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NCERT Solutions for Class 12 Physics Chapter 8 Electromagnetic Waves provide detailed answers to textbook theory questions, numerical problems, sheets, and exercises that will help you sort important electromagnetic wave topics and prepare electromagnetic wave class 12 notes. Download NCERT Solutions Class 12 Physics Chapter 8 PDF:-Download here NCERT Solutions for Class 12 Physics Chapter 8 Electromagnetic Waves is an important topic in the CBSE Class 12 exam. There are many complex formulas and equations in Grade 12 physics. In order to get good grades in the grade 12 exam, it is important to resolve the NCERT questions presented at the end of each chapter. Most often, questions asked in the 12th class CBSE physics exams directly arise from the NCERT textbook. Electromagnetism is one of the most frequently asked topics in exams. NCERT Solutions for Class 12 Physics Chapter 8 Electromagnetic Wave Electromagnetism is a kind of physical attraction that occurs in electrically charged particles, and this chapter consists of various subtopics that are equally important to learn. When the capacitor is charged with an external source, there may be a potential difference between the two capacitive plates, we will show you how to calculate this along with moving. This issue will be resolved according to The Rules of Kirchhoff. Concepts Participating in Class 12 Physics Chapter 8 Electromagnetic Waves Introduction Moving Current Electromagnetic Waves Sources of Electromagnetic Waves Nature Electromagnetic Waves Electromagnetic Wave Electromagnetic Wave Radiowave Microwave Waves Infrared Waves Visible Rays Ultraviolet Rays of Gamma Rays. We will determine the RMS value of the current current and analyze the similarities between conductivity current and current movement. We will analyze the similarity of wavelengths of X-rays, red lights and radio waves. In this solution you will see questions on the wavelength of electromagnetic waves traveling in a vacuum. Want to know what the frequency of electromagnetic waves produced by the oscillator is? Want to know about the electric field part of the harmonic electromagnetic wave in a vacuum? Check out the answers below. We will receive photo-energy of different parts of the electromagnetic spectrum and perceive how to get different scales of photon-energy electromagnetic radiation. We will learn how to prove that the energy density of one field is equal to the average energy density in another field. We know that there are more fundamental forces, such as weak and strong nuclear force and gravitational force. You'll find questions about them in another chapter. The questions mentioned in this chapter are very common in exams, and if prepared carefully will certainly make you understand electromagnetism nicely and Class 12 Physics NCERT Solutions Electromagnetic Waves Important Issues No. 8.1) The figure shows a capacitor of two circular plates each from a radius of 12 cm and divided into 5.0 cm. The capacitor is charged by an external source (not shown in the picture). The charging current is constant and is 0.15A. (a) Calculate the capacity and rate of change in the potential difference between the plates. (b) Get current displacement through the plates. (c) Does the first Kirchhoff rule (connection rule) apply to each capacitor plate? Explain. Answer 8.1: Given the values: the radius of each circular plate (r) is 12 cm or 0.12 m. The distance between the plates (d) is 5 cm or 0.05 m. Charging toka (I) is 0.0 15 Free space resolution is 0.85×10-12 C2N-1 m-2 varepsilon_{0} 8.85 times 10-12; Se-{2}N'-1'm'-2'0 8.85×10-12C2N-1m'2 (a) The capacity between the two plates can be calculated as follows: C'0Ad {0}C Each plate - 2'pi r'{2}r2 C'0'r2dC - frac-varepsilon {0} pi r'{2}'d'd'd0 No2 8.85 ×10-12×π (0.12)20.05-frak 8.85 times 10-12 times pi (0.12 {2}) 0.05-0 058.85×10-12×π (0.12)2 - 8,0032×10-12 F8.0032 times 10-12; F8.0032×10-12F and 80.032 pF Charge on each plate is given, q CV where, V is a potential difference between plates Differentiation on both sides in relation to time (t) gives: dqdt'CdVdt'frac'mathrm'd' q'mathrm'd' t't' C 'frac'mathrm'd' v'mathrm'd't'dtdq (CdtdV), No. dqdt'frac'mathrm'd' q'mathrm'd' t'dtdq - Current (i) ∴dVdt-IC∴'frac'mathrm'd' qgt; v'mathrm'd' ∴ t 1580.032×10-12×109 V/s-frac-0.15'80.032'times 10'-1 {9}2'; V/s80.032×10-120.15 1.87×109V/s Thus, the change in potential difference between the plates is 1.87×109 V/s1.87'times 10 '{9}'; V/s1.87×109V/s. (b) The current bias across the plate is the same as the current conductivity. Thus, the current movement, identifier 0.15 A. (c) Yes The first Kirchhoff rule is valid on each capacitor plate provided that we take the amount of conduct and movement for the current one. 8.2) Parallel plate capacitor (Figure 8.7) from circular plates each of the R and 6.0 cm radii has a capacitor C and 100 pF. The capacitor is connected to the delivery of 230 V ac with an angular frequency of 300 rad s-1. (a) What is the value of the current pursued? Is the current of the current equal to the current of movement? (c) Identify the amplitude B at 3.0 cm from the axis between the plates. Answer 8.2: Radius of each circular plate, R 6.0 cm and 0.06 m Capacity of parallel plate capacitor, C 100 pF and 100×10-12 F100 times 10'-12; F100×10-12F Power Strain, V No 230 Corner frequency, 300 rad with1 omega 300; Rade;s-1'300rads-1 (a) Rms value held current, I ' VXc-frac-V'X_'c'Xc V Where, XcX_-to-hawk - capacity reaction - 1 C-frac{1}omega C'C1 ∴I'V×C∴ I - Wimkh∴Meha S∴I× 230×300××100×10-12230s 300×100×10 -1230-300× 100 times 10-12-230×300×100×10-12 x 6.9×10-6A6.9 times 10-6,000 yen 6.9×10-6A and 6.9 9 euros; Thus, the value of rms during the current is 6.9 a6.9 euros; A6.9Z. (b) Yes, the current of the conduct is equivalent to the current of movement. (c) Magnetic field is given as: B'0r2'R2I0 I_{0} {2} mu_{0}B 0.mu_{0}0 - Free Space Re-writing - 4 10×7 H A24pi (time 10-7); Na A-24×10-7NA-2 I0I_{0}I0 - Maximum current value - 2 I'sqrt{2}; I2 I r - Distance between plates from axis 3.0 cm and 0.03 m ∴B-4×10×0.03×2×6,6,6 9× 10-62× (0.06)2∴B frak 4'pi'times 10-7times 0.03'times sqrt{2}times 6 10-6 degrees in time (0.06) {2} ∴B2× (0.06)24×10-7 × 0.03×2 ×6.9×10-6 and 1.63×10-11 T1.63 times 10-11; T1.63×10-11T Thus, the magnetic field at this point is 1.63×10-11 T1.63'times 10'-11'; T1.63×10-11T. 8.3) What is the same physical quantity for X-rays of wavelengths of 10-10 m, red wavelength light 6800 and 500m wavelengths? Answer 8.3: The speed of light (3×1083 times 10'{8}3×108 m/s) in a vacuum is the same for all wavelengths. It does not depend on the wavelength in the vacuum. 