

Roll No. Name

Half Yearly Examination 2014-15 GF-6/300

7P

Physics

Time : 3 Hrs.

Class XI

M.M. :

General Instructions :

- (1) All questions are compulsory.
- (2) There are 26 questions in total. Q. No. 1 to 5 are very short answer type questions and carry one mark each.
- (3) Q. 6 to 10 carry two marks each. 11 to 22 carry three marks each. Q. No. 23 carries four marks. Q. No. 24 to 26 carry five marks each.

(d) Physical Constant :

Boltzmann's constant

$$K = 1.381 \times 10^{-23} \text{ JK}^{-1}$$

Avogadro's Number

$$N_A = 6.022 \times 10^{23} / \text{mol}$$

$$g = 9.8 \text{ m/s}^2$$

$$R = 8.3 \text{ J mol}^{-1} \text{ K}^{-1}$$

- Round off the following numbers as indicated :
 - 18.35 up to 3 digits
 - 321.135 up to 5 digits
- Distinguish between dimensional and non dimensional variables.
- What does the area under acceleration time graph represents ?
- Why is the work done by centripetal force Zero ?

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P.T.O.

$$ms^{-3} \frac{\frac{m}{s^2}}{s} \frac{m}{s}$$

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5. Find unit vector parallel to the vector $3\hat{i} + 7\hat{j} + 4\hat{k}$.
6. The specific resistance σ of a thin wire of radius r cm, resistance $R\Omega$ and length L cm is given by :

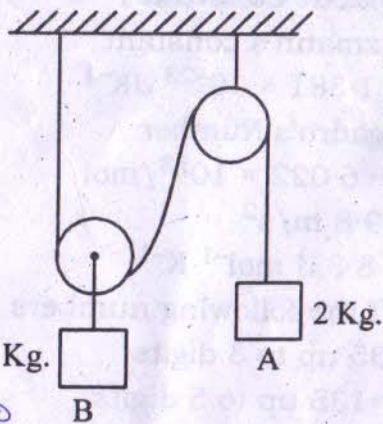
$$\sigma = \frac{\pi r^2 R}{L}$$

if $r = 0.26 \pm 0.02$ cm

$R = 32 \pm 1\Omega$

$L = 78 \pm 0.001$ cm, find the percentage error in σ

7. A projectile is fired horizontally with velocity u . Show that its trajectory is a parabola.
8. Find acceleration of A and B.



OR

Why is it easier to pull a lawn roller than to push it? Explain.

9. What is the coefficient of restitution? What is its significance?

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10. (a) Springs A and B are identical except that A is stiffer than B. In which spring is more work expended if they are stretched by the same force?
- (b) Can there be a situation in which $E - U < 0$?
11. (a) Distinguish between the terms precision and accuracy of a measurement.
- (b) Define relative error.
12. A body covers 12 m in 2nd second and 20 m in 4th sec. How much distance will it cover in 4 seconds after the 5th second.

Or

Explain the expression for the resultant acceleration of a particle having non-uniform circular motion.

13. What are impulsive forces? A batsman hits back a ball straight in the direction of the bowler without changing its initial speed of 12 ms^{-1} , if the mass of the ball is 0.15 kg , determine the impulse imparted to the ball. (assume linear motion of ball).
14. (a) Under what condition will the equality :

$$\left| \vec{A} \times \vec{B} \right| = A \cdot B \text{ hold good?}$$

- (b) Is the rocket in flight an example of projectile.

- (c) Can $\vec{A} + \vec{B} = \vec{A} - \vec{B}$?

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15. What do you mean by banking of a curved road? Determine the angle of banking so as to minimise the wear and tear of the tyres of a car negotiating a banked curve.
16. Derive by the method of dimensions, an expression for the volume of a liquid flowing out per second through a narrow pipe. Assume that the rate of flow of liquid depends on :
- The coefficient of viscosity of the liquid.
 - The radius of the pipe and
 - The pressure gradient along the pipe

$$K = \frac{\pi}{8}$$

17. Draw the graph of equation $F_s = -Kx$, where F_s is the spring force and x is the displacement of block from equilibrium position. Using the graph, show that max. work done by the spring at x_m is :

$$W_s = \frac{-Kx^2 m}{2}$$

(K = spring constant)

18. (a) A cricket players lowers his hands to catch the ball safely, explain why?
- (b) Why does a child in a merry-go-round press the side of his seat radially outward?
- (c) The outer rail of a curved railway track is generally raised over the inner. Why?

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19. A boy stands at 39.2 m from a building and throws a ball which just passes through a window 19.6 m above the ground. Calculate the velocity of projection of the ball.
20. Find an expression for the workdone against friction when a body is made to slide up an inclined plane.
21. State the work-energy theorem. Prove it for a constant force.
22. Draw and discuss the position time graphs of two objects moving along a straight line, when their relative velocity is :
- Zero
 - Positive and
 - Negative
23. Shiva was going on highway with uncle in their Wagnor. They overlook a minibus and continued forward. It was raining. Suddenly shiva saw a man at roadside waving red shirt. Shiva's uncle brakes and car stopped at 60 met distance. To his surprise shiva found that minibus also stopped nearby. They found water filled ditch ahead of them at 65 met. from where man with red shirt was standing :
- What does the incident tells about man with the red shirt?
 - Was there any other action which you would have preferred, had it been you in place of him?

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A = MK

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- (c) Minibus and wagnor stopped at same distance. Explain how was it possible ?
- (d) Name physics theorem on which this event can be explained ?
24. State the parallelogram law of vector addition and find the magnitude and direction of the resultant of two vectors \vec{P} and \vec{Q} inclined at an angle θ with each other. What happens, when $\theta = 0^\circ$ and $\theta = 90^\circ$?

OR

- Define centripetal acceleration. Derive an expression acceleration of a particle moving with uniform speed V along a circular path of radius r . Discuss the direction of this acceleration.
25. State the law of conservation of linear momentum and derive, its expression from Newton's second's law of motion. Show variation of momentum when two bodies of Equal/different masses have different/equal momenta.

OR

- (a) A body of mass m moves along X-axis such that its position, Co-ordinate at any instant t is :

$$x = at^4 - bt^3 + ct$$

Where a , b and c are constants. What is the force acting on the particle at any instant t ?

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- (b) Explain how is a horse able to pull a cart.
26. Show that the total energy of freely falling body remains constant through out its fall.

OR

- (a) Write two characteristics of inelastic collision.
- (b) Define SI unit of power.
- (c) How many ergs are there in one joule ?
- (d) Work done by gravitational force when body is lifted up ?