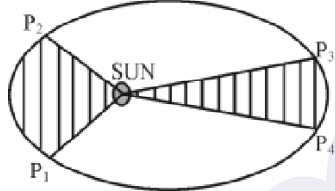


Answer all 6 questions. Each carries 3 scores

(6 x 3=18)

11. (a) Give an example for a body possessing zero velocity which is accelerating. [3]
 (b) Show that area under velocity-time graph gives displacement. [3]
12. (a) Consider a planet moving in an elliptical orbit around the sun as shown in fig. If t_1 and t_2 be the time taken by the planet to go from P_1 to P_2 and from P_3 to P_4 respectively. The two shaded parts have equal area, then [3]
 (i) $t_1 < t_2$ (ii) $t_1 = t_2$
 (iii) $t_1 > t_2$ (iv) $t_2 = -t_1$
- 
- (b) State the law which explains the above case.
13. State theorem of perpendicular axes. Using this theorem derive moment of inertia of the give disc about one of its diameter. The moment if inertia of the disc about Z axis is $\frac{MR^2}{2}$ [3]
14. State and explain the law of conservation of angular momentum. [3]
15. What is thermal conductivity ? Give its unit and dimension. [3]
16. (a) Derive an expression for time period of oscillation of a Simple Pendulum. [2]
 (b) Can a pendulum clock show correct time inside a spaceship? Why? [1]

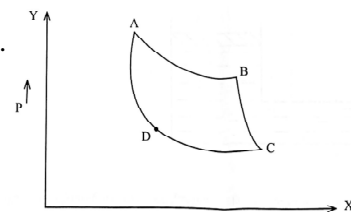
Answer all 2 questions. Each carries 4 scores

(3 x 4=12)

17. Match the following.

A		B	
a.	Torque ($\vec{\tau}$)	i.	Perpendicular to \vec{r} and \vec{p}
b.	Angular Momentum (\vec{L})	ii.	$\sum \vec{F} = 0$
c.	Rotational equilibrium	iii.	$\vec{\omega} \times \vec{r}$
d.	Linear velocity (\vec{v})	iv.	$\vec{r} \times \vec{F}$
		v.	$\sum \vec{\tau} = 0$

18. a) How will you calculate work? Explain various kinds of work. [2]
 b) State and explain work-energy theorem. [2]
19. a) State and explain first law of thermodynamics. [2]
 b) Identify the graph and name the process AB, BC, CD and DA. [2]



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Answer all 2 questions. Each carries 5 scores

(3 x 5=15)

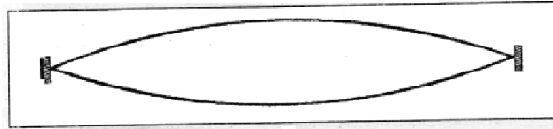
20. (a) State the law of equipartition of energy. [5]

(b) A box contains an equal number of molecules of hydrogen and oxygen.

If there is a fine hole on top of the box, which gas will leak rapidly? Why?

(c) When gas is heated, its temperature increases. Explain it on the basis of kinetic theory of gases.

21. The fundamental mode of vibration of a stretched string is shown below. [5]



a. Draw the second and third harmonics.

b. Prove that frequencies produced in the string are in the ratio of 1 : 2 : 3.

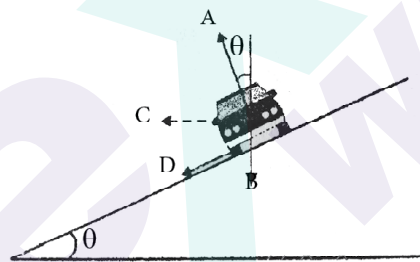
c. Let the fundamental frequency is 45 Hz and the length of the wire is 87.5 cm. If linear density of the wire is 4.0×10^{-2} kg/m. Find the tension in the string.

22. Circular motion of a car on a banked road is shown in figure. [5]

a. Write the name of forces A, B, C, D in the figure.

b. Write the equation which equate forces on the car along horizontal and vertical direction.

c. State the law of static friction.



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