PHYSICS

BOOKS - CBSE COMPLEMENTARY MATERIAL PHYSICS (HINGLISH)

CBSE EXAMINATION PAPER, DELHI REGION - 2015 (CODE NO. 55/1/1/D)

Section A

1. Define capacitor reactance. Write its SI units.

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2. What is the electric flux through a cube of side 1 cm which encloses an electric dipole ?

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3. A concave lens of refractive index 1.5 is immersed in a medium of refractive index 1.65. What is the nature of the lens ?

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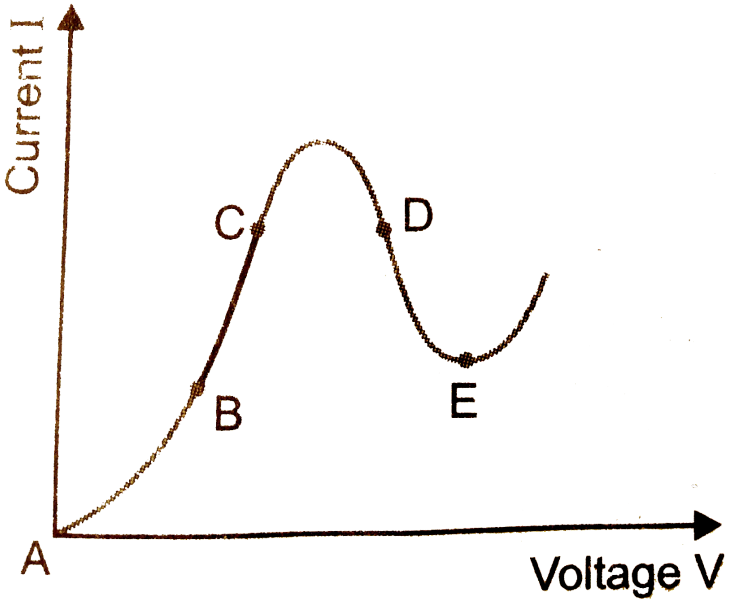
4. Graph showing the variation of current versus voltage for a material GaAs is shown in figure. Identify the region of (i) negative resistance (ii) where Ohm's law is obeyed.



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Section B

1. A proton and an a-particle have the same de-Broglie wavelength. Determine the ratio of their accelerating potentials

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2. A proton and an a-particle have the same de-Broglie wavelength. Determine the ratio of their speeds.

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3. Show that the radius of the orbit in hydrogen atom varies as n2, where n is the principal quantum number of the atom.

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4. Use the mirror equation to show that an object placed between f and $2f$ of a concave mirror forms an image beyond $2f$.

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5. Find an expression for intensity of transmitted light when a polaroid sheet is rotated between I polaroids. In which position of the polaroid sheet will the transmitted intensity be maximum ?

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6. Use Kirchhoff s rules to obtain conditions for the balance condition in a Wheatstone bridge.

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Section C

1. Name the parts of the electromagnetic spectrum which is

suitable for radar systems used in aircraft navigation.

Write in brief, how these waves can be produced.

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2. Name the parts of the electromagnetic spectrum which is

used to treat muscular strain.

Write in brief, how these waves can be produced.

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3. Name the parts of the electromagnetic spectrum which is

used as a diagnostic tool in medicine.

Write in brief, how these waves can be produced.

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4. A giant refracting telescope at an observatory has an objective lens of focal length $15cm$.If an eye piece of focal length $1.0cm$ is used What is the angular magnification of the telescope ?

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5. (i) A giant refracting telescope at an observatory has an objective lens of focal length 15 m . If an eyepiece of focal length 1.0 cm is used, what is angular magnification of the telescope ?

(ii) If this telescope is used to view the moon, what is the diameter of the image of the moon formed by the objective lens ? the diameter of the moon is $3.48 \times 10^6 m$, and the radius of lunar orbit is $3.8 \times 10^8 m$.

6. Write Einstein's photoelectric equation and mention which important features in photoelectric el explained with the help of .this equation. The maximum kinetic energy of the photoelectrons gets doubled when the wavelength of light the surface changes from λ_1 to λ_2. Derive the expressions for the threshold wavelength λ_0 and wo for the metal surface.

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7. In the study of Geiger-Marsdon experiment on scattering of a-particles by a thin foil of ... trajectory of α-particles in the coulomb field of target nucleus. Explain briefly how one gets the ... on the size of the nucleus from this study.

From the relation $R = R_0 A^{1/3}$, where R_0 is constant and A is the mass number of the nucleus, nuclear matter density is independent of A.

