



Exam Mate



Mock Test Paper for Std X, XII CBSE Board, IIT - JEE Main & Advanced.

FOR ANSWERS VISIT : www.dharitri.com

MOCK TEST PAPER # 2

CLASS-XII (PHYSICS)

Time Allowed : 3 hours

Maximum Marks: 70

GENERAL INSTRUCTIONS

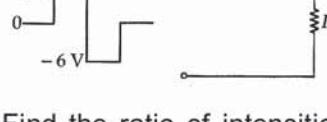
- All questions are compulsory. There are 27 questions in all.
- This question paper has five sections : Section A, Section B, Section C and Section D.
- Section A contains five questions of one mark each, Section B contains seven questions of two marks each, Section C contains twelve questions of three marks each, Section D contains three questions of 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 the three questions of five marks weightage. You have to attempt only one of the choices in such questions.

SECTION-A

- Why are alloys used for making standard resistance coils ?
- How does focal length of a lens change when red light is replaced by blue light ?
- Name the series of hydrogen spectrum lying in the infrared region.
- Would sky waves be suitable for transmission of TV signals of 60 MHz frequency ?
- What is the colour code for a resistor of resistance $3.5 \text{ k}\Omega$ with 5% tolerance ?

SECTION-B

- What is meant by the statement that the electric field of a point charge has spherical symmetry whereas that of an electric dipole is cylindrically symmetric?
- What is an ideal diode ? Draw the output waveform across the load resistor R, if the input waveforms is as shown in the figure.



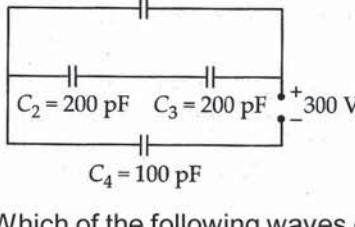
- Find the ratio of intensities of two points P and Q on a screen in Young's double slit experiment when waves from sources S_1 and S_2 have phase difference of (i) 0° and (ii) $\pi/2$ respectively.
- Two conductors are made of the same material and have the same length. Conductor A is solid wire of diameter 1 mm. Conductor B is a hollow tube of outer diameter 2 mm and inner diameter 1 mm. Find the ratio of resistance R_A and R_B .

OR

- The current sensitivity of a moving coil galvanometer increases by 20% when its resistance is increased by a factor 2. Calculate by what factor the voltage sensitivity changes.
- A coil of 0.01 H inductance and 1Ω resistance is connected to 200V, 50 Hz ac supply. Find the impedance of the circuit and time lag between maximum alternating voltage and current.
 - Why photoelectric effect cannot be explained on the basis of wave nature of light.
 - Answer the following points: Why is the binding energy per nucleon found to be constant for nuclei in the range of mass number (A) lying between 30 and 170?

SECTION-C

- Obtain equivalent capacitance of the following network. For a 300 V supply, determine the charge and voltage across each capacitor.



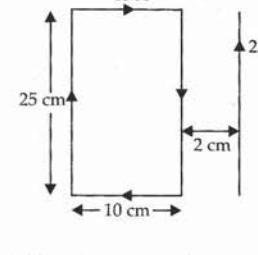
- Which of the following waves can be polarised ? (i) X-rays (ii) Sound waves. Give reasons. Two polaroids are used to study polarisation. One of them (the polariser) is kept fixed and other other (the analyser) is initially kept with its axis parallel to the polariser. The analyser is then rotated through angles of 45° , 90° and 180° in turn. How would the intensity of light coming out of analyser be affected for these angles of rotation, as compared to the initial intensity and why ?
- Illustrate the basic elements required for transmitting and receiving an audio signal with the help of a block diagram.
- Write the mathematical relation for the resistivity of a material in terms of relaxation time, number density and mass and charge of charge carriers in it. Explain, using this relation, why the resistivity of a metal increases and that of a semiconductor decreases with rise in temperature.
- A source contains two phosphorus radionuclides ^{32}P ($T_{1/2} = 14.3$ days) and ^{33}P ($T_{1/2} = 25.3$ days). Initially 10% of the decays come from ^{33}P . How long one must wait until 90% do so ?

