CBSE 12th Physics 2012 Unsolved Paper

Outside Delhi

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TIME - 3HR. | QUESTIONS - 30

THE MARKS ARE MENTIONED ON EACH QUESTION

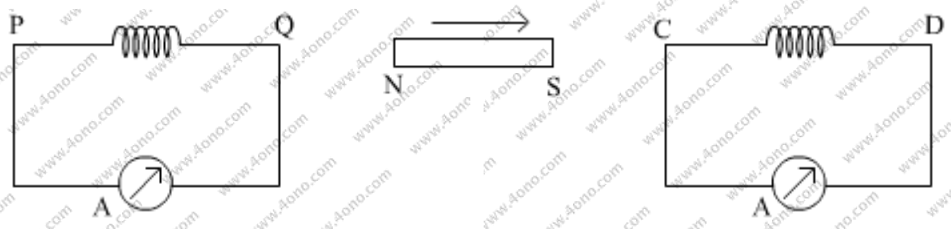
SECTION – A

Q.1. Two wires of equal length, one of copper and the other of manganin have the same resistance. Which wire is thicker? *1 marks*

Q.2. What are the direction of electric and magnetic field vectors relative to each other and relative to the direction of propagation of electromagnetic waves? *1 mark*

Q.3. How does the angular separation between fringes in single-slit diffraction experiment change when the distance of separation between the slit and screen is doubled? *1 mark*

Q.4. A bar magnet is moved in the direction indicated by the arrow between two coils PQ and CD. Predict the direction of induced current in each coil. *1 mark*



Q.5. For the same value of angle of incidence, the angles of refraction in three media A, B and C are 15°, 25° and 35° respectively. In which medium would the velocity of light be minimum? *1 mark*

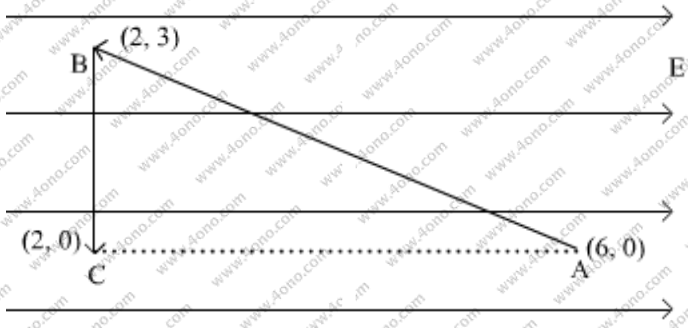
Q.6. A proton and an electron have same kinetic energy. Which one has greater de-Broglie wavelength and why? *1 mark*

Q.7. Mention the two characteristic properties of the material suitable for making core of a transformer. *1 mark*

Q.8. A charge 'q' is placed at the center of a cube of side *l*. What is the electric flux passing through each face of the cube? *1 mark*

SECTION – B

Q.9. A test charge 'q' is moved without acceleration from A to C along the path from A to B and then from B to C in electric field E as shown in the figure. (i) Calculate the potential difference between A and C. (ii) At which point (of the two) is the potential more and why? *2 mark*



Q.10. An electric dipole is held in a uniform electric field.

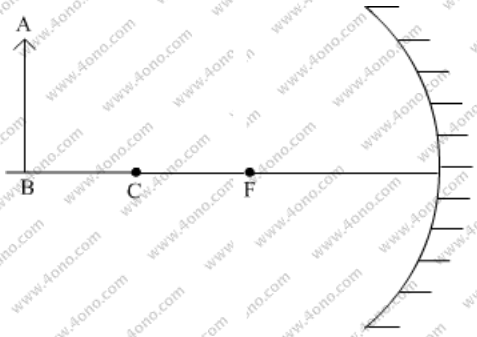
(i) Show that the net force acting it is zero.

(ii) The dipole is aligned to the field. Find the work done in rotating it through the angle of 180. *2 mark*

Q11. State the underlying principle of transformer. How is the large scale transmission of electric energy over long distance done with the use of transformers? *2 mark*

Q.12. A capacitor of capacitance 'C' is being charged by connecting it across a dc source along with an ammeter. Will the ammeter show a momentary deflection during the process of charging? If so, how would you explain this momentary deflection and the resulting continuity of current in the circuit? Write the expression for the current inside the capacitor. *2 mark*

Q.13. An object AB is kept in front of a concave mirror as show in the figure.