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8. Distinguish between nuclear fission and fusion. Show how in both these processes energy is ..... Calculate the energy release in MeV in the deuteriumtritium fusion reaction:

$$._1^2H + ._1^3H \rightarrow ._1^3He + n$$

Using the data.

$$m\left(._1^2H\right) = 2.014102u \quad m\left(._1^3H\right) = 3.016049u$$
$$m\left(._1^3He\right) = 4.002603u \quad m_n = 1.008665u$$
$$lu = 931.5MeV/c^2$$

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9. A cell of emf 'E' and internal resistance 'r' is connected across a variable load resistor R. Draw the terminal voltage V versus (i) R and (ii) the current I.

It is found that when $R = 4\Omega$, the current is 1 A and when R is increased to 9Ω, the current reduce to 0.5 A. Find the values of the emf E and internal resistance r.

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10. Two capacitors of unknown capacitances C_1 and C_2 are connected first in series and then in parallel, across a battery of 100V. If the energy stored in the two combinations is 0.045 J and 0.25 J respectively determine the values of C_1 and C_2. Also calculate the charge on each capacitor in parallel combination.

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11. State the principle of working of a galvanometer.

A galvanometer of resistance G is converted into a voltmeter to measure upto V volts by connecting resistance R_1 in series with the coil. If a resistance R_2 is connected in series with it, then it can measure V/2 volts. Find the resistance, in terms of R_1 and R_2, required to be connected to convert it into a volt meter that can read upto 2 V. Also find the resistance G of the galvanometer in terms of R_1 and R_2.

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12. With what considerations in view, a photodiode is fabricated ? State its working with the help of a suitable diagram.

Even though the current in the forward bias is known to the more than in the reverse bias. yet the photodiode works in reverse bias What is the reason ?

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13. In double slit experiment using light of wavelength $600nm$, the angular width of a fringe formed on a distant screen is 0.1°. What is the spacing between the two slits ?

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14. Answer the following questions:

Light of wavelength 5000 A propagating in air gets partly reflected from the surface of water.

How will the wavelengths and frequencies of the reflected and refracted light be affected ?

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15. An inductor L of inductance X_L is connected in series with a bulb B and an AC source . How would brightness of the bulb change when (i) number of turns in the inductor is increased (ii) an iron rod is inserted in the inductor and (iii) a capacitor of reactance $X_C = X_L$ is inserted in series .

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Section E

1. State Ampere's circuital law. Use this law to obtain the expression for the magnetic field inside an air cored toroid of average radius r having n-turns per unit length and carrying a steady current I.

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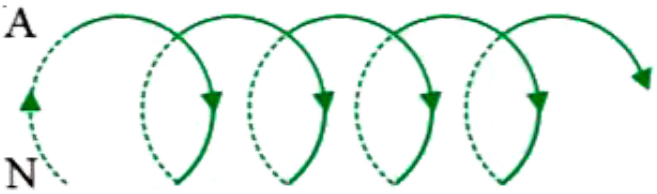
2. An observer to the left of a solenoid of N turns each of cross section area 'A' observes that a steady current I in it flows in the clockwise direction Depict the magnetic field lines due to the solenoid specifying its polarity and show mat it acts as a bar magnet of magnetic moment m = NIA



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3. Define mutual inductance and write its S.I. units.

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4. Write an expression for mutual inductance of two co-axial solenoids.

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5. An electric dipole of dipole moment $\overrightarrow{p}$ consists of point charges + q and - q

separated by a distance 2a apart. Deduce the expression for the electric field $\vec{E}$ due to the dipole at a distance x from the center of dipole on its axial line in terms of the dipole moment $\vec{p}$. Hence show that in the limit $a \to 0 \vec{E} = \frac{2\vec{p}}{(4\pi\varepsilon_0 x^3)}$.

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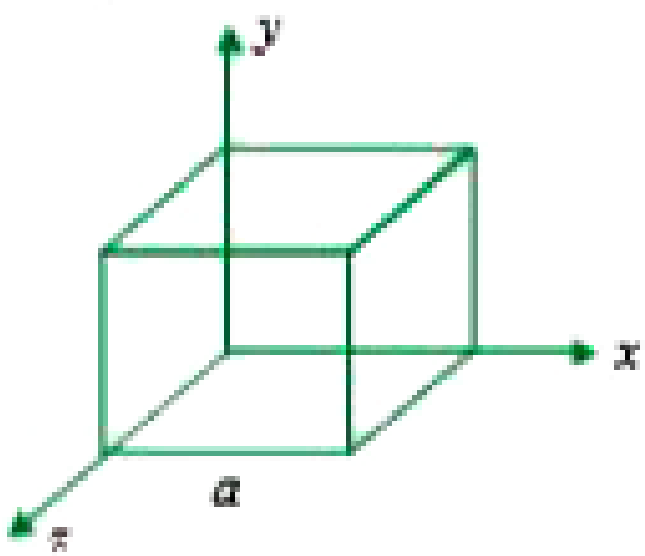
6. Given the electric field in the region $\vec{E} = 2\xi$, find the net electric flux through the cube

and enclosed by it.



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