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CBSE 12th Physics 2014 Unsolved Paper Outside Board

TIME - 3HR. | QUESTIONS - 26

THE MARKS ARE MENTIONED ON EACH QUESTION

SECTION - A

Q.1. Using the concept of force between two infinitely long parallel current carrying conductors, define one ampere of current. *1 mark*

Q.2. To which part of the electromagnetic spectrum does a wave of frequency 5×10^{19} Hz belong? *1 mark*

Q.3. What is the force between two small charges of 2×10^{-7}C placed 30 cm apart in air? 1 mark

Q.4. Define intensity of radiation on the basis of photon picture of light. Write its S.I unit. *1 mark*

Q.5. The electric current flowing in a wire in the direction from B to A decreasing. Find out the direction of the induced current in the metallic loop kept above the wire as shown. *1 mark*

Q.6. Why is it found experimentally difficult to detect neutrinos in nuclear β −decay? *1 mark*

Q.7. Why is the use of A.C. voltage preferred over D.C. voltage? Give two reasons. *1 mark*

Q.8. A biconcave lens made of a transparent material of refractive index 1.25 is immersed in water of refractive index 1.33. Will the lens behave as a converging or a diverging lens? Give reason. *1 mark*

SECTION – B

Q.9. Using Rutherford's model of the atom, derive the expression for the total energy of the electron in hydrogen atom. What is the significance of total negative energy possessed by the electron? *2 mark*

OR

Bohr's postulates of the atomic model, derive the expression for radius of nth electron orbit, thus obtaining the expression for Bohr's radius.

Q.10. A parallel plate capacitor of capacitance C is charged to a potential V. It is then connected to another uncharged capacitor with the same capacitance. Find out the ratio of the energy stored in the combined system to that stored initially in the single capacitor. *2 mark*

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Q.11. Considering the case of a parallel plate capacitor being charged, show how one is required to generalize Ampere's circuital law to include the term due to displacement current. *2 mark*

Q.12. A cell of emf 'E' and internal resistance 'r' is connected across a variable resistor 'R'. Plot a graph showing variation of terminal voltage 'V' of the cell versus the current 'I'. using the plot, show how the emf of the cell and its internal resistance can be determined. *2 mark*

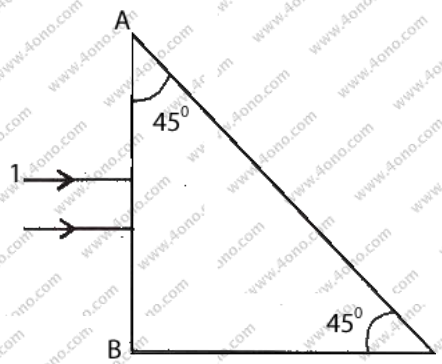
Q.13. Write the functions of the following in communication systems: *2 mark*

(i) Transmitter

(ii) Modulator

Q.14. Estimate the average drift speed of conduction electrons in a copper wire of cross-sectional area $1.0 \times 10^{-7}\ m^2$ carrying a current of 1.5×10^{-19} A. Assume the density of conduction electrons to be $9 \times 10^{28}\ m^{-3}$. *2 mark*

Q.15. Two monochromatic rays of light are incident normally on the face AB of an isosceles right - angled prism ABC. The refractive indices of the glass prism for the two rays '1' and '2' are respectively 1.35 and 1.45. Trace path of these rays after entering through the prism. ***2 marks***



Q.16. Write the functions of the following in communication system: *2 mark*

(i) Transducer

(ii) Repeater

Q.17. Draw a circuit diagram of $n - p - n$ transistor *2 mark*

Q.18. Show diagrammatically the behavior of magnetic field lines in the presence of : *2 mark*

(i) Paramagnetic and

(ii) Diamagnetic substance. How does one explain this distinguishing feature?

SECTION – C

Q.19. (a) Using the phenomenon of polarization, show, how transverse nature of light can be demonstrated.

(b) Two polaroid P_1 and P_2 are placed with their pass axes perpendicular to each other. Un-polarized light of intensity 10 is incident on P_1. A third polaroid P_3 is kept in between P_1 and P_2 such that its pass axis makes an angle of 30^0 with that of P_1. Determine the intensity transmitted through P_1, P_2 and P_3. *3 marks*

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Q.20. Define the term 'mutual inductance' between the two coils.