- The two plates of a parallel plate capacitor are 4 mm apart. A slab of dielectric constant 3 and thickness 3 mm is introduced between the plates with its faces parallel to them. The distance between the plates is so adjusted that the capacitance of the capacitor becomes $(2/3)^d$ of its original value. What is the new distance between the plates.

OR

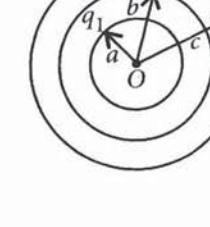
Define the term electric potential due to a point charge. Find the electric potential at the centre of a square of side $\sqrt{2} \text{ m}$, having charges $100\mu\text{C}$, $-50\mu\text{C}$, $20\mu\text{C}$ and $-60\mu\text{C}$ at the four corners of the squares.

- How would you establish an instantaneous displacement current of 2.0 A in the space between the two parallel plates of $1\mu\text{F}$ capacitor ?
- The figures shows a rectangular current carrying loop, placed 2 cm away from a long straight, current carrying conductor. What is the direction and magnitude of the net force acting on the loop ?



- Two lenses of powers $+15\text{D}$ and -5D are in contact with each other forming a combination lens.
(a) What is the focal length of this combination ?
(b) An object of size 3 cm is placed at 30 cm from this combination of lenses. Calculate the position and size of the image formed.
- (a) For what kinetic energy of a neutron will the associated de Broglie wavelength be $1.40 \times 10^{-10} \text{ m}$?
(b) Also find the de Broglie wavelength of a neutron, in thermal equilibrium with matter having an average kinetic energy of $\frac{3}{2}kT$ at 300 K.

- Why are de Broglie waves associated with a moving football not visible ? The wavelength 1, of a photon and the de Broglie wavelength of an electron have the same value. Show that the energy of the photon is $\frac{2\lambda mc}{h}$ times the kinetic energy of the electron, where m, c and h have their usual meanings.
- Three concentric conducting spherical shells of radii a, b and c ($c < b > a$) carrying charges q_1 , q_2 and q_3 respectively are arranged as shown in the figure. What is the value of electrostatic potential at the surface of three shells ? Which is higher ?



SECTION D

- What is induced emf ? Write Faraday's law of electromagnetic induction. Express it mathematically. A conducting rod of length l, with one pivoted, is rotated with a uniform angular speed ω in a vertical plane, normal to a uniform magnetic field B. Deduce an expression for the emf induced in this rod. In India, domestic power supply is at 220 V, 50 Hz, while in USA it is 110 V, 50 Hz. Give one advantage and one disadvantage of 220 V supply over 110 V supply.

OR

Explain the phenomenon of self induction. Define coefficient of self inductance. What are its units? Calculate self inductance of a long solenoid.

- (a) With the help of a circuit diagram explain the working of transistor as oscillator.
(b) Draw a circuit diagram for a two inputs OR gate and explain its working with the help of input, output waveforms.

OR

Define the terms potential barrier and depletion region for a p-n junction. Explain with the help of a circuit diagram, the use of a p-n diode as a full wave rectifier. Draw the input and output wave forms.

- Define magnifying power of an optical telescope. Draw a ray diagram for an astronomical refracting telescope in normal adjustment showing the paths through the instrument of three rays from a distant object. Derive an expression for its magnifying power. Write the significance of diameter of the objective lens on the optical performance of a telescope.

OR

State Huygens principle and prove laws of reflection and refraction on the basis of Huygens principle.

For Answers visit: www.dharitri.com

NATIONAL ADMISSION cum SCHOLARSHIP TEST ON 30th DECEMBER 2018

(FOR CLASS VII, VIII, IX, X, XI & XII STUDENTS) Ph. No. 0674 - 2421400, 2421800, 85990 87100 / 85990 87200

Preparation For:-IITJEE Main & Advanced, Medical (NEET / AIIMS), KVPY, Olympiad, NTSE & Board.

