



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) Let **p** and **E** denote the linear momentum and energy of emitted photon respectively. If the wavelength of incident radiation is increased \_\_\_\_\_ [1]

a) both p and E increase.

b) both p and E decrease.

c) p decreases and E increases.

d) p increases and E decreases.

(b) A graph of pressure versus volume for an ideal gas for different processes is as shown. In the graph curve OA represents \_\_\_\_\_ [1]



1	0	0
1	1	0

a) AND

b) OR

c) NAND

d) NOR

2. **Answer the following questions:** [8]
- (a) Draw a well labelled diagram of photoelectric cell. [1]
- (b) At which position, the total energy of a particle executing linear S.H.M. is purely potential? [1]
- (c) What is the average value of alternating current over a complete cycle? [1]
- (d) What is shunt? [1]
- (e) Define uniform circular motion. [1]
- (f) State the formula for electric field intensity at a point outside an infinitely long charged cylindrical conductor. [1]
- (g) Write the formula for torque acting on rotating current carrying coil in terms of magnetic dipole moment, in vector form. [1]
- (h) What happens if the rod of dia-magnetic material is placed in a non-uniform magnetic field? [1]

### 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. Draw a neat labelled diagram showing the various forces and their components acting on a vehicle moving along curved banked road. [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. Define: [2]
- a. Isothermal process
- b. Adiabatic process.
9. A 0.1 H inductor, a  $25 \times 10^{-6} F$  capacitor and a  $15\Omega$  resistor are connected in series to a 120 V, 50 Hz AC source. Calculate the resonant frequency. [2]
10. A body of mass 1 kg is made to oscillate on a spring of force constant  $25 \times 10^3$  dyne/cm. Calculate the magnitude of angular velocity and frequency of vibrations of the body. [2]
11. State the law of length and the law of linear density for a vibrating string. [2]
12. Calculate the energy radiated in half a minute by a black body of surface area  $200 \text{ cm}^2$  at  $127^\circ C$ . [2]
13. An unknown resistance is placed in the left gap and resistance of 50 ohm is placed in the right gap of a metrebridge. The null point is obtained at 40 cm from the left end. Determine the unknown resistance. [2]
14. Compute the ratio of longest wavelengths of Lyman and Balmer series in hydrogen atom. [2]

### Section C

#### Attempt any 8 questions

15. State the conditions to get constructive and destructive interference of light. [3]
16. Draw neat, labelled diagram of a parallel plate capacitor with a dielectric slab between the plates. [3]
17. What is Curie temperature and what happens above Curie temperature? [3]
18. Describe the construction of photoelectric cell. [3]

19. Distinguish between an ammeter and a voltmeter. (Two points each). [3]
20. Explain the formation of stationary waves by analytical method. Show the formation of stationary wave diagrammatically. [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. Two tuning forks of frequencies 320 Hz and 340 Hz are sounded together to produce sound wave. The velocity of sound in air is  $326.4 \text{ m/s}$ . Calculate the difference in wavelengths of these waves. [3]
23. In Young's experiment, two slits separated by 4 mm are illuminated by a light of wavelength 6400 Å. Interference fringes are obtained at a distance of 60 cm from the slits. Find the changes in the fringe width, if the separation between the slits is-
- increased by 1 mm, and
  - decreased by 1 mm.
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 alternating voltage given by  $e = 140 \sin(314.2t)$  is connected across a pure resistor of  $50\Omega$ . Calculate: [3]
- the frequency of the source
  - the r.m.s current through the resistor
26. Calculate the radius of second Bohr orbit in hydrogen atom from the given data. [3]
- Mass of electron =  $9.1 \times 10^{-31} \text{ kg}$   
 Charge on the electron =  $1.6 \times 10^{-19} \text{ C}$   
 Planck's constant =  $6.63 \times 10^{-34} \text{ J-s}$   
 Permittivity of free space =  $8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$

#### Section D

#### Attempt any 3 questions

27. Derive an expression for height of liquid column when a capillary tube is vertically dipped in a liquid. [4]
28. **Answer the following questions:** [4]
- Distinguish between step-up and step-down transformer. [2]
  - A wire 5 m long is supported horizontally at a height of 15 m along east-west direction. When it is about to hit the ground, calculate the average e.m.f. induced in it. ( $g = 10 \text{ m/s}^2$ ) [2]
29. **Answer the following questions:** [4]
- What is a thermodynamic process? Give any two types of it. [2]
  - 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]
- Draw a neat labelled diagram for Ferry's perfectly blackbody. [2]
  - The difference between the two molar specific heats of a gas is  $9000 \text{ J/kg K}$ . If the ratio of the two specific heats is 1.5, calculate the two molar specific heats. [2]
31. For a conical pendulum prove that  $\tan \theta = \frac{v^2}{rg}$ . [4]