



# COMMON QUARTERLY EXAMINATION - 2023

Standard - XI

Reg.No.

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Time: 3.00 hrs.

PHYSICS

Marks: 70

*Thoothukudi District*

PART - I

Answer all questions:

15×1=15

- If the length and time period of an oscillating pendulum have errors of 1% and 3% respectively then the error in measurement of acceleration due to gravity is  
 a) 4%                      b) 5%                      c) 6%                       d) 7%
- If a particle executes uniform circular motion, choose the correct statement  
 a) The velocity and speed are constant.  
 b) The acceleration and speed are constant.  
 c) The velocity and acceleration are constant.  
 d) The speed and magnitude of acceleration are constant.
- Two Masses  $m_1$  and  $m_2$  are experiencing the same force where  $m_1 < m_2$ . The ratio of their acceleration  
 a) 1    b) less than 1  
 c) greater than 1                              d) all the three cases
- A body of mass 1kg is thrown upwards with a velocity  $20\text{ms}^{-1}$ . It momentarily comes to rest after attaining a height of 18m. How much energy is lost due to air friction?  $g = 10\text{ms}^{-1}$ .  
 a) 20J                      b) 30J                      c) 40J                      d) 10J
- The center of mass of a system of particles does not depend upon,  
 a) position of particles                      b) relative distance between particles  
 c) Masses of particles                       d) force acting on *particle*
- A rigid body rotates with an angular momentum  $L$ . If its kinetic energy is halved, the angular momentum becomes,  
 a)  $L$                       b)  $L/2$                       c)  $2L$                        d)  $L/\sqrt{2}$
- Which of the following pairs of physical quantities have same dimension?  
 a) force and power                       b) torque and *frequency energy*  
 c) torque and frequency                      d) Frequency and Angular velocity
- An athlete covers 3 rounds on a circular track of radius 50m. Calculate the total distance and displacement travelled by him. *Example 2.16*  
 a)  $300\pi\text{m}$  and Zero                      b)  $200\pi\text{m}$  and zero  
 c)  $100\pi\text{m}$  and zero                      d)  $400\pi\text{m}$  and Zero
- The centrifugal force appears to exist  
 a) Only in inertial frames                       b) only in rotating frames  
 c) in any accelerated frame                      d) both in inertial and non - inertial frames
- If the linear momentum of the object is increased by 0.1% then the kinetic energy is increased by  
 a) 0.1%                       b) 0.2%                      c) 0.4%                      d) 0.01%

11. A round object of mass  $M$  and radius  $R$  rolls down without slipping along an inclined plane. The frictional force,
- dissipates kinetic energy as heat
  - decreases the rotational motion
  - decreases the rotational and translational motion
  - Converts translational energy into rotational energy
12. An object moving in a straight line with displacement  $s = 3 - 4t + 5t^2$  then initial velocity of the body is *Example 2.25 (model)*
- 3 m/s
  - 3 m/s
  - 4 m/s
  - 4 m/s
13. If  $\vec{\omega} = 2\hat{k}$ ,  $\vec{r} = 2\hat{i} + 2\hat{j}$  then linear velocity
- $4\hat{i} + 4\hat{j}$
  - $4\hat{i} + 4\hat{k}$
  - $-4\hat{i} + 4\hat{j}$
  - $-4\hat{i} - 4\hat{j}$
14. Calculate the energy consumed in electrical units when a 60 W fan is used for 10 hours daily for one month (30 days). *Example: 4.18 (model)*
- 14 Units
  - 18 Units
  - 16 Units
  - 20 Units
15. When a car takes a sudden left turn in the curved road, passengers are pushed towards the right due to
- Inertia of direction
  - inertia of motion
  - Inertia of rest
  - absence of Inertia

## PART - B

Answer any six questions only. Q.No.24 Compulsory.

6×2=12

- Distinguish between fundamental units and derived units.
- What are the rules following to draw the free body diagram?
- State Lami's theorem.
- A car takes a turn with velocity  $50 \text{ ms}^{-1}$  on the circular road of radius of curvature 10m. Calculate the centrifugal force experienced by a person of mass 60 kg inside the car?
- Define the Power. Give its unit.
- Define couple. Give two examples.
- State conservation of angular momentum.
- Define Projectile. Give examples.
- A RADAR signal is beamed towards a planet and its echo is received 7 minutes later. If the distance between the planet and the Earth is  $6.3 \times 10^{10} \text{ m}$ . Calculate the speed of the signal?

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## PART - C

Answer any six questions. Q.No.33 compulsory.

6×3=18

- Give the limitations of dimensional analysis.
- Write down the kinematic equations for angular motion.



27. The velocity of three particles A, B, C are given below. Which particle travels at the greatest speed?

$$v_{\vec{A}} = 3\hat{i} - 5\hat{j} + 2\hat{k}$$

$$v_{\vec{B}} = \hat{i} + 2\hat{j} + 3\hat{k}$$

$$v_{\vec{C}} = 5\hat{i} + 3\hat{j} + 4\hat{k}$$

28. What are the types of friction? Give the methods to reduce the friction.
29. Discuss the any four properties of vector product.
30. Compare the conservation force and Non conservative forces.
31. State Newton's three laws and discuss their significance.
32. Obtain the relation between kinetic energy and momentum.
33. A particle of mass 2kg experiences two forces,  $\vec{F}_1 = 5\hat{i} + 8\hat{j} + 7\hat{k}$ ,  $\vec{F}_2 = 3\hat{i} - 4\hat{j} + 3\hat{k}$ . What is the acceleration of the particle?

### PART - D

Answer all the question.

5×5=25

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

(OR)

Explain the motion of blocks connected by a string in Vertical motion.

35. Obtain an expression for the relation between power and velocity.

(OR)

Explain why a cyclist bends while negotiating a curve road? Arrive at the expression for angle of bending for a given velocity.

36. 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.

(OR)

Explain perfect in elastic collision and obtain an expression for the velocity? Also deduce an expression for loss of kinetic energy in inelastic collision.

37. Derive an expression for kinetic energy in rotation.

(OR)

I. Explain the Error in the power of a quantity.

II. A physical quantity  $x$  is given by  $x = \frac{a^2 b^3}{c \sqrt{d}}$  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  $X$ .

38. Explain in detail the triangle law of addition.

(OR)

Convert 76 cm of mercury pressure into  $\text{Nm}^{-2}$  using the method of dimensions.

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