PHYSICS

BOOKS - CBSE COMPLEMENTARY MATERIAL PHYSICS (HINGLISH)

CBSE BOARD EXAMNATION PAPER (2017)

Section A

1. Does the charge given to a metallic sphere depend on whether it is hollow or solid ? Give reason for your answer.

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2. A long straight current carrying wire passes normally through the centre of circular loop. If the current through the wire increases, will there be an induced emg in the loop ? Justify.

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3. At a place, the horizontal component of earth's magnetic field is B and angle of dip is 60°. What is the value of horizontal component of earth's magnetic field at equator?

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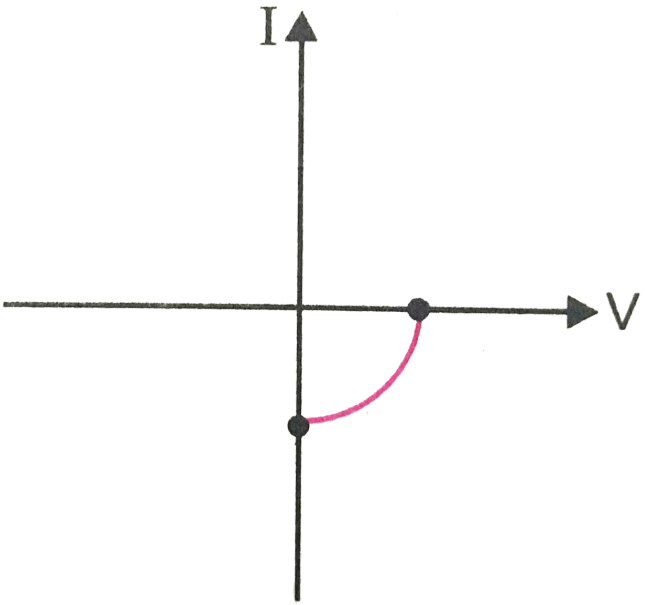
4. Name the junction diode whose I-V characteristics are drawn below:



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5. How is the speed of em-waves in vacuum determined by the electric and magnetic fields ?

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Section B

1. How does Ampere-Maxwell law explain the flow the of current through a capacitor when it is being charged by a battery? Write the expression for the displacement current in terms of the rate of change of electric flux.

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2. Define the distance of closest approach. An a particle of kinetic energy K is bombarded on a thin gold foil. The distance of the closest approach is r. What will be the distance of closest approach for an a particle of double the kinetic energy?

Or

Write two important of Rutherford nuclear model of the atom.

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3. Find out the wavelength of the electron orbiting in the ground state of hydrogen atoms.

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4. Define the magnifying power of a compound microscope when thefinal image is formed at infinity. Why must both the objective and the eyepiece of a compound microscope has short focal lengths? Explain.

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Section C

1. Find the values of the phase difference between the current and the voltage in the series LCR circuit shown below, which one leads in phase: current or voltage?

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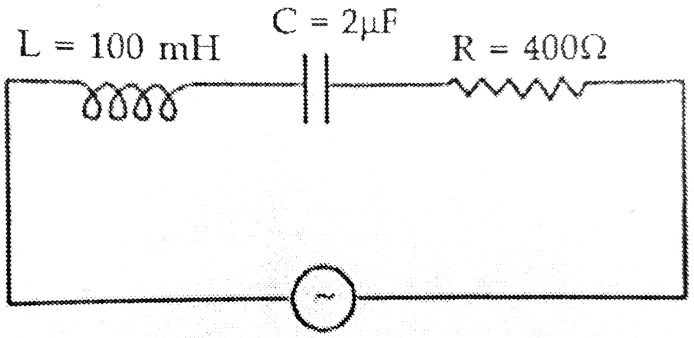
2. (i) Find the value of the phase difference between the current and the voltage in the

series LCR circuit shown below. Which one leads in phase : current or voltage ?



(ii) What making any other change, find the value of the additional capacitor C, to be connected in parallel with the capacitor C, in order to make the power factor of the circuit unity.

