

**SIR CV RAMAN COACHING CENTRE**  
**XI – PHYSICS – Half yearly model question paper -2024**  
**TOTAL MARK : 70 M TIME : 3 HRS**  
**SECTION – A ( 15 X 1= 15 M)**

**CHOOSE THE CORRECT BEST ANSWER**

1. A hot cup of coffee is kept on the table. After some time it attains a thermal equilibrium with the surroundings. By considering the air molecules in the room as a thermodynamic system, which of the following is true

a)  $\Delta U > 0, Q = 0$     b)  $\Delta U > 0, W < 0$     c)  $\Delta U > 0, Q > 0$     d)  $\Delta U = 0, Q > 0$

2. The following four wires are made of the same material. Which of these will have the largest extension when the same tension is applied?

(a) length = 200 cm, diameter = 0.5 mm    (b) length= 200 cm, diameter = 1 mm

(c) length = 200 cm, diameter = 2 mm    (d) length= 200 cm, diameter = 3 m

3. The magnitude of the Sun's gravitational field as experienced by Earth is

(a) same over the year

(b) decreases in the month of January and increases in the month of July

(c) decreases in the month of July and increases in the month of January

(d) increases during day time and decreases during night time.

4. When a mass is rotating in a plane about a fixed point, its angular momentum is directed along,

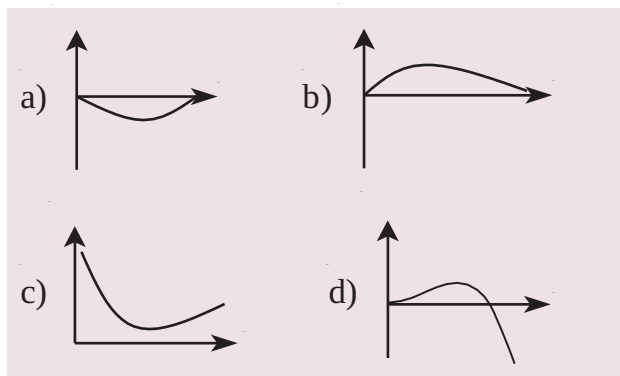
(a) a line perpendicular to the plane of rotation

(b) the line making an angle of  $45^\circ$  to the plane of rotation

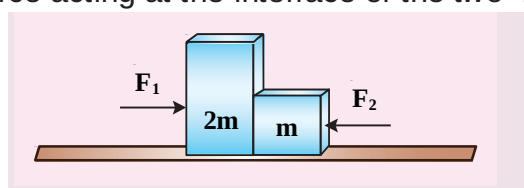
(c) the radius

(d) tangent to the path

5. A particle which is constrained to move along x-axis, is subjected to a force in the same direction which varies with the distance  $x$  of the particle from the origin as  $F(x) = -kx + ax^3$  Here,  $k$  and  $a$  are positive constants. For  $x \geq 0$ , the functional form of the potential energy  $U(x)$  of the particle is



6. 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



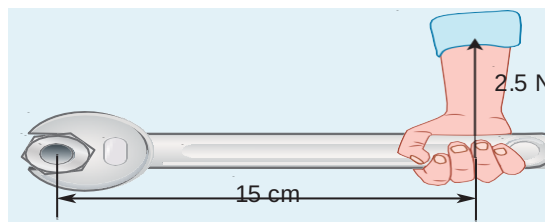
two cases is same, then  $F_1 : F_2$  is

- (a) 1:1      b) 1: 2                      c) 2: 1                      d) 1: 3
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.
8. The length of a body is measured as 3.51 m, if the accuracy is 0.01m, then the percentage error in the measurement is  
 a) 351%                      b) 1%      c) 0.28%                      d) 0.035%
9. State the number of significant figures in the following 400  
 a) 1                      b) 4                      c) 3                      d) 2
10. The resultant of two vectors A and B is perpendicular to vector A and its magnitude is equal to half of the magnitude of vector B. Then the angle between A and B is  
 a) 30°                      b) 45°                      c) 150°                      d) 120°
11. one calorie values is  
 a) 4186 J                      b) 4.186 J                      c) 418.6 J                      d) 41860 J
12. As the radius of gyration is  
 a) distance      b) displacement      c) moment of inertia      d) torque
13. In the following, what are the quantities which that are conserved?  
 a) Linear momentum of planet      b) Angular momentum of planet  
 c) Total energy of planet                      d) Potential energy of a planet
14. The kinetic energy per unit mass is  
 a)  $\frac{1}{2} mv^2$                       b)  $\frac{1}{2} v^2$                       c)  $mu-mv/2$                       d)  $mu^2$
15. The SI unit for molar specific heat capacity is  
 a) J mol/k/      b) J /mol/k                      c) J kg/k                      d) J /kg / m