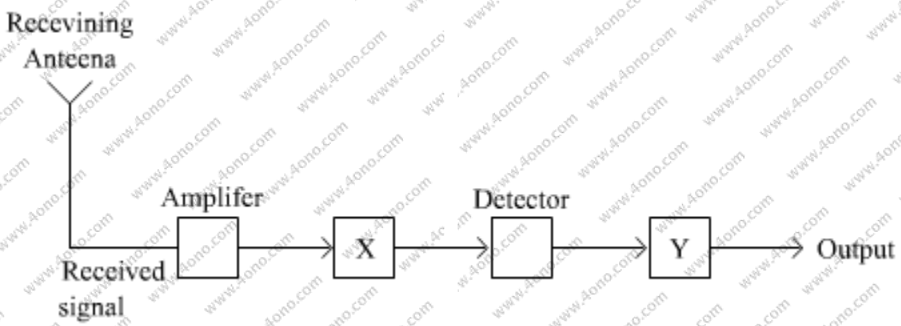
(i) Complete the ray diagram showing the image formation of the object.

(ii) How will the position and intensity of the image be affected if the lower half of the mirror's reflecting surface is painted black? *2 mark*

Q.14. Explain the scattering of light with an example. *2 mark*

Q.15. Describe briefly with the help of a circuit diagram, how the flow of current carriers in a p-n-p transistor is regulated with emitter-base junction forward biased and base-collector junction revers biased. *2 mark*

Q.16. In the given block diagram of a receiver, identify the boxes labelled as X and Y and write their function. *2 mark*



Q.17. A light bulb is rated 100 W for 220 V ac supply of 50 Hz. Calculate
(i) the resistance of the bulb;
(ii) the *rms* current through the blub. *2 mark*

OR

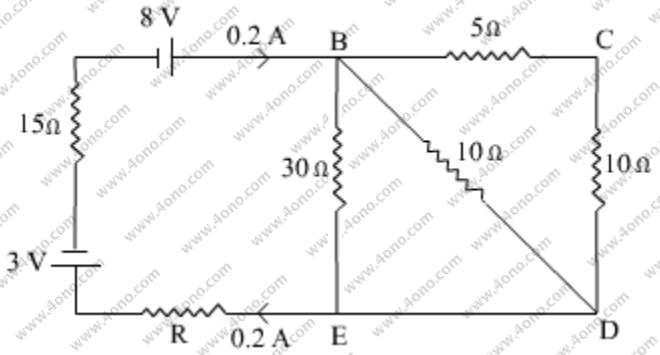
An alternating voltage given by V- 140 sin 314 is connected across a pure resistor of 50 Ω.Find
(i) the frequency of the source.
(ii) the rms current through the resistor.

Q.18. A circular coil of N turns and radius R carries a current I. It is unwound and rewound to make another coil of radius R/2. Current I remaining the same. Calculate the ratio of the magnetic moments of the new coil and the original coil. *2 mark*

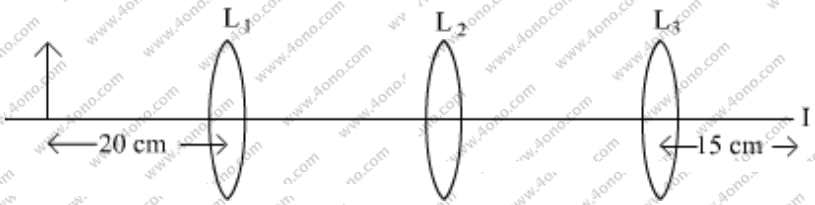
SECTION - C

Q.19. Deduce the expression for the electrostatic energy stored in a capacitor of capacitance 'C' and having charge 'Q'.
How will the (i) energy stored and (ii) the electric field inside capacitor be affected when it is completely filled with a dielectric material of dielectric constant 'K' ? *3 marks*

Q. 20. Calculate the value of the resistance R in the Circuit shown in the figure so that the current in the circuit is 0.2 A/ What would be the potential difference between point B and E? *3 marks*



Q.21. You are given three lenses L_1, L_2 and L_3each of focal length 20 cm. An object is kept at 40 cm in front of L_1, as shown. The final real image is formed at the focus 'I' of L_3. Find the separations between L_1, L_2 *and* L_3. *3 marks*



Q.22. Explain thermionic emission, field emission and photoelectric emission. *3 marks*

Q.23. Obtain the resonant frequency ωr of a series LCR circuit with L = 2.0H, C=32 μF and $R = 10\ \Omega$. What is Q-value of this circuit? *3 marks*

Q.24. Distinguish between unpolished and plane polarized light. An unpolished light is incident on the boundary between two transparent media. State the condition when the reflected wave is totally plane polarized find out the expression for the angle of incidence in this case. *3 marks*

Q.25. Draw a plot of potential energy of a pair of nucleons as a function separation. Mark the regions where the nuclear force is (i) attractive and (ii) repulsive. Write any two characteristic features of nuclear forces.