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3. Write the two processes that take place in the formatioin for a p-n junction. Explain with the help of a diagram, the formation of depletion region and barrier potential in a p-n junction.

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4. (i) Obtain the expression for the cyclotron frequency.

(ii) A deutron and a proton are accelerated by

the cyclotron. Can both the accelerated with the same oscillator frequency ? Give greason to justify your answer.

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5. A deutron and a proton are accelerated by the cyclotron. Can both be accelerated with the same oscillator frequency? Give reason to justify your answer.

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6. How does one explain the emission of electrons from a photosensitive surface with the help of Einstein's equation?

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7. (i) How does one explain the emission of electron from a photosensitive surface with te help of Einstein's photoelectric equation ?

(ii) The work function of the following metals is given :

$Na = 2.75eV, K = 2.3eV, Mo = 4.17eV$

and $Ni = 5.15eV$. Which of these metals will not cause photoelectric emission for radiation of wavelength 3300Å from a laser source placed 1 m aways from these metals ? What happens if the laser source is brought nearer and placed 50 cm away ?

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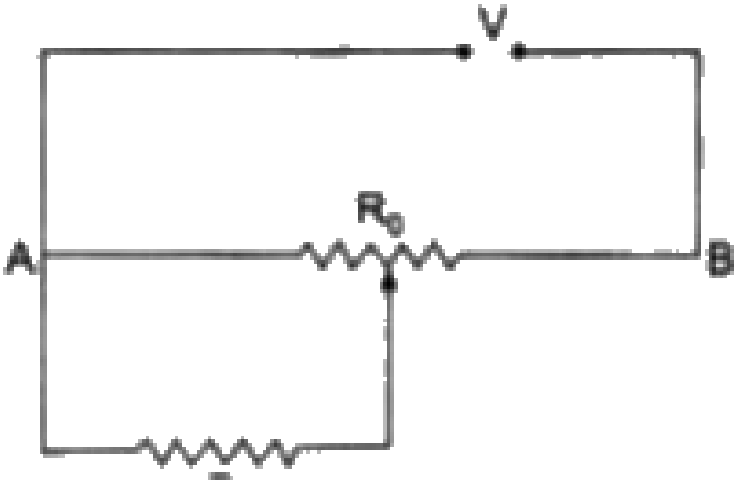
8. A resistance of R draw current from a potentiometer. The potentiometer wire, AB, has total resistance of R_0. A voltage V is

supplied to the potentiometer. Derive an expression for the voltage across R when the sliding contact is in the middle of potentiometer wire.



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9. Find equivalent capacitance between A and B in the combination givenbelow. Each capacitor is of $2\mu F$ capacitance.

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10. If a dc source of 7V is connected across AB, how much charge is drawn from the source and what is the energy stored in the network?

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11. Derive the expression for the electric potential at any point along the axial line of an electric dipole.

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12. Diagrammatically represent the position of a dipole in (i) stable (ii) unstable equilibrium when placed in a uniform electric field.

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13. A radioactive nucleus A undergoes a series of decays as given below.

$$A \xrightarrow{\alpha} A_1 \xrightarrow{\beta} A_2 \xrightarrow{\alpha} A_3 \xrightarrow{\gamma} A_4$$

The mass number and atomic number of are 176 and 71 respectively.

Determie the mass and atomic number of A4 and A.

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14. Write the basic nuclear processes underlying β^+ and β^- decays.

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15. A ray of light incident on face AB of an equilateral glass prism, shows minimum deviation of $30\circ$ .Calculate the speed of light through the prism.

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16. In the above example, find the angle of incidence at face AB, so that emergent ray

grazes along the face AC'.

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17. Describe the working principle of a moving coil galvanometer. Why is necessary to use

(i) a radial magnetic field and

(ii) a cylindrical soft iron core in a galvanometer ?

Write the expression for current sensitivity of the galvanometer .

Can a galvanometer as such be used for measuring the current ? Explain.

