



Code Number:

**A**

# Aakash

**Medical | IIT-JEE | Foundations**

**Corp. Office:** Aakash Educational Services Limited, 3rd Floor, Incuspaze Campus- 2, Plot No. 13,  
Sector- 18, Udyog Vihar, Gurugram, Haryana - 122015

Time: 2 hrs.

**Mock Test Paper for Class-XII**

Max. Marks: 60

## PHYSICS

Roll No.

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### GENERAL INSTRUCTIONS

Read the following instructions carefully and follow them:

1. There is a 'Cool-off time' of 15 minutes in addition to the writing time.
2. Use the 'Cool-off time' to get familiar with questions and to plan your answers.
3. Read questions carefully before answering.
4. Read the instructions carefully.
5. Calculations, figures and graphs should be shown in the answer sheet itself.
6. Give equations wherever necessary.
7. Electronic devices except non-programmable calculators are not allowed in the examination Hall.

**Questions 1 to 7 carry 1 mark each Answer any 5.**

**(5 × 1 = 5)**

1. The electric field lines passing normally through unit area is called \_\_\_\_\_.
2. The dipole moment per unit volume is called \_\_\_\_\_.
3. At high enough temperature. A ferro-magnet become a \_\_\_\_\_
4. Electromagnetic radiation belong to the region with wavelength of about 400 nm to 400 nm is called \_\_\_\_\_.
5. The phenomenon of photoelectric emission was discovered by \_\_\_\_\_.
6. Electron revolves around the nucleus only in those orbits for which the angular momentum is some integral multiple of \_\_\_\_\_.
7. An intrinsic semi-conductor will have like \_\_\_\_\_ at  $T = 0$  K

**Questions 8 to 14 carry 2 marks each Answer any 5.**

**(5 × 2 = 10)**

8. Differentiate between linear charge density and surface charge density.
9. Plot the graph showing the temperature dependence of resistivity for a typical semiconductor.
10. State Faraday's law of electromagnetic induction.
11. A light bulb is rated at 100 W for a 220 V supply. Find the resistance of the bulb.
12. Explain the coherent sources.
13. Explain Einstein's photoelectric equation.
14. Draw the energy level diagram for the hydrogen atom.

**Q. No. 15 to 21 carry 3 marks each Answer any 6.**

**(6 × 3 = 18)**

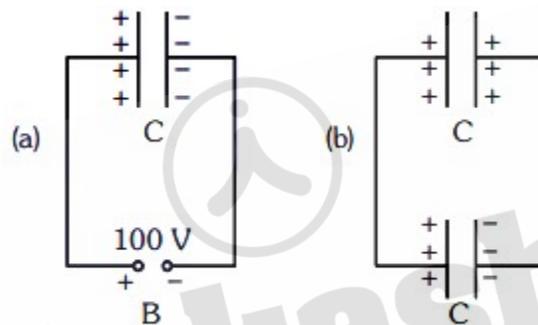
15. (a) Derive the expression for the potential due to a point charge. **(2)**  
(b) Plot the graph showing the variation of potential 'V' with distance 'r' **(1)**
16. (a) State Ampere' circuital law. **(2)**  
(b) Obtain the expression for the magnetic field at a distance 'r' from a long, straight wire carrying current 'I' **(1)**
17. Obtain the expression for the magnetic energy stored in a solenoid in terms of magnetic field 'B', are 'A' and length 'l' of the solenoid.

18. (a) How electromagnetic waves are produced? (2)  
 (b) Why infrared waves are called heave waves? (1)
19. Explain the refraction of a plane wave using Huygens's principle.
20. (a) What is radioactivity? (1)  
 (b) Explain the energy generation in stars. (2)
21. (a) What is half wave rectifier (1)  
 (b) Draw the input and output voltage waveforms of a half wave rectifier. (2)

**Questions 22 to 25 carry 4 marks each Answer any 3.**

**(3 × 4 = 12)**

22. (a) Obtain the expression for the energy stored in a capacitor. (2)  
 (b) A 900 pF capacitor is charged by a 100 V battery (Fig. 1). If the capacitor is disconnected from the battery and connected to another 900 pF capacitor (Fig. 2) what is the electrostatic energy stored in the system? (2)

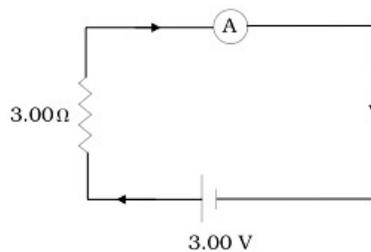


23. (a) State Kirchhoff's loop rule. (2)  
 (b) Derive the balancing condition of Wheatstone bridge, with a neat diagram (2)
24. (a) Explain Gauss's law in magnetism. (2)  
 (b) If magnetic monopoles are existed, how Gauss's law of magnetism be modified? (2)
25. (a) State Law of Refraction. (2)  
 (b) Explain total internal reflection. (2)

**Questions 26 to 29 carry 5 marks each Answer any 3.**

**(3 × 5 = 15)**

26. (a) Derive the expression for the field of an electrostatic dipole at points on the equatorial plane. (3)  
 (b) A system has two charges  $q_A = 2.5 \times 10^{-7} \text{C}$  and  $q_B = -2.5 \times 10^{-7} \text{C}$  located at points A(0, 0, -15 cm) and B (0, 0, +15 cm) respectively. What are the total charge and electric dipole moment of the system? (2)
27. (a) Define current sensitivity (1)  
 (b) How will you convert a galvanometer into voltmeter? (2)  
 (c) In the circuit given below, what is the value of the current of the ammeter shown is having a resistance of  $60\Omega$ . (2)



28. (a) Explain the principle of a transformer. (1)  
(b) Distinguish between step-up and step-down transformer (2)  
(c) List of four losses of a transformer. (2)
29. (a) Derive the expression for the refractive index of a prism, with a neat diagram. (4)  
(b) Obtain the expression for the angle of minimum deviation for a small angled prism. (1)

