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CBSE 12th Physics 2008 Unsolved Paper Delhi Board

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Q.10. Define magnetic susceptibility of a material. Name two elements, one having positive susceptibility and the other having negative susceptibility. What does negative susceptibility signify? 2 mark

Q.11. The oscillating magnetic field in a plane electromagnetic wave is given by

$$B_y = (8 \times 10^{-8}) \sin [2 \times 10^{11} \tau + 300 \pi x] \text{ T}$$

- (i) Calculate the wavelength of the electromagnetic wave. 1 marks
(ii) Write down the expression for the oscillating electric field. 1 marks

Q.12. Prove that an ideal capacitor, in an a.c. circuit does dissipate power. 2 marks

Or

Derive an expression for the impedance of an a.c. circuit consisting of an inductor and a resistor.

Q.13. A nucleus ${}_{10}^{23}\text{Ne}$ undergoes decay becomes ${}_{11}^{23}\text{Na}$. calculate the maximum kinetic energy of electrons emitted assuming that the daughter nucleus and anti-neutrino carry negligible kinetic energy. 2 mark

$$\left[\begin{array}{l} \text{mass of } {}_{10}^{23}\text{Ne} = 22.994466 \text{ u} \\ \text{mass of } {}_{11}^{23}\text{Ne} = 22.989770 \text{ u} \\ 1 \text{ u} = 931.5 \text{ MeV} / c^2 \end{array} \right.$$

Q.14. (i) A transistor has a current gain of 30. If the collector resistance is 6k and input resistance is 1k, calculate its voltage gain. 1 marks

(ii) why is a semiconductor damaged by strong current? 1 mark

Q.15. A convex lens of refractive index 1.5 has a focal length of 20cm in air. Calculate the change in its immersed in water of refractive index 4/3. 2 mark

Q.16. A ray of light passing through an equilateral triangular glass prism from air undergoes minimum deviation when angle of incidence is 3/4th the angle of prism. Calculate the speed of light the prism. 2 marks

Q.17. The given inputs A, B are to a 2-input NAND gate. Draw the output waveform of the gate. 2 marks

Q.18. A transmitting antenna at the top of tower has a height of 36 m and the height of the receiving is 49m. What is maximum distance between them, for satisfactory communication in the loss mode? (Radius of earth = 6400 km). 2 marks

SECTION - C

Q.19. How is a wave front defined? Using Huygens's construction draw a figure showing the propagation of a plane wave refracting at a plane surface separating two media. Hence verify Snell's law of refraction. 3 marks

Q.20. A metallic rod length l is rotated at a constant angular speed, normal to a uniform magnetic field B . derive an expression for the current induced in the rod, if the resistance of the rod is R . 3 marks.

Q.21. Draw a circuit diagram of L.E.D what are its advantages? 3 marks

Q.22. An inductor 200mH, capacitor 500 F, resistor 10 are connected in series with a 100 V. variable frequency a.c. source. Calculate the. 3 marks

- (i) frequency at which the power factor of the circuit is unity
- (ii) current amplitude at this frequency
- (iii) Q-factor

Q.23. An air solenoid of length 0.3m, area of cross section is $1.2 \times 10^{-3} m^2$ and has 2500 turns. Around its central section, a coil of 350 turns is wound. The solenoid and the coil are electrically insulated from each other. Calculate the emf induced in the coil if the initial current of 3A in the solenoid is reversed in 0.25s. 3 marks

Q.24. State Gauss's theorem in electrostatics. Apply this theorem to derive an expression for electric field intensity at a point outside a uniformly charged thin spherical shell. 3 mark

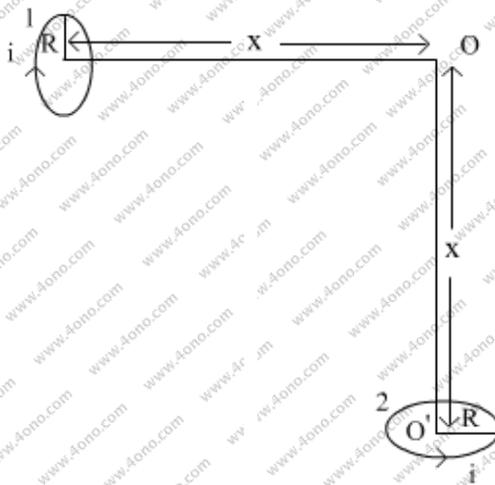
Q.25. An electromagnetic wave of wavelength is incident a photosensitive surface of negligible work function. If the photo-electrons emitted from this surface have the de-Broglie wavelength λ_1 , prove that $\lambda = \left(\frac{2 m c}{h}\right) \lambda_1^2$. 3 marks

Q.26. The level diagram of an element is given below. Identify by doing necessary calculations, which transition corresponds to the emission of a spectral line of wavelength 102.7 nm. 3 marks

Q.27. Draw a plot of the variation of amplitude versus for an amplitude modulated wave. Define modulation index. State its importance for effective amplitude modulation. 3 marks.

SECTION - D

- Q.28. (a)** Using Biota-Savart’s law, derive an expression for the magnetic field at the center of a circular coil of radius R, number of turns N, carrying current.
- (b)** two small identical circular coils marked 1, 2 carry equal currents and are placed with their geometric axes perpendicular to each other as shown in the figure. Derive an expression for the resultant magnetic field at O. *5 marks*



OR

Draw a schematic of a cyclotron. Explain its underlying principle and working stating clearly the function of the electric and magnetic fields applied ion a charged particle

Deduce an expression for the period of revolution and show that it does not depend on the speed of the charged particle.

- Q.29. (a)** for a ray of light travelling from a denser medium of refractive index n_1 to a rarer medium of refractive index n_2 , prove that $\frac{n_2}{n_1} = \sin i_c$, where i_c is the critical angle of incidence for the media.
- (b)** Explain with the help of a diagram. how the above principle is used for transmission of video signals using optical fibers? *5 marks*

OR

- (a)** What is plane polarized light? Two polaroid’s are placed at 90° to each other and the transmitted intensity is zero. What happens when one more polaroid is placed between these two bisecting the angle between them? how will the intensity of transmitted light vary on further rotting the polaroid?
- (b)** If a light beam shows no intensity variation when transmitted. Through a polaroid which is rotated, does it mean that the light is un – polarized? explain briefly.

Q.30. (a) Using Gauss's Law, derive an expression for the electric field intensity at any point outside a uniformly charged thin spherical shell of radius R and charge density C/m^2 . draw the field lines when the charge density of the sphere is (i) positive, (ii) negative.

(b) A uniformly charged conducting sphere of 2.5 m in diameter has a surface charge density of $100\mu C/m^2$. calculate the

(i) charge on the sphere

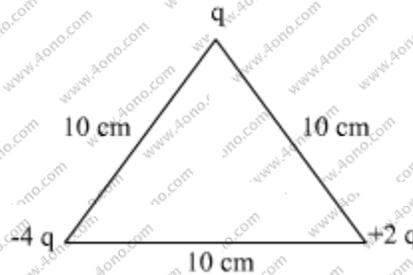
(ii) total electric flux passing through the sphere. 5 marks

OR

(a) Derive an expression for the torque experienced by an electric dipole kept in a uniform electric field.

(b) Calculate the work done to dissociate the system of three charged placed on the vertices of a triangle as shown.

Here $q = 1.6 \times 10^{-10} C$



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