UP Board Class 12 Physics 2026 Set 346 DX Question Paper

ZOLLEGE

General Instructions

(i) This question paper contains 30 questions. All questions are compulsory.

(ii) It comprises 6 single-correct multiple-choice questions.

(iii) Attempt every question; detailed solutions are provided in the companion solutions booklet.

1. In the followings, dimension of electric field is:

(A) $[MLT^2A]$

(B) $[MLT^{-1}A^{-1}]$

(C) $[MLT^{-3}A^{-1}]$

(D) $[ML^2T^{-3}A^{-1}]$

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2. In photoelectric emission, the frequency of incident light is doubled. Kinetic energy of emitted photoelectrons will become:

(A) double

(B) somewhat more than double

(C) less than double

(D) four times

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3. Two resistances are connected in parallel. Equivalent resistance of combination is $\frac{6}{5}\ \Omega$. When one resistance is broken out, resistance becomes $2\ \Omega$. The resistance of broken wire was:

(A) $\frac{2}{5}\ \Omega$

(B) $2\ \Omega$

(C) $3\ \Omega$

(D) $\frac{5}{2}\ \Omega$

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4. Following charged particles are projected perpendicular to a uniform magnetic field with same velocity. Which one will experience maximum force?

(A) electron

(B) proton

(C) α particle

(D) deuteron

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5. In L–C–R circuit power factor will be 1, if:

(A) $\omega L = \omega C$

(B) $\omega L = \frac{1}{\omega C}$

(C) $\left(\omega L - \frac{1}{\omega C}\right) = R$

(D) None of these

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6. Convex lens of focal length f_1 is placed in contact with a concave lens of focal length f_2. For $f_1 > f_2$ combination will behave:

(A) like a concave lens

(B) like a convex lens

(C) like a plane glass slab

(D) none of these

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7. On increasing temperature of a semiconductor, what will be effect on its conductivity?

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8. In a nuclear fusion reaction mass defect is 0.2%. What will be amount of energy released in the fusion of 1 kg mass?

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9. What is the phenomena of radioactivity?

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10. Explain the meaning of work function of a photosensitive surface.

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11. Electric field lines do not intersect. Why?

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12. Radiation of some definite frequency are either absorbed or emitted by the atoms. Explain the reason.

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13. An object is placed between centre of curvature and infinity in front of a concave mirror. Draw ray diagram for image.

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14. State Gauss' law in electrostatics. Charge inside a Gaussian surface is zero. Comment on the electric field intensity at each point of the surface.

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15. Explain the meaning of the electrical capacity of a conductor. How capacity of a conductor can be increased?

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16. What are isotone nuclei? In a nucleus average mass of nucleons is 1.67×10^{-27} Kg. Find the density of nucleus. [Given $R_0 = 1.2 \times 10^{-15}$ m.]

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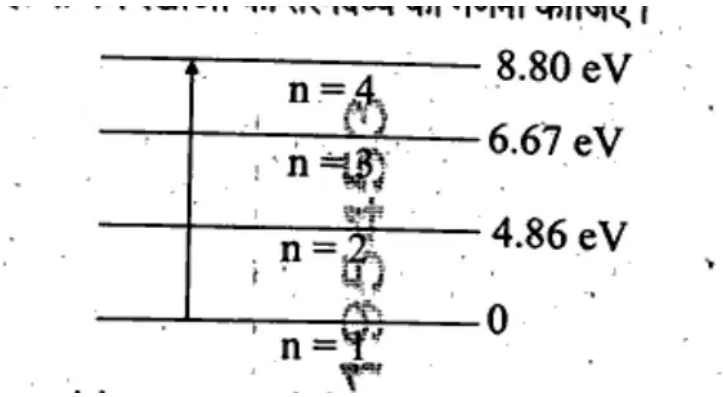
17.



An atom makes a transition on receiving energy from an external source, as shown in the figure. Depict the lines of possible spectrum and calculate the wavelength of any two spectral lines. (Energy levels: $n = 1$ at 0, $n = 2$ at 4.86 eV, $n = 3$ at 6.67 eV, $n = 4$ at 8.80 eV.)

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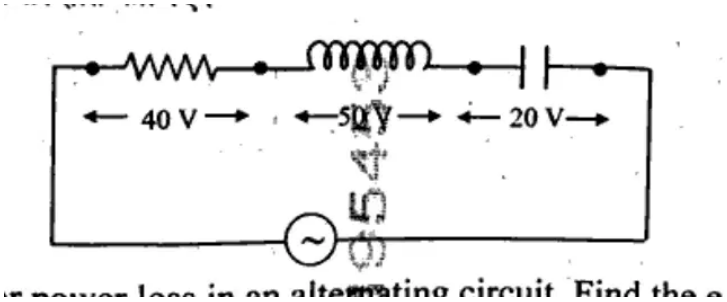
18.



Give formula for power loss in an alternating circuit. Find the e.m.f. of source in the circuit and the phase difference between resultant potential and the current flowing in the circuit. (Series R-L-C driven by an AC source with $V_R = 40$ V across the resistor, $V_L = 50$ V across the inductor and $V_C = 20$ V across the capacitor.)

