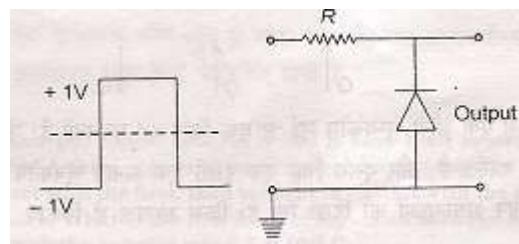


CLASS XII

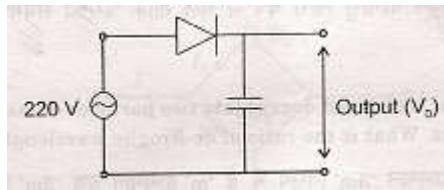
SAMPLE PAPER

PHYSICS

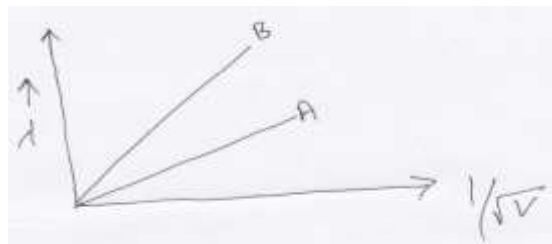
1. Name the device which works under the principle of velocity selector?
2. Define 1 Ampere the unit of a.c current and how does it vary from d.c current?
3. Is the magnitude of displacement current less, equal or greater than the conduction current? explain
4. a) Why secondary rainbow is fainter than the primary rainbow? b) why clouds are appearing white?
5. In a wave picture of light, the intensity of light is determined by square of amplitude of wave. What determines the intensity of light in photon picture of light?
6. The maximum K.E of emitted photo electron is 15eV. Find its stopping potential.
7. Draw a graph to show the variation of impact parameter (in alpha particle scattering) with scattering angle θ .
8. Name a communication channel which can offer a transmission bandwidth in excess of 100 GHz.
9. If accelerating voltage of anode is doubled what will be the change in De Broglie's wave length of electron?
10. Waves from which portion of EM spectrum are utilized to identify defects in crystals. Write the frequency range corresponding to this zone
11. Why does the electric field inside a dielectric decrease when it is placed in an external electric field?
12. Draw the symbol and write truth table of NOR gate.?
13. A wire is stretched to double its length. What will be the effect on its resistivity ?
14. Two thin lenses of power +7D and -3D are in contact. What is the focal length of the combination ?
15. The radii of curvature of the faces of a double convex lens are 10 cm and 15 cm. If focal length is 12 cm, what is the refractive index of glass ?
16. What is the distance of closest approach when a 5.0 MeV proton approaches a gold nucleus?
17. It is observed that only 6.25% of a given radioactive sample is left undecayed after a period of 16 days. What is the decay constant of this sample, in day^{-1} ?
18. For a transistor connected in common emitter mode, the voltage drop across the collector is 2 V and β is 50. Find the base current, if R_C is 2 K .
19. State the reason, why GaAs is most commonly used in making of a solar cell.
20. A square wave is applied to p-n junction diode as shown in the figure. Draw the output waveform.



21. A diode is connected to 220 V (r.m.s.) a.c. in series with a capacitor, as shown in the figure. What is the voltage V across the capacitor ?



22. An electron, an alpha-particle and a proton have the same kinetic energy. Which one of these particles has the largest de Broglie wavelength.
23. Write an expression for resistivity of a metallic conductor showing its variation over a limited range of temperature.
24. Magnetic field lines can be entirely confined within the core of a toroid, but not within a straight solenoid why?
25. How much average power dissipates, over a complete cycle of an A.C. source supply when connected to a capacitor?
26. A glass lens of refractive index 1.45 disappears when immersed in a liquid. What is the value of refractive index of the liquid?
27. The radioactive isotope D decays according to the sequence
 $D \xrightarrow{\beta} D_1 \xrightarrow{\alpha} D_2$ If the mass number and atomic number of D_2 are 176 and 71 respectively, what is the (i) mass number and (ii) atomic number of D
28. Two lines A and B in the plot given below show variation of de Broglie wavelength, λ versus $1/\sqrt{V}$, accelerating potential difference, for the two particles carrying the same charge. Which one of the two represents a particle of smaller mass?
29. Two nuclei have mass number in the ratio 1: 2 ratio of their nuclear densities?
30. An electron moving through a magnetic field experiences a force. Under what condition is this possible?
31. The instantaneous value of voltage from an a.c. source is given by $E=300 \sin 314t$. What is the r.m.s. voltage of the source?
32. A bulb and a capacitor are connected in series to an a.c. source of variable frequency. How will the brightness of the bulb change on increasing the frequency of the a.c. source.
33. Name the part of electromagnetic spectrum that has largest penetrating power.
34. When light undergoes refraction. What happens to its frequency.
35. In the given diagram, is the diode D forward or reverse biased?



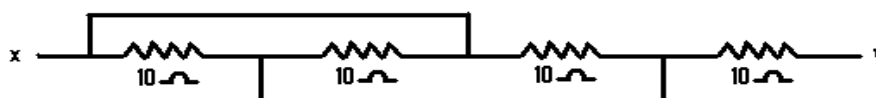
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36. Write the truth table for the gate shown below.



37. Two point charges $4\mu\text{C}$ and $-2\mu\text{C}$ are separated by a distance of 1m in air. At what point on the line joining the two charges is the electric potential zero.
38. Four resistors of resistance each of 10Ω are connected as given below.



