

Model Question Paper 3
Nature of the Physical World and Measurement 3

11th Standard

Physics

Reg.No. :

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Answer all the Question Paper

Time : 01:00:00 Hrs

Total Marks : 50

5 x 1 = 5

Part A

- 1) The length of a body is measured as 3.51 m. If the accuracy is 0.01 m, then the percentage error in the measurement is _____.
(a) 351% (b) 1% (c) 0.28% (d) 0.035%
- 2) The dimensional formula for gravitational constant is _____.
(a) $M^1L^3T^{-2}$ (b) $M^{-1}L^3T^{-2}$ (c) $M^{-1}L^{-3}T^{-2}$ (d) $M^1L^{-3}T^2$
- 3) The velocity of a body is expressed as $v = (x/t) + yt$. The dimensional formula for x is _____.
(a) ML^0T^0 (b) M^0LT^0 (c) M^0L^0T (d) MLT^0
- 4) The dimensional formula for Planck's constant is _____.
(a) MLT (b) ML^3T^2 (c) ML^0T^4 (d) ML^2T^{-1}
- 5) _____ have the same dimensional formula.
(a) Force and momentum (b) Stress and strain (c) Density and linear density (d) Work and potential energy

Part B

5 x 2 = 10

- 6) What is force?
- 7) What is Gravitational force?
- 8) What is electromagnetic force?
- 9) What is Kelvin?
- 10) What is candela?

Part C

5 x 3 = 15

- 11) The length, breadth and thickness of a rectangular plate are 4.234 m, 1.005 m and 2.01 cm respectively. Find the total area and volume of the plate to correct significant figure.
- 12) The length of a rod is measured as 25.0 cm using a scale having an accuracy of 0.1 cm. Determine the percentage error in length.
- 13) The force F acting on a body moving in a circular path depends on mass m of the body, velocity v and radius r of the circular path. Obtain an expression for the force by dimensional analysis (Take the value if k=1).
- 14) A wave of length 0.60 cm is produced in air and travels with a velocity of 340 ms^{-1} . Will it be audible to human ear?
Give data.
Wavelength of the wave produced $\lambda = 0.60 \text{ cm} = 0.60 \times 10^{-2} \text{ m}$.
Velocity of the sound wave $v = 340 \text{ ms}^{-1}$.
- 15) Check the correction of the following equation by dimensional analysis:
(i) $F = \frac{mv^2}{r^2}$ where F is force, m is mass, v is velocity and r is radius.
(ii) $n = \frac{1}{2\pi} \sqrt{\frac{g}{l}}$ where n is frequency, g is acceleration due to gravity and l is length.
(iii) $\frac{1}{2}mv^2 = mgh^2$ where m is mass, v is velocity, g is acceleration due to gravity and h is height.

Part D

4 x 5 = 20

- 16) A steel wire of length 1.2 m with a tension of 9.8 N is found to resonate in five segments at a frequency of 240 Hz. Find the mass of the string.
Give data.
Length of the steel wire (l) - 1.2 m
Tension in the wire (T) = 9.8 N
Frequency of vibration (n_5) = 240 Hz
- 17) How can a stretched string of length 114 cm be divided into three segments so that the fundamental frequency of the three segments be in the ratio of 1 : 3 : 4?
Give data.
Length of the stretched string = 114 cm = $114 \times 10^{-2} \text{ m}$
Number of segment into which the stretched string is divided = 3 segments
Ratio of the fundamental frequency of three segments = 1 : 3 : 4
- 18) A train standing at a signal of a railway station blows a whistle of frequency 256 Hz in air. Calculate the frequency of the sound as heard by a person standing on the platform when the train (i) approaches the platform with a speed of 40 ms^{-1} , (ii) recedes from the platform with the same speed.
Give data.
Frequency of the whistle sound of a stationary train (n) = 256 Hz
Velocity with which the train = Velocity with which the train recedes approaches the platform from the platform
 $v_s = 40 \text{ ms}^{-1}$
Velocity of sound in air (v) = 340 ms^{-1}

19) Two tuning forks A and B when sounded together give 4 beats per second. The fork A is reTwo tuning forks A and B when sounded together give 4 beats per second. The fork A is resonance with a closed column of air of length 15 cm, while the second is in resonance with an open column of length 30.5 cm. Calculate their frequencies.

Give data.

Number of beats heard per second = 4 beats

Resonating length of fork A (l_1) = 15 cm = 15×10^{-2} m

Resonating length of fork A (l_2) = 30.5 cm = 30.5×10^{-2} m