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19. Find the formula for the couple acting on a magnetic dipole placed in a magnetic field. On its basis, define magnetic dipole moment.

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20. What are matter waves? Write the de-Broglie formula for matter waves. The de-Broglie wavelength for a photon and an electron are same. Which will have greater energy?

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21. Write down the difference between displacement current and conduction current. The equation of an electromagnetic wave is $B_y = 2 \times 10^{-7} \sin(500x + 1.5 \times 10^{11}t)$ Tesla. Find the equation of the electric field of the wave, the direction of propagation and the wavelength of the wave.

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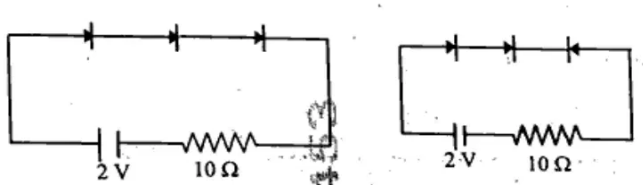

What is the need of doping of intrinsic semiconductors? Ideal diodes are used in the given circuits. Find the value of current in both the circuits.

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23. State the important characteristics of electromagnetic waves.

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24. How can a galvanometer be converted into a voltmeter? Explain with the help of a circuit diagram.

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25. Option 1: Write the 'lens maker' formula for a thin lens. The refractive index of the material of a thin lens is n and its focal length is f. The lens is placed in a medium of refractive index n. Find the focal length of the lens in the medium.

OR

Option 2: What is the difference between unpolarized and polarized light? Two polaroids A and B are placed such that light polarized by A cannot pass through B. Can some light be obtained by using a third polaroid?

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26. Define current density ($\vec{J}$) and write its unit. Prove that $\vec{J} = \sigma\vec{E}$, where σ is the specific conductivity (conductivity) of the conductor and $\vec{E}$ the electric field inside the conductor.

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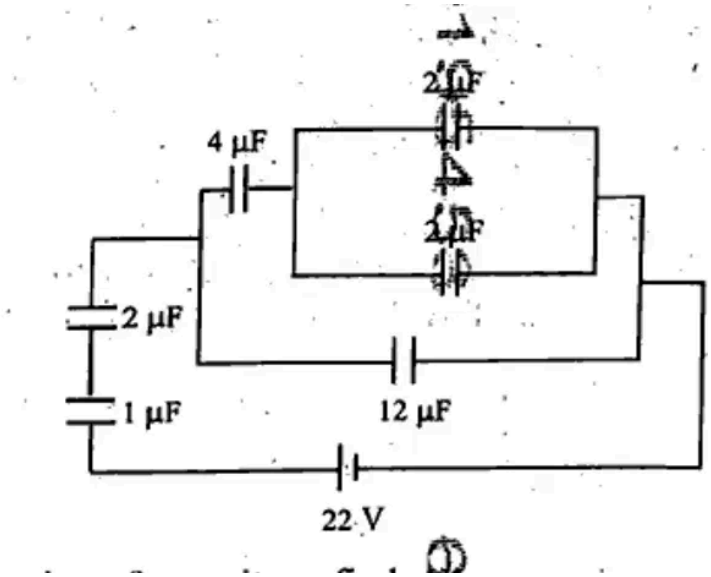
27.



Option 1: Write down the definition of electric dipole moment. Derive the formula for the electric field intensity at an axial point of an electric dipole.

OR

Option 2: In the given combination of capacitors (connected across a 22 V supply), find out (i) the total capacitance, (ii) the charge on the 4 μF capacitor and (iii) the total stored energy. The network contains capacitors of 4 μF, 2 μF, 1 μF, 2 μF, 1 μF and 12 μF.

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28. Option 1: Depict the series and the parallel combination of cells. When is the series and when is the parallel combination suitable? A cell of e.m.f. E and internal resistance r is connected with an external resistance R. Draw a graph between the voltage V across R and the current i flowing in it.

OR

Option 2: State Ampere's circuital law and, on its basis, find the formula for the magnetic field produced at a point due to an infinitely long straight current-carrying wire. A current of 10^{-4} A flows in a rectangular coil of dimensions $1.0\ \text{cm} \times 1.5\ \text{cm}$. The plane of the coil is parallel to a magnetic field of $0.6\ \text{N/A m}$. The coil has 30 turns. Calculate the torque acting on the coil.

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29. L, C and R are connected in series with an alternating current source. When there will be resonance in the circuit? What will be the nature of impedance during resonance?

OR

State the Faraday's laws of electromagnetic induction. Define self induction, state the Lenz's law regarding direction of self induced current. In a coil, due to change of current at the rate of 1 A/s an e.m.f. of 1 V is produced. What will be the coefficient of self inductance of the coil?

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30. Derive the formula $\frac{n}{v} - \frac{1}{u} = \frac{n-1}{R}$ due to refraction of light on a spherical surface.

OR

Draw a circuit diagram of p-n junction full wave rectifier and describe its working. Also, give the graphical representation of input and output current.