BRIKS ACADEMY   Padmanabhanagar

I PU MODEL QUESTION PAPER 2 - 2023

FOR PU PLUS BATCH

Time: 3 hours.   **Subject: PHYSICS**   **Max. Marks: 70**

PART – A

I. Pick the correct option among the four given options for <u>ALL</u> of the following questions: **15 × 1 = 15**

1. The number of significant figure in 0.006400 is

   A) 4   B) 3   C) 2   D) 1

2. Slope of position time graph gives

   A) position   B) velocity   C) displacement   D) acceleration

3. What is the magnitude of a null vector

   A) 1   B) 2   C) 0   D) 3

4. 1 newton =

   A) $1kg \times 1ms^{-2}$ B) 1kgm   C) $1kg \times 1ms^{-1}$ D) ms^{-2}

5. Newton's second law of motion is

   A) $F \alpha \frac{dv}{dt}$ B) $F \alpha \frac{da}{dt}$ C) $F \alpha \frac{dx}{dt}$ D) $F \alpha \frac{dp}{dt}$

6. Time rate at which work is done is called

   A) Energy   B) force   C) momentum   D) power

7. An acrobat dancer spins faster when she draws her hands close to the body. This is due to

   A) Conservation of angular momentum   B) conservation of linear momentum

   C) Conservation of temperature   D) conservation of energy

8. The value of universal gravitational constant G is (in Nm^2kg^{-2})

   A) 6.67×10^{-10} B) 6.67×10^{-11} C) 6.67×10^{-12} D) 6.67×10^{-13}

9. The maximum deforming force upto which a body can retain its property of elasticity

   A) Bulk modulus   B) elastic limit   C) Young's modulus   D) shear modulus

10. For liquids, as temperature increases, coefficient of viscosity

    A) decreases   B) increases   C) remains the same   D) first increases and then decreases.

11. If α_l is coefficient of linear expansion and α_A is coefficient of area expansion of a metal then

    A) $\alpha_l = \alpha_A$ B) $2\alpha_l = \alpha_A$ C) $3\alpha_l = \alpha_A$ D) $\alpha_l = 2\alpha_A$

12. During isothermal process

    A) No heat energy flows out of the system

    B) No heat energy flows into the system

    C) There is no change in the internal energy of the system

    D) No work is done by the system

13. Pressure of an ideal gas is increased by keeping temperature constant. The kinetic energy of molecule

   A) Decreases   B) increases   C) remains same   D) increases or decreases depending on the nature of the gas

14. Among the following which is not a characteristic of Simple Harmonic motion?

   A) It is a periodic motion

   B) It is to and fro motion of a particle from its mean position

   C) Acceleration of the particle is directly proportional to its displacement

   D) Acceleration is directly proportional to its square root of the displacement

15. According to Newton, as the sound wave travels in a gas change in pressure and volume are

   A) Isothermal   B) Adiabatic   C) isobaric   D) isochoric

II. Fill in the blanks by choosing appropriate answer given in the brackets for <u>ALL</u> the following questions: 5 × 1 = 5

 (*atoms, both energy and momentum, uniform circular motion, radius, Bernoulli's theorem*)

16. A particle moving with constant speed is_____.

17. Escape speed depends on_____of the particle.

18. The principle behind uplift of an aero plane is _____.

19. Kinetic theory explains the behavior of gases on the assumption that gas consists of rapidly moving _____.

20. Sound wave transfer _____.

PART – B

III. Answer any <u>FIVE</u> of the following questions: 5 × 2 = 10

21. Write the uses of dimensional analysis.

22. Write the comparisons of mass and weight.

23. What is elastic collision? give an example.

24. Mention any two factors on which moment of inertia of a rigid body depends.

25. What is orbital velocity of a satellite? Write an expression for it.

26. Write the relation between Celsius scale and kelvin scale of temperature.

27. State and explain first law of thermodynamics.

28. Write any two characteristics of Simple Harmonic Motion.

29. What is frictional force? What is the angle between the frictional force and the displacement of a body in the state of motion?

PART – C

IV. Answer any <u>FIVE</u> of the following questions: 5 × 3 = 15

30. State and explain parallelogram law of vector addition.

31. Derive $\vec{F} = m\vec{a}$

32. What is conservative force? Mention two examples.

33. The moment of inertia of a grind stone about its axis of rotation is 25kgm^2 starting from rest it acquires a speed of 120rpm in 10sec. Find the torque acting on it.

34. Mention three types of moduli of elasticity.

35. State and explain Bernoulli's theorem.

36. Explain three modes of heat transfer.

37. State any 3 postulates of kinetic theory of ideal gases.

38. Give any three difference between longitudinal wave and transverse wave.

PART – D

V. Answer any <u>THREE</u> of the following questions: 3 × 5 = 15

39. What is v-t graph? Derive $v^2 = v_0^2 + 2ax$ using v-t graph?

40. Show that path traced by the projectile is a parabola.

41. State work-energy theorem. Prove it in case of a constant force.

42. a) Define torque.

    b) Show that the torque is equal to the rate of change of angular momentum of a particle.

43. a) Define isothermal process.

    b) Derive an equation for work done in isothermal process by using first law of thermodynamics.

44. State and explain principle of superposition of waves.

VI. Answer any <u>TWO</u> of the following questions: 2 × 5 = 10

45. The ceiling of a long hall is 25m high. What is the maximum horizontal distance that a ball thrown with a speed of 40ms^{-1} can go without hitting the ceiling of the hall? (g = 9.8ms^{-2})

46. A constant retarding force of 50N is applied to a body of mass 20kg moving initially with a speed of 15ms^{-1}. How long does the body takes to stop?

47. The acceleration due to gravity on moon is 1.6ms^{-2} and its radius is 0.27 times the radius of the earth. Calculate the ratio of mass of the earth to the mass of the moon. The acceleration due to gravity on the earth's surface is 9.8ms^{-2}.

48. A copper block of mass 2.5kg is heated in a furnace to a temperature of 500°C and then placed on a large ice block. What is the maximum amount of ice that can melt? (specific heat of copper = 390Jkg^{-1}k^{-1}, heat of fusion of water = 335kJkg^{-1}).

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