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HALF PORTION TEST - PHYSICS

Class: XI **Max.marks: 70**
Subject: Physics (vol- II) **Time: 2.30 hrs**

PART – I

Choose the correct answer. **15 x 1 = 15**

1. A planet moving along an elliptical orbit is closest to the sun at a distance r_1 and farthest away at a distance of r_2. If v_1 and v_2 are linear speeds at these points respectively. Then the ratio $\frac{V_1}{V_2}$ is
   a) $\frac{r_2}{r_1}$ b) $\left(\frac{r_2}{r_1}\right)^2$ c) $\frac{r_1}{r_2}$ d) $\left(\frac{r_1}{r_2}\right)^2$
2. A man waves his arms, while walking. This is due
   a) To keep constant velocity b) to ease the tension
   c) to increase the velocity d) to balance the effect of gravity
3. The concept of epicycle is introduced by
   a) Copernicus b) Ptolemy c) Tycho Brahe d) Kepler
4. For a given material, the rigidity modulus is $\left(\frac{1}{3}\right)^{rd}$ of young's modulus. Its Poisson's ratio is
   a) 0 b) 0.25 c) 0.3 d) 0.5
5. Two wires A and B are of same material. Their lengths are in the ratio 1:2 and diameters are in the ratio 2:1. When stretched by forces F_A and F_B respectively, they get equal increase in their lengths. Then the ratio $\frac{F_A}{F_B}$ should be
   a) 1:1 b) 1:2 c) 8:1 d)2:1
6. The dimension formula of coefficient of viscosity is
   a) $ML^{-1}T^{-2}$ b) $M^{-1}LT^{-2}$ c) $M^2L^{-1}T^{-1}$ d) $ML^{-1}T^{-1}$
7. The coefficient of a heat engine working between the freezing point and boiling point of water is
   a) 6.25% b) 20% c) 26.8% d) 12.5%
8. The temperature of two bodies A and B are respectively 727°C and 327°C, the ratio of rates of heat radiated (H_A:H_B) by them is
   a) 625:81 b) 25:9 c) 5:3 d) 727:372
9. For all the processes that occur in nature(irreversible process), the entropy always
   a) Decreases b) does not change c) zero d) increases
10. The average translational kinetic energy of gas molecules depends on
    a) Number of moles and T b) only on T c) P and T d) P only
11. The ratio of rotational kinetic energy to the total kinetic energy of a diatomic molecule is
    a) $\frac{3}{5}$ b) $\frac{2}{5}$ c) $\frac{2}{3}$ d) $\frac{5}{2}$
12. When a damped harmonic oscillator completes 100 oscillations, its amplitude is reduced to $\frac{1}{3}$ of its initial value. What will be its amplitude when it's completes 200 oscillations?
    a) $\frac{1}{5}$ b) $\frac{2}{3}$ c) $\frac{1}{6}$ d) $\frac{1}{9}$
13. Which of the following relationships between the acceleration a and the displacement x of the particle involve simple harmonic motion?
    a) $a = -200\,x^2$ b) $a = -10\,x$ c) $a = 100\,x^3$ d) $a = 0.7\,x$
14. The displacement y of a wave travelling in the x direction is given by $y = (2 \times 10^{-3})$ sin $(300t - 2x + \frac{\pi}{4})$, where x and y are measured in metres and t in seconds. The speed of the wave is
    a) 150 ms^{-1} b) 300 ms^{-1} c) 450 ms^{-1} d) 600 ms^{-1}
15. For every 1°C rise in temperature, the speed of sound in air increases as
    a) 0.94 ms^{-1} b) 2.13 ms^{-1} c) 0.61 ms^{-1} d) 0.32 ms^{-1}

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PART II

Answer any six of the following questions. Q. no. 24 is compulsory. **6 x 2 = 12**

