Simran Singh
XI-B
Roll no → 31

MODERN CONVENT SCHOOL

SECTOR-4, DWARKA

HALF YEARLY EXAMINATION(2017-18)

PHYSICS(SET- 2) (042)

CLASS: XI

M.M: 70

TIME ALLOWED:3HOURS

GENERAL INSTRUCTIONS:

1. All questions are compulsory.
2. Q.No.1 to 5 are very short answer questions and carry one mark each.
3. Q.No.6 to 10 are short answer questions and carry two marks each.
4. Q.No.11 to 22are also short answer questions and carry three marks each.
5. Q.No.23 is a value based question and carries four marks.
6. Q.No.24-26 are long answer questions and carries five marks each.
7. Use log tables if necessary, use of calculators is not permitted.

Q1. At which point of the trajectory is the speed of motion minimum?

Q2. A light body and a heavy body have the same momentum. Which one will have greater kinetic energy?

Q3.Which of the following measurements is more accurate and why?

(a) 0.0002 g (b) 20.0 g

Q4. Write two uses of velocity time graph?

Q5. Why does the earth have an atmosphere and the moon does not?

Q6. 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?

Q7. A cyclist has to bend a little inwards from his vertical position while turning. Why?

Q8. If the radius of the earth were increased by a factor of 3, by what factor would its density have to be changed to keep 'g' the same? 22.

2M

Q9. Define power. Obtain an expression for it in terms of force and velocity.

Q10. Show that Newton's second law is the real law of motion.

Q11. Define the term 'coefficient of limiting friction' between two surfaces. A body of mass 10 kg is placed on an inclined plane of angle 30 ^{0}. If the coefficient of limiting friction is $1/\sqrt{3}$, find the force required to just push the body up the inclined surface. The force is being applied parallel to the inclined surface.

Q12. Draw a graph showing the variation of potential energy and kinetic energy with respect to a height of a free fall under gravitational force.

Q13. Show that range of projection of a projectile for two angles of a projection α and β is same where $\alpha+\beta = 90^0$.

Q14. A body starts accelerating uniformly with 'a' from a velocity 'u' and travels in a straight line. Prove that it covers a length of $u+a/2(2t-1)$ in the t^{th} second of motion.

Q15. In an experiment, refractive index of glass was observed to be 1.45, 1.56, 1.54, 1.44, 1.54 and 1.53. Calculate (i) mean value of refractive index; (ii) mean absolute error; (iii) fractional error; (iv) percentage error. Express the result in terms of absolute error and percentage error?

Q16. Define the term orbital speed. Establish a relation for orbital speed of a satellite orbiting very close to the surface of the earth. Find the ratio of this orbital speed and escape speed.

Q17. A body of mass 'M' at rest is struck by a body of mass 'm'. Show that the fraction of kinetic energy of mass m transferred to the struck particle is $4mM/(m+M)^2$.

Q18. The displacement (in metre) of a particle moving along x- axis is given by $x=18t+5t^2$. Calculate

(i) The instantaneous velocity at t=2 s,

(ii) Average velocity between t=2s and t=3s, and

(iii) Instantaneous acceleration.

Q19. A person of mass m is standing in a lift. Find his apparent weight when the lift is:

(i) Moving upward with uniform acceleration 'a'.

(ii) Moving downward with uniform acceleration 'a' (<g)

(iii) Falls freely .

Q20. State Kepler's laws of planetary motion and deduce Newton's law of gravitation from them.

Q21. Show dimensionally that the frequency 'n' of a transverse waves in a string of length 'l' and mass per unit length 'm' under a tension is given by $n = K/l\sqrt{T/m}$.

Q22. Why does a horse have to apply more force to start a cart than to keep it moving?

Q23. Samir went to circus with his family on Sunday. The most exciting item in the circus for him was "well of death" in which a biker was riding a motorcycle in a big ball of iron. Motorcycle was driven in all the directions from upside down to left and right. He was amazed to find that the biker didn't fall down. Seeing his interest in the item, his father advised him not to perform such thing by himself on his cycle. He told him that this stunt is very difficult and the biker is specially trained for this. He knows with what velocity he should drive the bike so that he could not fall. Samir understood and promised his father that he would not do anything like this on his own.

(i) What moral do you get from above?

(ii) A motorcyclist loops in a vertical loop of diameter 50m, without dropping down even at the uppermost point. What is minimum speed at lowest and highest point of the loop?

(iii) What should be the net force on the body of mass m tied to one end of string and revolved in a vertical circle of radius,R at the lowest and highest point of circle directed vertically downward.

Q24. Derive an expression for the velocity of the two masses m1 and m2 moving with the speeds u1 and u2 undergoing elastic collision in one dimension.

Q25. Consider a mass 'm' attached to a string of length 'l' performing a vertical circle. Find an expression for the

(i) Velocity at any point,

(ii) Tension at any point,

(iii) Velocity minimum at the lower most point for a vertical circle.

Q26. (i) With the help of a simple case of an object moving with constant velocity show that the area under velocity time curve represents the displacement over a given time interval.

(ii) A projectile is projected with velocity u making an angle Θ with horizontal direction, find time of flight and horizontal range.