



PHYSICS

Class 12 - Physics

Time Allowed: 3 hours

Maximum Marks: 70

General Instructions:

The question paper is divided into **four sections**:

1. **Section A**

- Q. No. 1 contains **Ten multiple choice type** of questions carrying **One mark** each.
- Q. No. 2 contains **Eight very short answer type** of questions carrying **One mark** each.

2. **Section B**

- Q. No. 3 to Q. No. 14 contain **Twelve short answer type** of questions carrying **Two marks** each. (Attempt any Eight).

3. **Section C**

- Q. No. 15 to Q. No. 26 contain **Twelve short answer type** of questions carrying **Three marks** each. (Attempt any Eight).

4. **Section D**

- Q. No. 27 to Q. No. 31 contain **Five long answer type** of questions carrying **Four marks** each. (Attempt any Three).

5. Use of the log table is allowed. Use of calculator is not allowed.

6. Figures to the right indicate full marks.

7. For each multiple choice type of question, it is mandatory to write the correct answer along with its alphabet. e.g., (a)...../(b)...../(c)...../(d) No marks(s) shall be given, if **ONLY** the correct answer or the alphabet of the correct answer is written. Only the first attempt will be considered for evaluation.

Section A

1. **Select and write the correct answers for the following multiple choice type of questions:** [10]

(a) In a photocell, increasing the intensity of incident light increases _____. [1]

- | | |
|--|------------------------------|
| a) the energy of the incident photons | b) the photoelectric current |
| c) maximum kinetic energy of the photoelectron | d) the stopping potential |

(b) The second law of thermodynamics deals with the transfer of _____. [1]

- | | |
|-----------|--------------|
| a) energy | b) pressure |
| c) heat | d) work done |

Section B

Attempt any 8 questions

3. Define coefficient of viscosity. State its formula and S.I. units. [2]
4. Draw a neat and labelled diagram of suspended coil type moving coil galvanometer. [2]
5. Explain the principle of conservation of angular momentum with the help of two appropriate examples. [2]
6. Define capacitance of a capacitor and its S.I. unit. [2]
7. Define second's pendulum. Derive a formula for the length of second's pendulum. [2]
8. What is a thermodynamic process? Give any two types of it. [2]
9. A 0.1 H inductor, a $25 \times 10^{-6} F$ capacitor and a 15Ω resistor are connected in series to a 120 V, 50 Hz AC source. Calculate the resonant frequency. [2]
10. A particle performing linear S.H.M. has a period of 6.28 seconds and a pathlength of 20 cm. What is the velocity when its displacement is 6 cm from mean position? [2]
11. Distinguish between free vibrations and forced vibrations [2]
12. Calculate the energy radiated in half a minute by a black body of surface area 200 cm^2 at $127^\circ C$. [2]
13. A moving coil galvanometer has a resistance of 25Ω and gives a full scale deflection for a current of 10 mA. How will you convert it into a voltmeter having range 0 – 100 V? [2]
14. An electron is orbiting in 5th Bohr orbit. Calculate ionisation energy for this atom, if the ground state energy is -13.6 eV. [2]

Section C

Attempt any 8 questions

15. What is **diffraction of light**? Explain its two types. [3]
16. Draw neat, labelled diagram of a parallel plate capacitor with a dielectric slab between the plates. [3]
17. Draw the diagrams showing the dipole moments in paramagnetic substance when external magnetic field is [3]
 - i. absent
 - ii. strong
18. What is photoelectric effect? [3]

Define:

 - i. Stopping potential
 - ii. Photoelectric work function.
19. Explain how a moving coil galvanometer can be converted into voltmeter. [3]
20. Explain the reflection of transverse and longitudinal waves from a denser medium and rarer medium. [3]
21. Explain, why the equivalent inductance of two coils connected in parallel is less than the inductance of either of the coils. [3]
22. In a set, 21 tuning forks are arranged in a series of decreasing frequencies. Each tuning fork produces 4 beats per second with the preceding fork. If the first fork is an octave of the last fork, find the frequencies of the first and tenth fork. [3]
23. In Young's double slit experiment, the slits are 0.5 mm apart and interference is observed on a screen placed at a distance of 100 cm from the slit. It is found that 9th bright fringe is at a distance of 8.835 mm from the 2nd dark fringe, on the same side of the centre of the fringe pattern. Find the wavelength of light used. [3]
24. A circular coil of 250 turns and diameter 18 cm carries a current of 12 A. What is the magnitude of magnetic moment associated with the coil? [3]
25. An a.c circuit consists of inductor of 125 mH connected in parallel with a capacitor of $50\mu F$. Determine [3]

resonant frequency.

26. Find the value of energy of electron in eV in the third Bohr orbit of hydrogen atom. [3]
[Rydberg's constant (R) = $1.097 \times 10^7 \text{ m}^{-1}$, Planck's constant (h) = $6.63 \times 10^{-34} \text{ J-s}$, Velocity of light in air (c) = $3 \times 10^8 \text{ m/s}$.]

Section D

Attempt any 3 questions

27. Define surface energy of the liquid. Obtain the relation between the surface energy and surface tension. [4]
28. **Answer the following questions:** [4]
- (a) State the principle on which a transformer works. With neat diagram, explain the construction of a step-up transformer. [2]
- (b) A metal rod $\frac{1}{\sqrt{\pi}} \text{ m}$ long rotates about one of its ends perpendicular to a plane whose magnetic induction is $4 \times 10^{-3} \text{ T}$. Calculate the number of revolutions made by the rod per second if the e.m.f. induced between the ends of the rod is 16 mV. [2]
29. **Answer the following questions:** [4]
- (a) Define: [2]
- a. Isothermal process
- b. Adiabatic process.
- (b) An ideal mono-atomic gas is adiabatically compressed so that its final temperature is twice its initial temperature. Calculate the ratio of final pressure to its initial pressure. [2]
30. **Answer:** [4]
- (a) Represent graphically energy distribution of a black body against wavelength at various temperatures. [2]
- (b) Calculate the kinetic energy of 10 grams of Argon molecules at 127°C . [2]
[Universal gas constant $R = 8320 \text{ J/k mole K}$, Atomic weight of Argon = 40]
31. Obtain an expression for torque acting on a rotating body with constant angular acceleration. Hence state the dimensions and SI unit of torque. [4]