16. Will the angular momentum of a planet be conserved? Justify your answer.
17. Define surface tension of a liquid. Mention its SI unit and dimension.
18. A solid sphere has a radius of 1.5 cm and a mass of 0.038 kg. Calculate the specific gravity or relative density of the sphere.
19. What are intensive and extensive variables? Give examples.
20. An ideal refrigerator keeps its content at 0°C while the room temperature is 27°C. Calculate its coefficient of performance.
21. Explain the beat phenomenon.
22. A passing aeroplane sometimes causes the rattling of the windows of house. Give reason.
23. Write the factors affecting Brownian motion.
24. For aluminium the bulk modulus and modulus of rigidity are 7.5×10^{10} Nm^{-2} and 2.1×10^{10} Nm^{-2}. Find the velocity of longitudinal waves in the medium. (Given: Density of aluminium is 2.7×10^{3} kgm^{-3}.)

PART III

Answer any six of the following questions. Q.no. 29 is compulsory. **6 x 3 = 18**

25. What is the gravitational potential energy of the Earth and Sun? The Earth to Sun distance is around 150 million km. The mass of the Earth is 5.9×10^{24} kg and mass of the Sun is 1.9×10^{30} kg.
26. Explain elasticity using intermolecular forces.
27. Distinguish between streamline flow and turbulent flow.
28. What is PV diagram?
29. The temperature of a uniform rod of length L having a coefficient of linear expansion α_L is changed by ΔT. Calculate the new moment of inertia of the uniform rod about axis passing through its centre and perpendicular to an axis of the rod.
30. Why moon has no atmosphere?
31. Explain resonance. Give an example.
32. Explain red shift and blue shift in Doppler effect.
33. The speed of a wave in a certain medium is 900 ms^{-1}. If 3000 waves passes over a certain point of the medium in 2 minutes, then compute its wavelength?

PART IV

Answer the following questions. **5 x 5 = 25**

34. Discuss the important features of law of gravitation.

OR

Derive the time period of satellite orbiting the earth.

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

OR

What is capillarity? Obtain an expression for the surface tension of a liquid by capillary rise method.

36. Describe the anomalous expansion of water. How is it helpful in our lives?

OR

Derive the expression for Carnot engine efficiency.

37. Derive the ratio of two specific heat capacities of monoatomic, diatomic and triatomic molecules.

OR

Discuss in detail the energy in simple harmonic motion.

38. Show that the velocity of a travelling wave produced in a string is $v = \sqrt{\frac{T}{\mu}}$

OR

Write short notes on intensity and loudness.

