



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) The momentum associated with photon is given by \_\_\_\_\_ [1]

a)  $h\lambda$

b)  $hv$

c)  $hE$

d)  $\frac{hv}{c}$

(b) In a cyclic process, if  $\Delta U$  = internal energy,  $W$  = work done,  $Q$  = Heat supplied then [1]

a)  $Q = 0$

b)  $W = 0$

c)  $W = Q$

d)  $\Delta U = Q$



- (g) What is the value of force on a closed circuit in a magnetic field? [1]  
 (h) What is magnetization? [1]

### Section B

#### Attempt any 8 questions

3. What is capillarity? Give any **two** applications of capillarity. [2]  
 4. Draw a neat and labelled diagram of suspended coil type moving coil galvanometer. [2]  
 5. Distinguish between centripetal force and centrifugal force. [2]  
 6. Two capacitors of capacities  $C_1$  and  $C_2$  are connected in parallel and this combination is connected in series with a capacitor of capacity  $C_3$ . Calculate the equivalent capacity of the combination of capacitors. [2]  
 7. Define epoch of S.H.M. State the factors on which the total energy of a particle performing S.H.M. depends. [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  $15\Omega$  resistor are connected in series to a  $120 V, 50 Hz AC$  source. Calculate the resonant frequency. [2]  
 10. The displacement of a particle performing simple harmonic motion is  $\frac{1}{3}$  rd of its amplitude. What fraction of total energy will be its kinetic energy? [2]  
 11. Draw neat, labelled diagrams for the modes of vibration of a stretched string in second harmonic and third harmonic. [2]  
 12. A pinhole is made in a hollow sphere of radius 5 cm whose inner wall is at temperature  $727^\circ C$ . Find the power radiated per unit area. [2]  
 [Stefan's constant  $\sigma = 5.7 \times 10^{-8} J/m^2 s K^4$ , emissivity ( $e$ ) = 0.2]  
 13. When two cells of emfs  $E_1$  and  $E_2$  are connected in series so as to assist each other, their balancing length on potentiometer wire is found to be 3.2 m. When two cells are connected in series so as to oppose each other, the balancing length is found to be 0.7 m. Compare the emfs of two cells. [2]  
 14. The energy of an excited hydrogen atom is  $-0.85 eV$ . Find the angular momentum of the electron. [2]  
 ( $h = 6.63 \times 10^{-34} Js, \pi = 3.142, E_1 = -13.6eV$ )

### Section C

#### Attempt any 8 questions

15. State the conditions necessary for obtaining sharp and steady interference pattern. [3]  
 16. Draw neat, labelled diagram of a parallel plate capacitor with a dielectric slab between the plates. [3]  
 17. Define and state unit and dimensions of: [3]  
 i. Magnetization  
 ii. Magnetic susceptibility  
 18. Describe the construction of photoelectric cell. [3]  
 19. Explain how a moving coil galvanometer can be converted into voltmeter. [3]  
 20. Explain what is Doppler effect in sound and state its any 'four' applications. [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. A stretched wire emits a fundamental note of frequency 256 Hz. Keeping the stretching force constant and reducing the length of wire by 10 cm, the frequency becomes 320 Hz. Calculate the original length of wire. [3]  
 23. A parallel beam of monochromatic light is incident on glass slab at an angle of incidence  $60^\circ$ . Find the ratio of the widths of the beam in glass to that in air, if refractive index of glass is 1.5. [3]  
 24. A circular coil of 250 turns and diameter 18 cm carries a current of 12 A. What is the magnitude of magnetic [3]

moment associated with the coil?

25. An alternating voltage given by  $e = 140 \sin ( 314.2t )$  is connected across a pure resistor of  $50\Omega$ . Calculate: [3]  
i. the frequency of the source  
ii. the r.m.s current through the resistor
26. Obtain expressions for longest and shortest wavelength of spectral lines in ultraviolet region for hydrogen atom. [3]

#### Section D

#### Attempt any 3 questions

27. Explain the rise of liquid in the capillary on the basis of pressure difference. [4]
28. **Answer the following questions:** [4]  
(a) Distinguish between step-up and step-down transformer. [2]  
(b) An emf of 91 mV is induced in the windings of a coil, when the current in a nearby coil is increasing at the rate of  $1.3 A/s$ , what is the mutual inductance (M) of the two coils in  $mH$ ? [2]
29. **Answer the following questions:** [4]  
(a) What are mechanical equilibrium and thermal equilibrium? [2]  
(b) 104 J of work is done on certain volume of a gas. If the gas releases 125 kJ of heat, calculate the change in internal energy of the gas. [2]
30. **Answer:** [4]  
(a) What is perfectly black body? Draw a neat labelled diagram of artificial perfectly black body. [2]  
(b) Calculate the energy radiated in half a minute by a black body of surface area  $200 cm^2$  at  $127^\circ C$ . [2]
31. State and prove: law of conservation of angular momentum. [4]