8.4) The electromagnetic wave aircraft travels in a vacuum along the z-direction. What can you say about the directions of its electric and magnetic field vectors? If the wave frequency is 30 MHz, what is its wavelength? Answer 8.4: The electromagnetic wave moves in a vacuum along the z-direction. The electric field (E) and the magnetic field (H) are in the x-y plane. They are mutually perpendicular. Wave frequency, v 30 MHz and 30×106 with 130 times 10'{6};s'-1'30×106s-1 Speed of light in a vacuum, C 3×1083times 10'{8}3×108 m/s Wavelength is given a: 'cv'lambda - frac'v'vc 3×10830×106-frac 3 times 10{8} x 30 times 10.{6} 30×1063×108 and 10 m 8.5) Radio can be tuned to any station ranging from 7.5 MHz to 12 MHz. What is the corresponding wavelength band? Answer 8.5: Radio can be tuned to a minimum frequency, v1'7'5 MHz 7.5×106 Hzv_{1} 7.5 ; MHz - 7.5 times in 10 {6}; Maximum frequency Hz 7.5 MHz 7.5×106 Hz, v2-12 MHz×106 Hzv_{2} 12; MHz - 12 times 10 {6}; Hzv2 12 MHz×106 Hz Light Speed, from 3×108 m/s3 times 10{8}; m/s3×108m/s The corresponding wavelength for v1v_{1}v1 v_{1} lambda_{1} can be calculated as: 10 {3} 7.5 times 10 {6} 40;m7.5×1063×103 (40m Corresponding wavelength for v2v_{2}v2 can be calculated as v_{2} lambda_{2}: 3×10312×106 -25 m-frak 3 times {3} 10×1063×103 10{6} - 25;m12×1063×103 25m Thus, the wavelength of the radio range is from 40 m to 25 m. 8.6) The charged particle fluctuates about its average equilibrium position with a frequency of 109 Hz. What is the frequency of electromagnetic waves produced by the oscillator? Answer 8.6: The frequency of the electromagnetic wave produced by the oscillator is the same as that of the charged particle, which oscillates about its middle position, i.e. 109 Hz. What is the amplitude of the electric field of part of the wave? Answer 8.7: Electromagnetic wave amplitude in a vacuum, B0-510 nT-510×10-9 TB_{0} 510 euros; nT - 510 times 10-9; TB0 510nT-510×10-9T Speed of light in a vacuum, with 3×108 m/s3 times 10{8}; m/s3×108 m/s Amplitude of the electric field of electromagnetic wave is given by ratio, E'cB0×3×108×510×10-9-153 N/CE - cB_{0} - 3 times 10.{8} times 510 times 10-9; N/CE'cB0 No3×108×510×10-153N/C Thus, the electric part of the wave field is 153 N/C. 8.8) Suppose that the amplitude of the electric wave field E0'120 N/CE_{0} N/CE0 120N/C and its frequency of M50Hz. (a) Identify B0, q, k and q B_{0}, ; omega; k; and; lambdaB0, kand (b) Find expressions for E and B. Answer 8.8: Electric Field Amplitude, E0'120 N/CE_{0} y 120; N/CE0 120N/C Source Frequency, v 50 MHz and 50×10650 times 10 {6}50×106 Hz Light Speed, 3×1083 time of 1 {8}0×3×108 m/s (a) The magnitude of the magnetic field force is given as: B0 E_{0}'E0cB_{0} 3×108-frac{120} x 3 times 10{8} x 3×108120 y 4×10-7 TH 400 nT4 times 10-7; T 400 euros; nT4×10-7T-400nT Corner source frequency is given: 2nv'2n×50×106'omega 2nv 50 times 10 {6} 2nv×50×106 and 3.14×1083.3 14 times Constant spread {8}3.14×108 rad/× with given as: kek ×108-1.05 rad/m-frak 3.14 times in 10-{8} x 3 times 10.{8} x 1.05 euros; Rad/m3×1083.14×108 1.05rad/m Wavelength is given: thujambada and frak vc 3×10850× 10 6-frac 3'times 10'{8}'50'times 10'{6}'50×1063×108 and 6.0 m (b) Suppose the wave spreads in a positive direction x. Then the electric field vector will be in a positive direction, and the magnetic field vector will be in a positive z-direction. This is because all three vectors are mutually perpendicular. The equation of the electric field vector is given as: E_{0};sin (kx - omega t); 'widehat'j'E0 sin (kx-'t)j 120 sin '1.05x-3.14×108t j'1 20';sin'1.05x - 3.14'times 10'{8}t';' widehat'j'120sin'1.05x-3.14×108t'j, magnetic field vector is given as: B-'B0 sin (kx-'t) ke B_{0} -B';sin (kx - omega t);' widehat'k'B'B0 sin (kx-t)k B-(4×10-7) sin 1.05x-3.14×108t