JP INTERNATIONAL SCHOOL

SECTOR 3A, OMEGA-1

I Term Examination

Session-2016-2017

CLASS XI

PHYSICS

Time: Three Hours **Max. Marks: 70**

Date:- 26-09-16

GENERAL INSTRUCTIONS:

1. *All questions are compulsory.*
2. *Questions 1 to 5 carry 1 mark each.*
3. *Questions 6 to 10 carry 2 marks each.*
4. *Questions 11 to 22 carry 3 marks each.*
5. *Question 23 carries 4 marks.*
6. *Questions 24 to 26 carry 5 marks each.*

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1. Name the Indian physicist , who was first awarded the Nobel Prize.

2. Why length, mass and time are chosen as base quantities in mechanics ?

3. What is the minimum number of forces acting on an object in a plane that can produce a zero resultant.

4. Why is it difficult to put a cycle into a motion than to maintain its motion.

5. What happens to coefficient of friction , when the weight of the body is doubled ?

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

7. A force $F = i + 5j + 7k$ acts on a particle and displaces it through $S = 6i + 9k$. Calculate the work done if the force is in newton and displacement in metre.

8. If the Kinetic energy of a body increases by 300% by what will the linear momentum of the body increase ?

   OR

   A jet plane starts from rest with an acceleration of 3 ms^{-2} and makes run for 35 sec before taking off. What is the minimum length of the runway ?

9. The density of mercury is 11.6 g cm^{-3} in CGS system . Find its value in SI units.

10. Find the dimensions of a/b in the equation : $F = a x^{½} + bt^2$, where F is force, x is distance and t is time.

11. State the work-energy theorem. Prove this theorem for a variable force.

12. A force $F = a + bx$ acts on a particle in the X-direction, where a and b are constants. Find work done by this force during a displacement from $x = 0$ to $x = d$.

13. Find an expression for the work done against the friction when a body is made to slide up an inclined plane.

14. Two masses M and m are connected at the two ends of an inextensible string. The string passes over a smooth frictionless pulley. Calculate the acceleration of the masses and the tension in the string . Given $M > m$.

15. A man of mass m is standing on the floor of lift. Find his apparent weight when the lift is
    i) moving upwards with uniform acceleration 'a' ii) moving downwards with uniform acceleration 'a' iii) moving with uniform velocity 'v'.

16. Two vectors A and B are inclined at an angle θ. Using triangle law of vector addition , find the magnitude and direction of their resultant.

17. If $A=3\hat{i}+4\hat{j}$ and $B=7\hat{i}+2\hat{j}$ find a vector having the same magnitude as B and parallel to A.

OR

Determine a unit vector perpendicular to both $A = 2i + j + k$ $B = i - j + 2k$

18. Deduce the following equations for uniformly accelerated motion by using integration technique

(i) $S=ut+\frac{1}{2}at^2$ (ii) $S_{nth} = u+\frac{a}{2}(2n-1)$

19. A car moving along a straight highway with a speed of 126 km/hr is brought to stop with in a distance of 200 m . What is the retardation of the car and how long does it take for the car to stop.

20. a) Two different masses are determined as (23.7 ± 0.5)g and (17.6 ± 0.3)g. What is the sum of their masses.
b) The resistance R = V/I, where V = 100 ± 5 V and I = 10 ± 0.2 *A*. Find the percentage error in R.

21. The angular diameter of the sun is 1920". The distance of the Sun from the earth is 1.5×10^{11} m , what is the linear diameter of the Sun.

22. The velocity '*v*' of water waves depends on the wavelength 'λ', density of water 'ρ' and acceleration due to gravity 'g'. Deduce by the method of dimension the relation between these quantities.

23. Mohan drive a car at a speed of 70 Km/hr along a straight road for 8.4 km. Then the car suddenly ran out of petrol. Mohan did not lose his cool. Instead he walked for 30 min to reach a petrol pump at a distance of 2 km.
a) What are the values displayed by Mohan ?
b) What was the average velocity from the beginning of his drive till he reached the petrol pump ?

24. Define elastic collision. Give its characteristics. Prove that in an elastic collision between two bodies the relative velocities of approach before collision is equal to relative velocity of separation.

OR

Show that the elastic force of a spring is a conservative force. Show that the total energy of the stretched spring remains conserved when it is released. Find the expression for the maximum speed .

25. What do you mean by banking of a curved road ? Determine the angle of banking ao as to minimise the wear and tear of the tyres of a car negotiating a banked curve.

OR

Two blocks of mass 2 kg and 5 kg are connected by an ideal string passing over a pulley. The block of mass 2 kg is free to slide on a surface inclined at an angle of 300 with the horizontal whereas 5 kg block hangs freely. Find the acceleration of the system and the tension in the string. Given $\mu = 0.30$.

26. A projectile is fired with a velocity u making an angle with the horizontal. Show that its trajectory is a parabola. Derive expressions for i) time of flight ii) maximum height iii) horizontal range.

OR

A projectile is fired horizontally with a velocity u. Show that its trajectory is a parabola. Also obtain expressions for its i) time of flight ii) horizontal range iii) velocity at any instant