CBSE 12th Physics 2011 Unsolved Paper Outside Delhi

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TIME - 3HR. | QUESTIONS - 30
THE MARKS ARE MENTIONED ON EACH QUESTION

SECTION - A

Q.1. Define electric dipole moment. Write its S.I. unit. *1 mark*

Q.2. Where on the surface of Earth is the· angle of dip 90°? *1 mark*

Q.3. A hollow metal sphere of radius 5 cm is charged such that the potential on its surface is 10 V. What is the potential at the center of the sphere?

Q.4. How are radio waves produced? *1 mark*

Q.5. Write any two characteristic properties of nuclear force. *1 mark*

Q.6. Two bar magnets are quickly moved towards a metallic loop connected across a capacitor 'C' as shown in the figure. Predict the polarity of the capacitor. *1 mark*

Q.7. What happens to the width of depletion layer of a p-n junction when it is (i) forward biased, (ii) reverse biased? *1 mark*

Q.8. Define the term 'stopping potential' in relation to photoelectric effect. *1 mark*

SECTION - B

Q.9. A thin straight infinitely long conducting wire having charge density λ is enclosed by a cylindrical surface of radius r and length l, its axis coinciding with the length of the wire. Find the expression for the electric flux through the surface of the cylinder. *2 mark*

Q.10. Plot a graph showing the variation of coulomb force (F) versus $\left(\frac{1}{r^2}\right)$, where r is the distance between the two charges of each pair of changes: *2 mark*
$(1\ \mu C, 2\mu C)$ and $(2\mu C, -3\mu C)$, interpret the graphs obtained

Q.11. Write the expression for Lorentz magnetic force on a particle of charge 'q' moving with velocity $\vec{v}$ in a magnetic field $\vec{B}$. *2 mark*

Or

If χ stands for the magnetic susceptibility of given material, identify the class of material for which

(i) $-1 \geq \chi < 0$

(ii) $0 < \chi < \epsilon$ **(ϵ stands for a small positive number)**

Q.12. What are eddy currents? Write any two applications of eddy currents. *2 mark*

Q.13. What is sky wave communication? Why is this mode of propagation restricted to the frequencies only up to few MHz? *2 mark*

Q.14. In the given circuit, assuming point A to be at zero potential, use Kirchhoff's rules to determine the potential at point B. *2 mark*

Q.15. What is the area of the plates of a 2F parallel plate capacitor having separation between the plates is 0.5 cm? *2 mark*

Q.16. Net capacitance of three identical capacitors in series is 1 μF What will be their net capacitance if connected in parallel?
Find the ratio of energy stored in the two configurations if they are both connected to the same source. *2 mark*

Q.17. Using the curve for the binding energy per nucleon as a function of mass number A, state clearly how the release in energy in the processes of nuclear fission and nuclear fusion can be explained. *2 mark*

Q.18. In the meter bridge experiment, balance point was observed at J with AJ = l. ***2 mark***

(i) The values of R and X were doubled and then interchanged. What would be the new position of balance point?

(ii) If the galvanometer and battery are interchanged at the balance position, how will the balance point get affected? *2 mark*

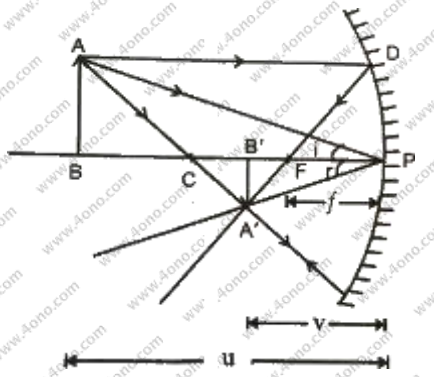
SECTION - C

Q.19. A convex lens made up of glass of refractive index 1·5 is dipped, in turn, in (i) a medium of refractive index 1·65, (ii) a medium of refractive index 1·33.
(a) Will it behave as a converging or a diverging lens in the two cases?
(b) How will its focal length change in the two media? *3 marks*

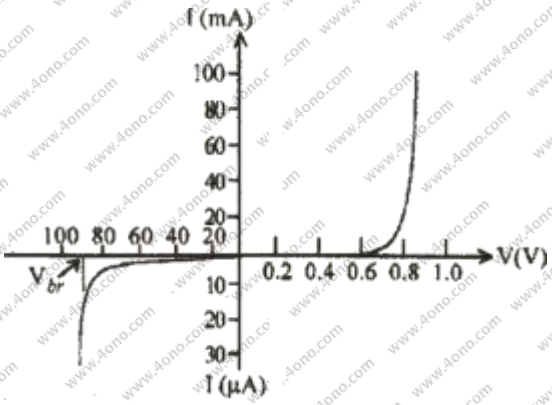
Q.20. Draw a plot showing the variation of photoelectric current with collector plate potential for two different frequencies, $V_1 > V_2$, of incident radiation having the same intensity. In which case will the stopping potential be higher? Justify your answer. *3 marks*

