R}\right)$ (5)

OR

What is centripetal acceleration ? find its magnitude and direction in case of a uniform circular motion?

Q29. A simple pendulum oscillates under the action of the force of gravity. Suppose that the period of oscillation depends on

(i) mass 'm' of the bob

(ii) Length 'l' of the pendulum

(iii) acceleration due to gravity 'g'. Derive the expression for its time period using the method of dimension?

(5)

OR

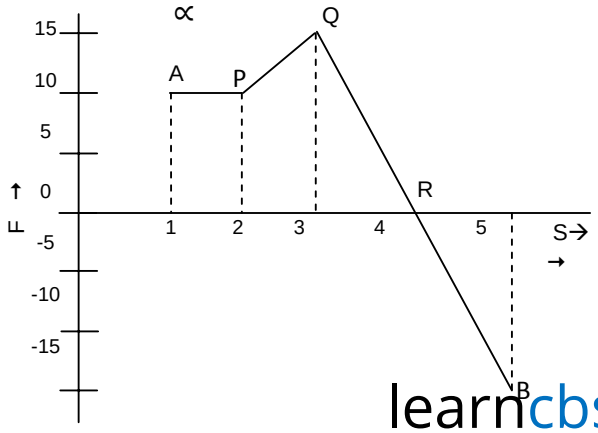
A planet moves around the sun in nearly circular orbit its period of revolution 'T' depends on:

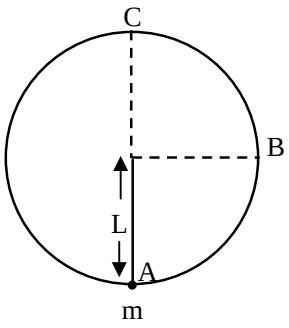
(i) radius 'r' of orbit

(ii) mass 'M' of the sun

(iii) gravitational constant 'G'. Show dimensionally that T^2 r^3.

Q30. A body moves from point A to B under the action of force, varying in magnitude as shown in figure obtain the work done. (5)





A bob of mass m is suspended by a light string of length L. It is imparted a horizontal velocity v_o at the lowest point A such that it complete a semicircular trajectory in the vertical plane with the string becoming slack only on reaching the top most point C. Obtain an expression for

(i) v_o

(ii) speed at point B & C

(iii) Ratio of KE (K_B/K_C) at B&C