

Code: A-P337123-A

I Semester Exam – 2022-23

4 x 690

Std.: XII

Sub: PHYSICS

Marks: 70

Date: 21/11/2022

Roll No.: _____

Time: 3 hrs.

General Instructions :-

- The question paper is divided into four sections.
- Section A :** Q. No. 1 contains **10 multiple choice** type questions carrying **one mark** each.
Q.No.2 contains **8 very short answer** type questions carrying **one mark** each.
- Section B :** Q. No. 3 to Q. No. 14 are **12 short answer – I** type questions carrying **two marks** each. Attempt any **eight** questions.
- Section C :** Q.No.15 to Q.No. 26 are **12 short answer – II** type questions carrying **three marks** each. Attempt any **eight** questions.
- Section D :** Q.No. 27 to Q.No. 31 are **5 long answer** type questions carrying **four marks** each. Attempt any **three** questions.
- Start each section on a new page.
- Figures to right indicate full marks.
- For each MCQ, correct answer must be written along with its alphabet:
e.g. (a) / (b) / (c) / (d)
- Evaluation of each MCQ would be done for the first attempt only.
- Use of Logarithm Tables is allowed. Use of a calculator is **not** allowed.

Physical constants :

(1) $\pi = 3.142$ (2) $g = 10 \text{ m/s}^2$ (3) $h = 6.63 \times 10^{-34} \text{ J.S}$ (4) $c = 3 \times 10^8 \text{ m/s}$ (5) $e = 1.6 \times 10^{-19} \text{ C}$
 (6) $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{N.m}^2$ (7) $\mu_0 = 4\pi \times 10^{-7} \text{ T.m/A}$ (8) $\sigma = 5.7 \times 10^{-8} \text{ W/m}^2.\text{K}^4$

Section - A**Q.1****Select and write the correct answers to the following questions.****10**

- For a curved banked road, safe speed is given as _____
 a) $V_s = \sqrt{N^2 / rg}$ b) $V_s = \sqrt{r^2 g \tan \theta}$
 c) $V_s = \sqrt{rg \tan \theta}$ d) $V_s = \sqrt{g \tan \theta}$
- Kirchhoff's first law i.e. $\sum I = 0$ at a Junction deals with the conservation of _____
 a) charge b) energy
 c) momentum d) mass
- Total energy of a particle in Simple harmonic motion is inversely proportional to _____
 a) Square of time b) Square of amplitude
 c) mass of bob d) time period
- The momentum associated with photon is given by _____
 a) $h\nu$ b) $\frac{h\nu}{c}$
 c) hE d) $h\lambda$
- Two Capillary tubes of radii 0.3 cm and 0.6 cm are dipped in the same liquid. The ratio of heights through which the liquid will rise in the tubes is _____
 a) 1 : 2 b) 2 : 1
 c) 1 : 4 d) 4 : 1

P.T.O

- Q.10 A torque of 400 Nm acting on a body of mass 40 kg produces an angular acceleration of 20 rad/s^2 . Calculate the moment of inertia.
- Q.11 Find momentum of the electron having de broglie wavelength of $0.5 \text{ \AA}$.
- Q.12 A wire length 1 m and mass 2g is in unison with a tuning fork of frequency 300 Hz. Calculate the tension produced in the wire.
- Q.13 Explain Biot Savart Law.
- Q.14 On what factors does the frequency of a Conical Pendulum depend? is it independent of some factors?

Section - C

Attempt any eight of the following questions.

24

- Q.15 Using differential equation of linear S.H.M. obtain the expression for velocity in SHM.
- Q.16 State and explain laws of a Vibrating string.
- Q.17 Obtain an expression relating the torque with angular acceleration for a rigid body.
- Q.18 Derive an expression for magnitude of magnetic dipole moment of a revolving electron.
- Q.19 A drop of mercury of radius 0.2 cm is broken into 8 droplets of the same size find the work done if the surface tension of mercury is $0.4355 \frac{\text{N}}{\text{m}}$.
- Q.20 A long solenoid of length 1 m has 1000 turns of wire closely wound on it. If the current in winding is 3 A. Calculate magnetic field at the Centre of Solenoid.
- Q.21 A solid sphere of mass 1 kg rolls on a table with linear speed 2 m/s. Find its total kinetic energy.
- Q.22 Find the fundamental, first overtone and second overtone frequencies of a pipe open at both the ends, of length 25 cm if the speed of sound in air is 330 m/s.
- Q.23 Explain with the help of formulae how moving coil galvanometer can be converted into a voltmeter.
- Q.24 Derive an expression for a magnetic field at the centre of current carrying arc of wire.
- Q.25 On the basis of de broglie hypothesis obtain the relation for wavelength of an electron accelerated by a potential difference of V volt.
- Q.26 An iron rod is subjected to a magnetising field of 1200 Am^{-1} the susceptibility of iron is 599. Find permeability and magnetic field produced.

Section - D

Attempt any three of the following questions.

12

- Q.27 a) Define magnetization state its formula and SI unit.
b) The photoelectric cut off voltage in a certain experiment is 1.5 v what is the maximum kinetic energy of photoelectrons emitted.
- Q.28 a) State the principle of parallel axes and perpendicular axes.
b) A potentiometer wire has a length of 2m and resistance of 10Ω in series with resistance 990Ω and a cell of emf 2V calculate potential gradient.
- Q.29 Obtain the expression for total energy of a particle performing S.H.M.

- Q.30** a) Derive Cyclotron Formula
b) A standing wave is produced in a tube open at both ends the fundamental frequency is 300 Hz. What is the length of tube? (Speed of sound 340 m/s)
- Q. 31** Derive an expression of excess pressure inside a liquid drop.
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