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ANSWER FOR ONE MARKS

1. a
2. d
3. b
4. d
5. c
6. d
7. c
8. a
9. d
10. a
11. b
12. d
13. b
14. a
15. c

HALF PORTION TEST

Class : XI **Max. Marks: 70**
Subject: PHYSICS(VOL-II) **Time: 3.00 Hours**

I. Choose the best answer. **(15x1=15)**

1. 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
2. If the distance between the Earth and Sun were to be doubled from its present value, the number of days in a year would be:
   (a) 64.5 (b) 1032 (c) 182.5 (d) 730
3. If a wire is stretched to double of its original length, then the strain in the wire is:
   (a) 1 (b) 2 (c) 3 (d) 4
4. A man is sitting in a boat, which is floating on a pond. If the man drinks some water from the pond, the level of water in the pond :
   (a) Increases (b) decreases (c) remains unchanged (d) may increase or decrease depending on the weight of the man
5. In anomalous expansion of water, at what temperature, the density of water is maximum?
   (a) $< 4^oC$ (b) 4^oC (c) $> 4^oC$ (d) 10^oC
6. Which of the following parameters does not characterise the thermodynamic state of matter?
   (a) Pressure (b) volume (c) work (d) temperature
7. If the internal energy of an ideal gas U and volume V are doubled then the pressure:
   (a) Doubles (b) remains same (c) halves (d) quadruples
8. The mean translational kinetic energy of a perfect gas molecule at the temperature T k is:
   (a) k_BT (b) $3/2\ k_BT$ (c) $½\ k_BT$ (d) $2\ k_BT$
9. A simple pendulum has a time period T_1. When its point of suspension is moved vertically upwards according as $y=kt^2$, where y is vertical distance covered and k=1 ms-2, its time period becomes T_2. Then, T_1^2/T_2^2 is ($g=10\ ms^{-2}$):
   (a) 5/6 (b) 11/10 (c) 6/5 (d) 5/4
10. The length of second pendulum is 1m on earth. If mass and diameter of the planet is doubled than that of earth, then length becomes:
    (a) 2 m (b) 0.5 m (c) 4 m (d) 1 m
11. A pendulum is hung in a very high building oscillates to and fro motion freely like a simple harmonic oscillator. If the acceleration of the bob is 16 ms-2 at a distance of 4 m from the mean position, then the time period is:
    (a) 2 s (b) 1 s (c) 2 πs (d) πs
12. The composition of two simple harmonic motions of equal periods at right angle to each other and with a phase difference of π results in the displacement of the particles along:
    (a) A circle (b) an ellipse (c) the figure of eight (d) a straight line
13. A sound wave whose frequency is 5000 Hz travels in air and then hits the water surface. The ratio of its wavelengths in water and air is:
    (a) 4.30 (b) 0.23 (c) 5.30 (d) 1.23
14. A 5.5 meter long string has a mass of 0.035 kg. If the tension in the string in 77N, the speed of wave on the string is:
    (a) $165\ ms^{-1}$ (b) $102\ ms^{-1}$ (c) $110\ ms^{-1}$ (d) $77\ ms^{-1}$
15. Two waves travel in the same direction in a medium. The amplitude of each wave is A and the phase difference between the two waves is 120o. The resultant amplitude will be:
    (a) 2 A (b) 3 A (c) √2 A (d) A

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II. Answer any 6 of the following questions. Q.No. 23 is compulsory. (6x2=12)

16. Define gravitational field. Give its unit.
17. A spring balance shows wrong readings after using for a long time. Why?
18. An ideal refrigerator keeps its content at 0^oC while the room temperature is 27^oC. Calculate its coefficient of performance.
19. What is the microscopic origin of temperature?
20. What is an epoch?
21. What is meant by interference of waves?
22. What is a cyclic process?
23. If the angular momentum of a planet is given by $L = 5t^2i-6tj+3k$. What is the torque experienced by the planet? Will the torque be in the same direction as that of the angular momentum?
24. State Bernoulli's theorem.

III. Answer any 6 of the following questions. Q.No.33 is compulsory. (6x3=18)

25. Write down any six postulates of kinetic theory of gases.
26. Derive an expression for the terminal velocity of a sphere falling through a viscous liquid.
27. What are the different types of thermodynamic systems?
28. Define specific heat capacity and molar specific heat capacity. Give its units.
29. List the factors affecting mean free path.
30. State the laws of simple pendulum.
31. Explain red shift and blue shift in Doppler Effect.
32. The reading of pressure meter attached with a closed pipe is $5x10^5$ Nm^{-2}. On opening the value of the pipe, the reading of the pressure meter is 4.5×10^5 Nm^{-2}. Calculate the speed of the water flowing in the pipe.
33. Two waves of wavelength 99cm and 100cm both travelling with the velocity of 396 ms^{-1} are made to interfere. Calculate the number of beats produced by them per sec.

IV. Answer all the questions. (5x5=25)

34. Explain in detail the idea of weightlessness using lift as an example.

(OR)

Derive the ratio of two specific heat capacities of monoatomic, diatomic and triatomic molecules.

35. Derive Mayer's relation for an ideal gas.

(OR)

Explain the variation of g with depth from the Earth's surface.

36. What is capillarity? Obtain an expression for the surface tension of a liquid by capillary rise method.

(OR)

Describe the vertical oscillations of a spring.

37. How will you determine the velocity of sound using resonance air column apparatus.

(OR)

Derive the expression for Carnot engine efficiency.

38. Write a short note on the oscillations of liquid column in U-tube.

(OR)

Write down the differences between the travelling wave and stationary waves.

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