Q.26. In a Geiger-Marsden experiment, calculate the distance of closet approach to the nucleus of $Z = 80$, when an α-particle of 8 MeV energy impinges on it before it comes momentarily to rest and reverses its direction.
How will the distance of closet approach be affected when the kinetic energy of the α-particle is doubled? *3 marks*

OR

The ground state energy of hydrogen atom is -13.6 eV. If an electron makes a transition form an energy level -0.85 eV to -3.4eV, calculate the wavelength of the spectral line emitted. To which series of hydrogen spectrum does this wavelength belong?

Q.27. Define relaxation time of the free electrons drifting in conductor. How is it related to the drift velocity of free electrons? Use this relation to deduce the expression for the electrical resistivity of the material. *3 marks*

SECTION - D

Q.28 (a) In young's double slit experiment, drive the condition for (i) constructive interference and (ii) destructive interference at a point on the screen.

(b) A beam of light consisting of two wavelengths, 800 nm and 600 nm is used to obtains the interference fringes in young's double slit experiment on a screen placed 1.4m away. If the two slits are separated by 0.28 mm. calculate the least distance from the central bright maximum where the bright fringes of the two wavelength coincide. *5 marks*

OR

(a) How does an un-polarized light incident on polaroid get polarized? Describe briefly, with the help of a necessary diagram, the polarization of light by reflection from a transparent medium.

(b) Two polaroid 'A' and 'B' are kept in crossed position. How should a third polaroid 'C' be placed between them so that the intensity of polarized light transmitted by polaroid B reduced to 1/8th of the intensity of un-polarized light incident on A?

Q29 (a) Differentiate between three segments of a transistor on the basis of their size and level of doping.

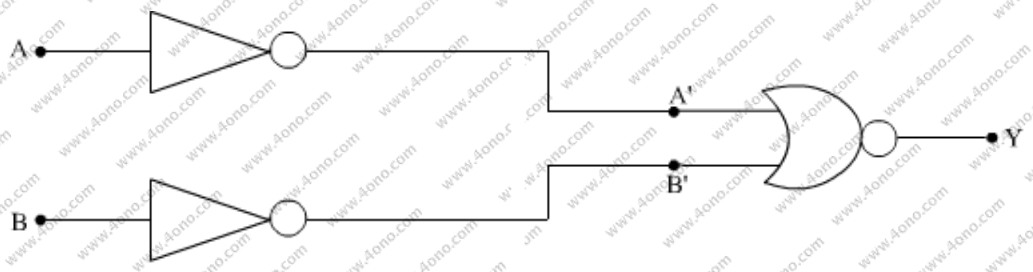
(b) How is a transistor biased to be in active state?

(c) With the help of necessary circuit diagram, describe briefly how n-p-n transistor in CE configuration amplifies a small sinusoidal input voltage. Write the expression for the ac current gain. *5 marks*

OR

(a) Explain briefly the principal on which a transistor-amplifier works as an oscillator. Draw the necessary circuit diagram and explain its working.

(b) Identify the equivalent gate for the following circuit and write its truth table.



Q.30. (a) Write the expression for the force, $\vec{F}$, acting on a charged particle of charge 'q' moving with a velocity $\vec{v}$ in the presence of both electric field $\vec{E}$ and magnetic field $\vec{B}$. Obtain the condition under which the particle moves undeflected through the fields.

(b) A rectangular loop of size $l \times b$ carrying a steady current I is placed in a uniform magnetic field $\vec{B}$. Prove that the torque $\vec{\tau}$ acting on the loop is given by $\vec{\tau} = \vec{m} \times \vec{B}$, where m is the magnetic moment of the loop. *5 marks*

OR

(a) Explain giving reasons, the basic difference in converting a galvanometer into (i) a voltmeter and (ii) and ammeter.

(b) Two long straight parallel conductors carrying steady currents I_1 and I_2 are separated by a distance 'd'. Explain briefly, with the help of a suitable diagram, how the magnetic field due to one conductor acts on the other. Hence deduce the expression for the force acting between the two conductors. Mention the nature of this force.