

SRI KRISHNA MATRIC HR. SEC. SCHOOL, ODDANCHATRAM.

I – 25% EXAMINATION-2023 – 2024

Std: XI

MARKS : 70

SUBJECT: PHYSICS

TIME: 3 HRS.

I. Choose the correct answer

15X1 = 15

1. Density of wood is 0.5 gm/cc in CGS system of units. The corresponding value in MKS units is

- a) 500 b) 5 c) 0.5 d) 5000

2. A force F is given by $F = at + bt^2$, where t is time. The dimensions of a and b are :

- a) MLT^{-3} and MLT^{-4} b) MLT^{-4} and MLT^{-3} c) MLT^{-1} and MLT^{-2} d) MLT^{-2} and MLT^0

3. Two resistors of resistances $R_1 = (100 \pm 3) \Omega$ and $R_2 = (150 \pm 2) \Omega$ are connected in series

The equivalent resistance of the parallel combination is:

- a) $(200 \pm 4) \Omega$ b) $(250 \pm 5) \Omega$ c) $(200 \pm 5) \Omega$ d) $(250 \pm 4) \Omega$

4. If the error in the measurement of radius is 2 %, then the error in the determination of volume of the sphere will be

- a) 8% b) 6% c) 2% d) 4%

5. Which relation is wrong?

- a) $1 \text{ A}^0 = 10^{-10} \text{ m}$ b) $1 \text{ parsec} = 3.08 \times 10^{16} \text{ m}$
c) $1 \text{ shake} = 10^{-8} \text{ s}$ d) $1 \text{ newton} = 10^{-5} \text{ dyne}$

6. If Two vectors A and B are given in the component form as $A = 5i + 7j - 4k$ and $B = 6i + 3j + 2k$ then $A+B$ is

- a) $i - 4j + 6k$ b) $11i + 10j - 2k$ c) $5i + 10j - 6k$ d) $11i + 10j + 2k$

7. If the distance covered is zero, the displacement:

- a) must be zero b) may or may not be zero
c) can't be zero d) depends upon the particle

8. A stone thrown upwards with a speed ' u ' from the top of the tower reaches the ground with a velocity ' $3u$ '. The height of the tower is:

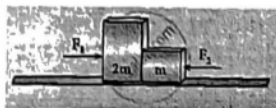
- a) $3u^2/g$ b) $4u^2/g$ c) $6u^2/g$ d) $9u^2/g$

9. If a particle executes uniform circular motion in the xy plane in anti clock wise direction, then the angular velocity is in

- a) $+y$ direction b) $+z$ direction c) $-z$ direction d) $-x$ direction

10. If the velocity is $v = 2i + t^2j - 9k$, then the magnitude of acceleration at $t = 0.5 \text{ s}$ is

- a) zero b) 1 ms^{-2} c) -1 ms^{-2} d) 2 ms^{-2}

11. Two blocks of masses m and $2m$ are placed on a smooth horizontal surface as shown. In the first case only a force F_1 is applied from the left. Later only a force F_2 is applied from the right. If the force acting at the interface of the two blocks in the two cases is same, then $F_1:F_2$ is

- a) 1 : 1 b) 1 : 2 c) 2 : 1 d) 1 : 3

12. A player catches a ball of 200g moving with a speed of 20m/s. If the time taken to complete the catch is 0.5 sec, the force exerted on the players hand is

- a) 8 N b) 4 N c) 2 N d) 0

13. consider a circular road of radius 20 meter banked at an angle of 15° with what speed the car has to move so that it will have a safe turn

- a) 9.8 m/s b) 7.1 m/s c) 17.1 m/s d) 2.1 m/s

14. Impulse also called

- a) rate of change of momentum b) rate of change of displacement
c) change of momentum d) change of displacement.

15. Conditions for safe turn

- a) $\mu > v^2/rg$ b) $\mu < v^2/rg$ c) $\mu < v/rg$ d) $\mu > v/rg$

II. Answer any six of the following questions. Qn.No.24 is compulsory.

6X2 =12

16. What is fundamental and derived quantities?

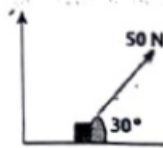
17. What is dimensional constant? Give examples

18. A physical quantity x is given by $x = a^2b^3/c\sqrt{d}$. If the percentage errors of measurement in a , b , c and d are 4%, 2%, 3% and 1% respectively, then calculate the percentage error in the calculation of x .
19. Write down the kinematic equations for angular motion.
20. How do you deduce that two vectors are perpendicular?
21. A baby is playing in a swing which is hanging with the help of two identical chains is at rest. Identify the forces acting on the baby. Apply Lami's theorem and find out the tension acting on the chain.
22. State Newton's law.
23. What is the meaning by 'pseudo force'?
24. Consider two trains A and B moving along parallel tracks with the same velocity in the same direction. Let the velocity of each train be 50 km h^{-1} due east. Calculate the relative velocities of the trains.

III. Answer any six of the following questions. Qn.No.33 is compulsory.

6x3=18

25. Derive the kinematic equations of motion for constant acceleration.
26. Write down the expression for angle made by resultant acceleration and radius vector in the non uniform circular motion.
27. What are the resultants of the vector product of two given vectors given by $A = 4i - 2j + k$ and $5i + 3j - 4k$?
28. Distinguish between static and kinetic friction.
29. Using free body diagram, show that it is easy to pull an object than to push it.
30. A force of 50N act on the object of mass 20 kg. shown in the figure. Calculate the acceleration of the object in x and y directions.



31. What do you mean by propagation of errors? Explain the propagation of errors in addition and multiplication.
32. What are the limitations of dimensional analysis?
33. If the value of universal gravitational constant in SI is $6.6 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$, then find its value in CGS System?

IV. Answer the following questions in detail.

5x5=25

34. Write a note on triangulation method and radar method to measure larger distances.

(OR)

Derive the equation of motion, range and maximum height reached by the particle thrown at an oblique angle θ with respect to the horizontal direction.

35. Discuss the properties of scalar and vector products.

(OR)

Prove the law of conservation of linear momentum. Use it to find the recoil velocity of a gun when a bullet is fired from it.

36. Explain the motion of blocks connected by a string in i) Vertical motion ii) Horizontal motion.

(OR)

Explain in detail the various types of errors.

37. Write the rules for determining

i) significant figures. ii) rounding off. (OR)

Derive the equations of motion for a particle (a) falling vertically (b) projected vertically.

38. State and Explain in detail the triangle law of addition.

(OR)

Briefly explain the origin of friction. Show that in an inclined plane, angle of friction is equal to angle of repose.

- All the best -