

Mock Test -2 (CBSE)

Time: 3 Hours

Max. Marks: 70

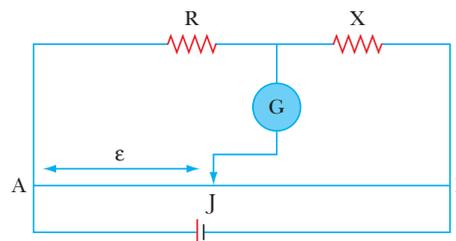
General Instructions

- All questions are compulsory.
- There are 30 questions in total. Questions 1 to 8 carry one mark each, questions 9 to 18 carry two marks each, questions 19 to 27 carry three marks each and questions 28 to 30 carry five marks each.
- There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks each. You have to attempt only one of the given choices in such questions.
- Use of calculators is not permitted.

- What is Bohr's radius?
- What are majority current carriers in n -type and p -type semiconductor?
- Peak value of e.m.f. of an a.c. source is E_0 . What is its r.m.s value?
- Which law asserts that the electric field lines cannot form a closed path?
- Define forbidden energy gap.
- Why does a diamond shine?
- Will an induced current develop in a conductor moved in a direction parallel to magnetic field?
- How much force will be experienced by a moving charge in a magnetic field.
- How would you establish an instantaneous displacement current of 1.0 A in the space between the parallel plates of 1 μ F capacitor.
- What is attenuation?
- What do you understand by Lorentz force? Explain.
- Find the radii of first three Bohr's orbits of a singly ionised helium atom (He^+).
- If the length of the wire be (i) doubled and (ii) halved, what will be the effect on the position of zero deflection in a potentiometer.
- Why is interference pattern not detected, when the two coherent sources are far apart?
- Write Einstein's photoelectric equation.
- An immersion heater is rated 836 watt. In what time, it should heat 1 litre of water from 20°C to 40°C . $J=4.18 \text{ J/cal}$.
- The work function of a photo-sensitive material is 2 eV. Calculate the wavelength of the incident light which will just cause photo emission.
- Two point charges of $+2 \mu\text{C}$ and $+6 \mu\text{C}$ repel each other with a force of 12 N. If each is given an additional charge of $-4 \mu\text{C}$, what will be the new force.
- An audio signal of amplitude one half the carrier amplitude is employed in amplitude modulation. What is the modulation index?
- What are coherent sources of light? Why are coherent sources required to obtain sustained interference pattern?
- A particle of mass $9 \times 10^{-5} \text{ g}$ is kept over a large horizontal sheet of charge having surface charge density $5 \times 10^{-5} \text{ Cm}^{-2}$. What charge should be given to this particle, so that if released, it does not fall?
- State Joule's law for heating effect of electric current. What is the cause of it? Is it reversible or not.

OR

In the meter bridge experiment a student observed a balance point at the point J, where $AJ=l$. Draw the equivalent Wheat stone bridge circuit diagram for this set up.



The value of R and X are both doubled and then interchanged. What would be the new position of the balance point? If, in this set up, the galvanometer and battery are interchanged at the balance position, how will the balance point get affected.

OR

What is the principle of electrostatic shielding?

- 23.** Explain the concept of magnetic flux. Discuss its units and dimensions.
- 24.** The equation of alternating current for a circuit is given by $I = 50 \cos 100 \pi t$
Find (i) frequency of a.c. applied (ii) mean value of current during positive half of the cycle (iii) virtual value of current and (iv) the value of current 1/300 second after it was zero.
- 25.** In a particular fission reaction, a ${}_{92}^{235}\text{U}$ nucleus captures a slow neutron. The fission products are three neutrons, a ${}_{57}^{142}\text{La}$ nucleus and a fission product ${}_{Z}^Y\text{X}$. What is the value of Y and Z?
- 26.** What do understand by polarization of dielectrics? Define dielectric constant in terms of electric field.
- 27.** Two interfering sources have an intensity ratio 16:1. Deduce amplitude ratio and ratio of intensity between the maxima and minima in interference pattern.
- 28.** State and prove Ampere's circuital law and by applying it find the magnetic field at a point well inside the solenoid carrying current.

OR

- (a) A plane wave front approaches a plane surface separating two media. If medium one is (optically) denser and medium two is (optically) rarer, construct the refracted wave front using Huygens's principle.

Hence prove Snell's law.

- (b) Draw the shape of the refracted wave front when a plane wave front is incident on (i) prism and (ii) convex mirror. Give a brief explanation for the construction.

OR

- (a) How does a paramagnetic material behave in the presence of an external magnetic field? Explain with the help of an appropriate diagram.
- (b) What happens when the temperature of a paramagnetic sample is lowered?
- (c) To which of the two - a polar dielectric or a non-polar dielectric - does a paramagnetic material correspond? Justify your answer.
- 30.** Explain the function of base region of a transistor. Why is this region made thin and lightly doped? Draw a circuit diagram to study the input and output characteristics of *n-p-n* transistor in a common emitter (CE) configuration. Show these characteristics graphically. Explain how current amplification factor of the transistor is calculated using output characteristics.

OR

- (a) A magnetic dipole is placed in a magnetic field with its axis tilted with respect to its position of stable equilibrium. Deduce an expression for the time period of (small amplitude) oscillation of this magnetic dipole about an axis, passing through its centre and perpendicular to its plane.
- (b) If this bar magnet is replaced by a combination of two similar bar magnets, placed over each other, how will the time period vary?