Obtain the expression for mutual inductance of a pair of long coaxial solenoids each of length *l* and radii r_1 and r_2 $(r_2 \gg r_1)$. Total number of solenoids are N_1 and N_2 respectively. *3 marks*

Q.21. Answer the following:

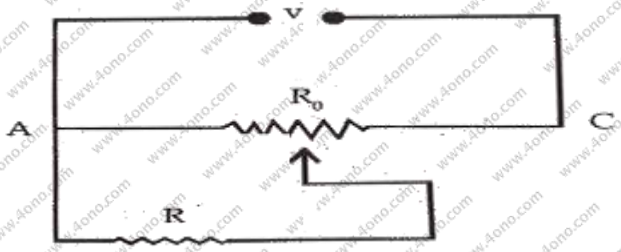
(a) Why are the connections between the resistors in a meter bridge made of thick copper strips?

(b) Why is it generally preferred to obtain the balance point in the middle of the meter bridge wire?

(c) Which material is used for the meter bridge wire and why. *3 marks*

OR

A resistance of R Ω draws current from a potentiometer, as shown in the figure. The potentiometer has a total resistance R_0 Ω. A voltage V is supplied to the potentiometer. Drive an expression for the voltage across R when the sliding contact is in the middle of the potentiometer.



Q.22. A convex lens of focal length 20 cm is placed coaxially with a convex mirror of radius of curvature 20 cm. The two are kept at 15 cm each other. A point object lies 60 cm in front of the convex lens. Draw a ray diagram to show the formation of the image by the combination. determine the nature position of the image formed. *3 marks*

Q.23. A voltage V= $V_0 \sin \omega t$ is applied to a series LCR circuit. Derive the expression for the average power dissipated over a cycle.

Under what condition (i) no power is dissipated even though the current flows through the circuit?

(ii) Maximum power is dissipated in the circuit? *3 marks*

Q.24. Write any two distinguishing features between conductors, semiconductors and insulators on the basis of energy band diagram. *3 marks*

Q.25. For the past some time, Aarti had been observing some erratic body movement. Unsteadiness and lack of Radha, who also used to complain of severe headache occasionally. Aarti suggested her parents to get a medical check-up of radha. The thoroughly examined Radha and diagnosed that she has a brain tumor. *3 marks*

(a) What, according to you, are the value to displayed by Aarti?

(b) How can radioisotopes help a doctor to diagnose brain tumor?

Q.26. Write two basic modes of communication. Explain the process of amplitude modulation. Draw a schematic sketch showing how amplitude modulated signal is obtained by superimposing a modulating signal over a sinusoidal carrier wave. *3 marks*

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Q.27. An electron microscope uses electron accelerated by a voltage of 50 k. V. Determine the de-Broglie wavelength associated with the electrons. Taking other factors, such as numerical aperture etc. to be same, how does the resolving power of an electron microscope compare with that of an optical microscope which used yellow light? *5 marks*

SECTION - D

Q.28. Draw a labelled diagram of van de Graff Generator. State its working principle to show how by introducing a small charged sphere into a larger sphere, a large amount of charge can be transferred to the outer sphere. State the use of this machine and also point out its limitations. *5 marks*

Q.29. (a) In young's double slit experiment, describe briefly how bright and dark fringes are obtained on the screen kept in front of a double slit. Hence obtain the expression for the fringe width. *5 marks*

(b) the ratio of the intensity at minima to the maxima in young's double slit experiment is 9:25. Find the ratio of the widths of the two slits.

OR

(a). Describe briefly how a diffraction Patten is obtained on a screen due to a single narrow slit illuminated by a monochromatic source of light. Hence obtain the conditions for the angular width of secondary maxima and secondary minima.

(b) Two wavelength of sodium light of 590 nm and 596 nm are used in turn to study the diffraction taking place at single slit of aperture 2×10^{-6} m. The distance between the slit and the screen is 1.5m. Calculate the separation between the positions of first maxima of the diffraction pattern obtained in the two cases.

Q.30. Deduce an expression for the frequency of revolution of a charged particle in a magnetic field and show that it is independent of velocity or energy of the particle.

(b) Draw a schematic sketch of a cyclotron. explain, giving the essential details of its construction, how it used to accelerate the charged particles. *5 marks*

OR

(a) Draw a labelled diagram of a moving coil galvanometer. Describe briefly its principle and working.
(b) Answer the following:
(i) Why is it necessary to introduce a cylindrical soft iron core inside the coil of a galvanometer?
(ii) Increasing the current sensitivity of galvanometer may not necessarily increase its voltage sensitivity. Explain, giving reason.

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