### SECTION – B ( 6 X 2 = 12 M)

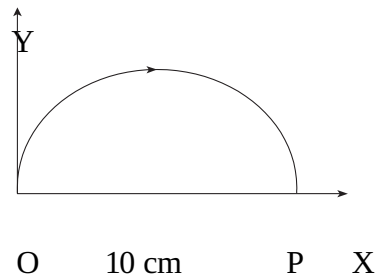
#### ANSWER ANY SIX QUESTIONS COMPULSORY Q.NO 24

16. What are the limitations of dimensional analysis?
17. Define a radian
18. State the empirical laws of static and kinetic friction.
19. Write the various types of potential energy. Explain the formulae.
20. If the force applied is perpendicular to the handle of the spanner as shown in the diagram, find the (i) torque exerted by the force about the centre of the nut, (ii) direction of torque and (iii) type of rotation caused by the torque about the nut.



21. How will you prove that Earth itself is spinning?
22. Distinguish between streamlined flow and turbulent flow
23. What is Wien's law?
24. Consider an object travelling in a semi circular path from point O to point P in 5

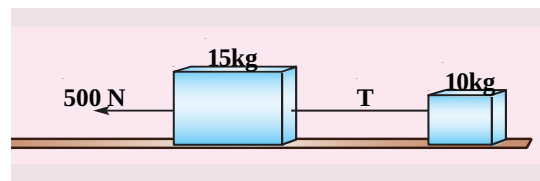
second, as shown in the Figure given below. Calculate the average velocity and average speed



### SECTION – B ( 6 X 3 = 18 M)

#### ANSWER ANY SIX QUESTION COMPULSORY Q.NO 33

25. Explain the use of screw gauge and vernier caliper in measuring smaller distances.
26. Discuss the properties of scalar and vector products
27. Two bodies of masses 15 kg and 10 kg are connected with light string kept on a smooth surface. A horizontal force  $F=500\text{ N}$  is applied to a 15 kg as shown in the figure. Calculate the tension acting in the string



28. Arrive at an expression for power and velocity. Give some examples for the same.
29. What is the relation between torque and angular momentum?
30. Explain in detail the geostationary and polar satellites.
31. State the principle and usage of Venturimeter.
32. Draw the PV diagram for a. Isothermal process b. Adiabatic process c. Isobaric process d. Isochoric process
33. A Carnot engine whose efficiency is 45% takes heat from a source maintained at a temperature of  $327^\circ\text{C}$ . To have an engine of efficiency 60% what must be the intake temperature for the same exhaust (sink) temperature?

### SECTION – D ( 5 X 5 = 25 M)

#### Answer all the questions

34. a) (i) Explain in detail the thermal expansion (ii) Eiffel tower is made up of iron and its height is roughly 300 m. During winter season (January) in France the temperature is  $2^\circ\text{C}$  and in hot summer its average temperature  $25^\circ\text{C}$ . Calculate the change in height of Eiffel tower between summer and winter. The linear thermal expansion coefficient for iron  $\alpha = 10 \times 10^{-6}$  per  $^\circ\text{C}$



(or)

b) 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?

35 a) Derive an expression for the elastic energy stored per unit volume of a wire.

(or)

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

36 a) (i) Derive an expression for escape speed. (ii) If the ratio of the orbital distance of two planets  $d_1/d_2 = 2$ , what is the ratio of gravitational field experienced by these two planets?

(or)

b) 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.

37.a) (i) Explain why a cyclist bends while negotiating a curve road? Arrive at the expression for angle of bending for a given velocity. (ii) A cyclist while negotiating a circular path with speed  $20 \text{ m s}^{-1}$  is found to bend an angle by  $30^\circ$  with vertical. What is the radius of the circular path? (given,  $g = 10 \text{ m s}^{-2}$ )

(or)

b) Arrive at an expression for elastic collision in one dimension and discuss various cases

38 a) State and prove parallel axis theorem

(or)

b) (i) An iron ball and a feather are both falling from a height of 10 m.

a) What are the time taken by the iron ball and feather to reach the ground?

b) What are the velocities of iron ball and feather when they reach the ground?

(Ignore air resistance and take  $g = 10 \text{ m s}^{-2}$ ) (ii) A water fountain on the ground sprinkles water all around it. If the speed of the water coming out of the fountain is  $v$ . Calculate the total area around the fountain that gets wet



**PREPARED BY**

**Dr.G.THIRUMOORTHI ,M.Sc.B.Ed.Ph.D**

**GOVT ARTS COLLEGE (A) SALEM- 7**

**PHYSICS**

**thiruphysics 1994@ gmail.com**

**8610560810**