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18. Define mutual inductance between two long coaxial solenoids. Find out the expression for the mutual inductance of inner solenoid of length l having the radius r_1 and the number of turns n_1 per unit length due to the second other solenoid of same length and n_2 number of turns per unit length.

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Section E

1. Draw a labelled diagram of AC generator. Derive the expression for the instantaneous value of the emf induced in the coil.

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2. A circular coil of cross-sectional area $200cm^2$ and 20 turns is rotated about the vertical

diameter with angular speed of $50 rad/s$ in a uniform magnetic of $3.0 \times 10^{-2} T$. Calculate the maximum value of current in the coil.

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3. (a) Draw a labelled diagram of a step-up transformer. Obtain the ratio of secondary to primary voltage in terms of number of turns and currents in the two coils.

(b) A power transmission line feeds input power at 2200 V to a step-down transformer

with its primary windings having 3000 turns. Find the number of turns in the secondary to get the power output at $220V$.

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4. A power transmission line feeds input potential at 2200 V to a step down transformer with its primary winding having 3000 turns. Find the number of turns in secondary to get the power output at 220 V.

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5. (a) Distinguish between unpolarized light and linearly polarized light. How does one get linearly polarised light with the help of a plaroid ?

(b) A narrow beam of unpolarised light of intensity I_0 is incident on a polaroid P_1. The light transmitted by it is then incident on a second polaroid P_2 with its pass axis making angle of 60° relative to the pass axis of P_1. Find the intensity of the light transmitted by P_2.

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6. A narrow beam of unpolarised light of intensity I_0 is incident on a polaroid P_1. The light transmitted by it is then incident on a second polaroid P_2 with its pass axis making an angle of 60° to the pass axis of P_1. Find intensity of light transmitted by P_2.

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7. (a) Explain two features to distinguish between the interference pattern in Young's double slit experiment with the difference pattern obtained due to a single slit.

(b) A monochromatic light of wavelength $500nm$ is incident normally on a single slit of width 0.2 nm of produce a diffraction pattern. Find the angular width of the central maximum obtained on the screen.

Estimate the number of fringes obtained in Young's double slit experimental with fringe width $0.5mm$, which can be accommodated

within the region of total angular spread of the central maximum due to single slit.

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8. A monochromatic light of wavelength $500nm$ is incident normally on a single slit of width $0.2mm$ to produce a diffraction pattern. Find the angular width of central maximum obtained on the screen, $1m$ away.

Estimate the number of fringes obtained in YDSE with fringe width $0.5mm$, which can be

accommodated within the region of total angular spread of the central maximum due to a single slit.

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9. Derive an expression for drift velocity of electrons in a conductor. Hence deduce ohm's law.

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10. A wire whose cross-sectional area is incereasing linearly from its one end to the other, is connected across a battery of V volts. Which of the following quantities remain constant in the wire ?

A. drift speed

B. current density

C. electric current

D. electric field

Answer:

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11. State the Kirchhoff's rules used in electric networks. How are these rules justified ?

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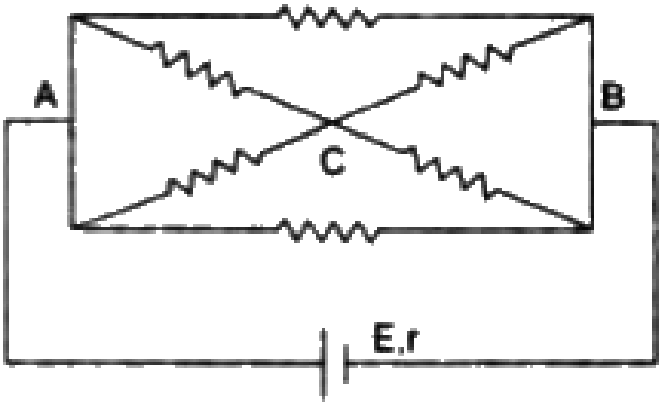
12. The current is drawn from a cell of emf E and iternal resitance r connected to the network of resistors each of resistor r as shown in the figure. Obtain the expression for

(i) the current draw from the cell and (ii) the power consumed in the network.



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