ke overline B (4'times 10'-7); sin 1.05h - 3.14 times 10{8}t; widehat'k'B (4×10-7)sin 1.05x-3.14×108t'k No 8.9) The terminology of different parts of the electromagnetic spectrum is given in the text. Use the E xz formula (for quantum radiation energy: photon) and get a photon of energy in EV units for different parts of the electromagnetic spectrum. How are the different scales of photon-energy you receive related to electromagnetic radiation sources? Answer 8.9: Energy photon is given as: E and hv - hc'frac'hc'lambda'h,h,h,h,5 Where, h - Permanent Planck - 6.6×10-34 Js6.6'times 10'-34'; Js6.6×10-34Js c - Light speed 3×108 m/s3 times 10{8};m/× 3×108 m/s ∴×× . 10819.8×10-26J∴ e x frak 6.6 times 10-34 times 3-times 10 {8}lambda; J∴E6×10×3×108 No19.8×1026 J and 19.8×10×1.6× 10-19-12.12 375×10-7 eV-frak 19.8 times 10-26lambda times 1.6-times 10 -19; eV×1.6×10-1919.8×10-26 No12.375×10-7 eV This table lists photon-energy for different parts of the electromagnetic spectrum for different lambda. λ\lambdaλ (m) 103 1 10−310^{-3}10−3 10−610^{-6}10−6 10−810^{-8}10−8 10−1010^{-10}10−10 10−1210^{-12}10−12 E (eV) 12.375×10−1012.375\times 10^{-10}12.375×10−10 12.375×10−712.375\times 10^{-7}12.375×10−7 12.375×10−412.375\times 10^{-4}12.375×10−4 12.375×10−112.375\times 10^{-1}12.375×10−1 12.375×10112.375\times 10^{1}12.375×101 12.375×10312.375\times 10^{3}12.375×103 12.375×10512.375\times 10^{5}12.375×105 The photon energies for the different parts of the spectrum of a source indicate the spacing of the relevant energy levels of the source Q 8.10) In a plane electromagnetic wave, the electric field oscillates sinusoidally at a frequency of 2.0 × 1010 Hz and amplitude 48 V m–1. What is the wavelength? (b) What is the amplitude of a oscillating magnetic field? (c) Show that the average energy density of Field E is equal to the average energy density of field B. with 3×108 m with 13 times 10 {8}; m;s-1-3×108m-1 Answer 8.10: Frequency of electromagnetic wave, v 2×1010 Hz2 times 10 {10}; Amplitut of the electric field Hz2×1010 Hz, E0-48 In 1E_{0} 48\; Wh;m-1'E0 48Vm-1 Light speed, with 3×108 m/s3'time 10'{8};m/s3×108m/s (a) Wavelength is given as: -Frak-Kovacki 3×1082×1010-0.015 m-frak 3 times 10.{8} x 2 times 10.{10} x 0.015; m2×10103×108 0.015 m (b) Magnetic Field Force is given as: B0'E0cB_{0} E_{0} 3×108×1.6×10-7 Thraq{48} 3 times 10 {8} 1.6 times 10-7; T3×10848 1.6×10-7T (c) Electric Field Energy Density is given as: UE-12 -0 E2U_ E and frac{1}{2}; Epsilon ({0}); E-{2}UE No21 No0 E2 and, magnetic field energy density is given as: UB-12 0B2U_ B - frac{1}2 mu_{0} B{2}UB No20 1 B2 Where, No 0'epsilon No 0 {0}0 - Free Space Resolution 0'mu_{0}0 - Free Space Permeability of Free Space E ... (1) Where, c mu_{0} epsilon_{0}{1}'1'0 q0c (2) Putting equation (2) into the equation (1), we get E'1'0 0 0 frac{1} sqrt epsilon_{0} ; »mu_{0} »; On both sides we get the equaliser NO0 1 B epsilon_{0} squaring on both sides, we get E2'1'0 {2} B2E{1} mu_{0} BHHA {2}E2'0 0 1 B2 and 0 E2'B2'0 epsilon_{0};; E-{2} - Frak {2} mu_{0} 0 E20 B2 12 0 E212 0 B200{1}{2}000; (epsilon_{0}); The {2}'s equalizer is frak{1}{2}; Frak {2} mu_{0}21 x 0 E221 0 B2 UE) UBU_ E U_ UB BYJU'S provides a class-wise NCERT SOLUTIONS, along with educational materials, notes, books, assignments and examples of work prepared by top-notch country experts who have been involved in the teaching of the cbsE curriculum for decades. Decades. em waves class 12 ncert solutions. ncert solutions class 12 physics em waves