Q.21. The velocity of a certain monochromatic light, in a given transparent medium $2.25 \times 10^8 m/s$. What is the (a) critical angle of incidence, (b) polarizing angle for this medium? *3 marks*

Q.22. Use the mirror equation to show that. *3 marks*
(a) An object placed between f and 2f of a concave mirror produces a real image beyond 2f.
(b) A convex mirror always produces a virtual image independent of the location of the object.
(c) An object placed between the pole and focus of a concave mirror produces a virtual and enlarged image.



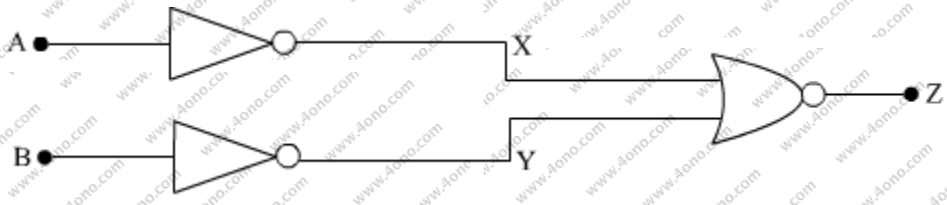
Q.23. The figure below shows the V-I characteristic of a semiconductor diode.
(i) Identify the semiconductor diode used.
(ii) Draw the circuit diagram to obtain the given characteristic of this device.
(iii). Briefly explain how this diode can be used as a voltage regulator. *3 marks*



Q.24. (a) Using de Broglie's hypothesis, explain with the help of a suitable diagram, Bohr's second postulate of quantization of energy levels in a hydrogen atom.

(b) The ground state energy of hydrogen atom is - 13·6 eV. What are the kinetic and potential energies of the electron in this state? *3 marks*

Q.25. You are given a circuit below. Write its truth table. Hence, identify the logic operation carried out by this circuit. Draw the logic symbol of the gate it corresponds to. ***3 marks***



Q.26. A compound microscope uses an objective lens of focal length 4 cm and eyepiece lens of focal length 10 cm. An object is placed at 6 cm from the objective lens. Calculate the magnifying power of the compound microscope. Also calculate the length of the microscope. *3 marks*

OR

A giant refracting telescope at an observatory has an objective lens of focal length 15 m. If an eyepiece lens of focal length 1·0 cm is used, find the angular magnification of the telescope.

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 3 moon is 3·42 x 106 m and the radius of the lunar orbit is $3 \cdot 8 \times 10^{8} m$ m.

Q.27. Two heating elements of resistances R_1 and R_2 when operated at a constant supply of voltage, V, consume powers P_1 and P_2 respectively. Deduce the expressions for the power of their combination when they are, in turn, connected in (i) series and (ii) parallel across the same voltage supply. *3 marks*

SECTION – D

Q.28. Prove that an ideal inductor does not dissipate power in an a. c. circuit. ***5 mark***

OR

(a) Using Ampere's circuital law, obtain the expression for the magnetic field due to a long solenoid at a point inside the solenoid on its axis.

(b) In what respect is a toroid different from a solenoid? Draw and compare the pattern of the magnetic field lines in the two cases.

(c) How is the magnetic field inside a given solenoid made strong? ***5 marks***

Q.29. State the working of a.c. generator with the help of a labelled diagram. The coil of an a.c. generator having N turns, each of area A, is rotated with a constant angular velocity ω. Deduce the expression for the alternating emf generated in the coil. What is the source of energy generation in this device? *5 marks*

OR

(a) Show that in an a.c. circuit containing a pure inductor, the voltage is ahead of current by 1p/2 in phase.

(b) A horizontal straight wire of length L extending from east to west is falling with speed v at right angles to the horizontal component of Earth's magnetic field B.

(i) Write the expression for the instantaneous value of the emf. induced in the wire.

(ii) What is the direction of the emf?

(iii). Which end of the wire is at the higher potential?

Q.30. State the importance of coherent sources in the phenomenon of interference. In Young's double slit experiment to produce interference pattern, obtain the conditions for constructive and destructive interference. Hence deduce the expression for the fringe width. How does the fringe width get affected, if the entire experimental apparatus of Young is immersed in water? *5 marks*

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