



# All 'Bout Physics

(Youtube channel)

## MODEL QUARTERLY EXAMINATION - SEP 2022

STD: XI

Max. Marks: 70

Subject: PHYSICS

Time: 3:00 Hrs

### PART-I

Answer all the questions. Choose the correct answer.

(15 × 1 = 15)

- If  $\pi = 3.14$ , then the value of  $\pi^2$  is  
(a). 9.8596 (b). 9.860 (c). 9.86 (d). 9.9
- Which of the following has the highest number of significant figures?  
(a). 0.007 m<sup>2</sup> (b). 2.64 × 10<sup>24</sup> kg (c). 0.0006032 m<sup>2</sup> (d). 6.3200 J
- The dimension of  $(\mu_0 \epsilon_0)^{1/2}$  is  
(a). length (b). time (c). velocity (d). force
- An object at an angle such that the horizontal range is 4 times of the maximum height. What is the angle of projection of the object?  
(a). 30° (b). 45° (c). 60° (d). 90°
- If a particle has negative velocity and negative acceleration, its speed  
(a). increases (b). decreases (c). remains the same (d). zeroes
- If a particle executes uniform circular motion in the xy plane in clockwise direction, then the angular velocity is in  
(a). +y direction (b). +z direction (c). -z direction (d). -x direction
- When a car takes a sudden left turn in the curved road, passengers are pushed towards the right due to  
(a). inertia of direction (b). inertia of motion  
(c). inertia of rest (d). absence of inertia
- A book is at rest on the table which exerts a normal force on the book. If this force is considered as reaction force, what is the action force according to Newton's third law?  
(a). Gravitational force exerted by Earth on the book  
(b). Gravitational force exerted by the book on Earth  
(c). Normal force exerted by the book on the table  
(d). None of the above
- Force acting on the particle moving with constant speed is  
(a). always zero (b). need not to be zero  
(c). always non zero (d). cannot be concluded
- When an object is at rest on the inclined rough surface,  
(a). static and kinetic frictions acting on the object is zero  
(b). static friction is zero but kinetic friction is not zero  
(c). static friction is not zero and kinetic friction is zero  
(d). static and kinetic frictions are not zero
- The ratio of the acceleration for a solid sphere (mass m and radius R) rolling down an incline of angle  $\theta$  without slipping and slipping down the incline without rolling is,  
(a) 5 : 7 (b) 2 : 3 (c) 2 : 5 (d) 7 : 5

12. The work done on an object does not depend upon the
  - (a). displacement      (b). angle between force and displacement
  - (c). force applied      (d). initial velocity of the object
13. The work done by the Sun's gravitational force on the Earth is
  - (a). always zero      (b). always positive
  - (c). can be positive or negative      (d). always negative
14. If the masses of the Earth and Sun suddenly double, the gravitational force between them will
  - (a). remain the same      (b). increase 2 times
  - (c). increase 4 times      (d). decrease 2 times
15. One horse power is \_\_\_\_\_
  - (a). 707 W      (b). 786 W      (c). 746 W      (d). 647 W

### PART-II

**Answer any six questions. Question number 24 is compulsory. (6 × 2 = 12)**

16. State Newton's second law.
17. What are the uses of dimensional analysis?
18. How do you deduce that two vectors are perpendicular?
19. Check the correctness of the equation  $\frac{1}{2}mv^2 = mgh$  using dimensional analysis method.
20. Under what condition will a car skid on a leveled circular road?
21. Give any two examples of torque in day-to-day life.
22. Define: Gravitational potential ( $V_r$ )
23. Why work and energy have the same dimension?
24. *If a mango of mass  $\frac{1}{2}$  kg falls from a tree from a height of 15 meters, what is the acceleration due to gravity when it begins to fall?*

### PART-III

**Answer any six questions. Question number 33 is compulsory. (6 × 3 = 18)**

25. Discuss the properties of scalar products.
26. Define gross error. How to minimize gross error.
27. Using free body diagram, show that it is easy to pull an object than to push it
28. What are the resultants of the vector product of two given vectors by  $\vec{A} = 4\hat{i} - 2\hat{j} + \hat{k}$  and  $\vec{B} = 5\hat{i} + 3\hat{j} - 4\hat{k}$ ?
29. A cyclist while negotiating a circular path with speed  $20 \text{ ms}^{-1}$  is found to bend an angle by  $30^\circ$  with vertical. What is the radius of the circular path? (given:  $10 \text{ ms}^{-2}$ )
30. Give the salient features of static and kinetic friction
31. Explain the characteristics of elastic and inelastic collision.
32. State Kepler's three laws.
33. *Calculate the energy consumed in electrical units when a 75 W fan is used for 8 hours daily for one month (30 days).*

**PART-IV**

**Answer all questions. Draw diagrams wherever necessary. (5 × 5 = 25)**

34. (a). Explain the use of Triangulation method and radar method in measuring larger distances. **[OR]**

(b). Obtain an expression for the time period  $T$  of a simple pendulum. The time period  $T$  depends on (i) mass ( $m$ ) of the bob, (ii) length of the pendulum and (iii) acceleration due to gravity  $g$  at the place where the pendulum is suspended. (Constant  $K = 2\pi$ ) i.e

35. (a). Derive the kinematic equations of motion for constant acceleration. **[OR]**

(b). Difference the salient features of centripetal and centrifugal forces.

36. (a). Prove that at points near the surface of the Earth, the gravitational potential energy of the object is  $U = mgh$ . **[OR]**

(b). Derive the expression for moment of inertia of rod about its centre and perpendicular to rod.

37. (a). State and explain work energy principle. Mention three examples for it. **[OR]**

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

38. (a). Discuss rolling on inclined plane and arrive at the expression for the acceleration **[OR]**

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

*All the very best*

*With regards,*

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