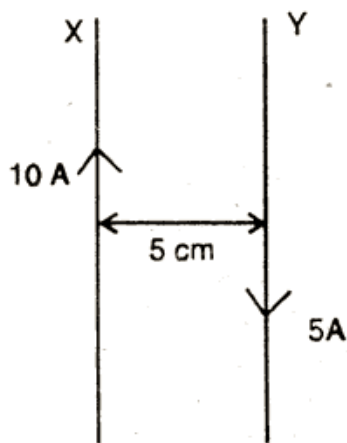
a.

equivalent resistance between points X and Y

Calculate the

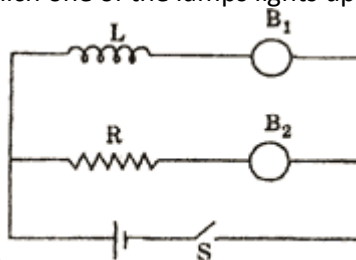
39. Explain how the width of depletion layer in a p-n junction diode changes when the junction is (i) forward biased (ii) reverse biased.
40. How does the resistivity of (i) a conductor and (ii) a semiconductor vary with temperature? Give reason for each case.
41. An alternating voltage of frequency f is applied across a series LCR circuit. Let f_r be the resonance frequency for the circuit. Will the current in the circuit lag, lead or remain in phase with the applied voltage when (i) $f > f_r$, (ii) $f < f_r$? Explain your answer in each case.
42. Define 'electric line of force' and give its two important properties.

43. Define the terms 'Magnetic Dip' and 'Magnetic Declination' with the help of relevant diagrams.
44. Find the wavelength of electromagnetic waves of frequency 5×10^{19} Hz in free space. Give its two applications.
45. What is an 'analog signal' and a 'digital signal'? How can an analog signal be converted into a digital signal?
46. A T.V. tower has a height of 400 m at a given place. Calculate its coverage range, if the radius of the earth is 6400 km.
47. With the help of a diagram, show the biasing of a light emitting diode (LED). Give its two advantages over conventional incandescent lamps.
48. An a.c. voltage of 100 V, 50 Hz is connected across a 20 ohm resistor and 2mH inductor in series. Calculate (i) impedance of the circuit, (ii) rms current in the circuit.
49. A galvanometer has a resistance of I_t gives full scale deflection with a current of 2 mA. Calculate the value of the resistance needed to convert it into an ammeter of range 0-0.3 A.
50. The output of an OR gate is connected to both the inputs of a NAND gate. Draw the logic circuit of this combination of gates and write its truth table.
51. Two point charges are separated by a distance of 1 m in air. Calculate at what point on the line joining the two charges is the electric potential zero.
52. The output of a 2-input NOR gate is fed to a NOT gate. Draw the logic circuit of this combination of gates and write the truth table for the output of the combination for all inputs.
53. Write any four characteristics of electromagnetic waves. Give two uses each of (a) Radio-waves (b) Micro-waves
54. Explain with the help of a labelled diagram the underlying principle and working of a step-up transformer. Why cannot such a device be used to step-up d.c. voltage ?
55. State the laws of radioactive decay. Establish a mathematical relation between half-life period and disintegration constant of a radioactive nucleus.
56. How is the mutual inductance of a pair of coils affected when (a) separation between the coils is increased? (b) the number of turns of each coil is increased ? (c) a thin iron sheet is placed between the two coils, other factors remaining the same? Explain your answer in each case.
57. Define the terms threshold frequency and stopping potential in relation to the phenomenon of photoelectric effect. How is the photoelectric current affected on increasing the (i) frequency (ii) intensity of the incident radiations and why?
58. State Gauss' theorem. Apply this theorem to obtain the expression for the electric field intensity at a point due to an infinitely long, thin, uniformly charged straight wire and at any point outside a uniformly charged thin spherical shell.
59. Explain (i) forward biasing, (ii) reverse biasing of a P-N junction diode. With the help of a circuit diagram, explain the use of this device as a half - wave rectifier.
60. Define self-inductance and give its S. I . unit. Derive an expression for self- inductance of a long, air-cored solenoid of length l , radius r , and having N number of turns.
61. Draw a labelled ray diagram to show the formation of an image by a compound microscope. Write the expression for its magnifying power. How does the resolving power of a compound microscope change, when (i) refractive index of the medium between the object and the objective lens increases; and (ii) wavelength of the radiation used is increased?
62. An electric dipole is held in a uniform electric field. (a) Using suitable diagram, show that it does not undergo any translatory motion and (ii) derive an expression for the torque acting on it and specify its direction.
63. Draw a graph to show the variation of the angle of deviation 'D' with that of the angle of incidence 'i' for a monochromatic ray of light passing through a glass prism of refracting angle 'A'. Hence deduce the relation.
- $$\frac{\sin\left(\frac{D_m + A}{2}\right)}{\sin\frac{A}{2}}$$
64. Two long parallel straight wires X and Y separated by a distance of 5 cm in air carry currents of 10 A and 5 A respectively in opposite directions. Calculate the magnitude and direction of the force on a 20 cm length of the wire Y.



A circ

65. circular coil of 100 turns, radius 10 cm carries a current of 5 A. it is suspended vertically in a uniform horizontal magnetic field of 0.5 T, the field lines making an angle of 60° with the normal of the plane of the coil. Calculate of the torque must be applied on it to prevent it from turning.
66. Two point charges $q_A = +3 \mu\text{C}$ and $q_B = -3 \mu\text{C}$ are located 20 cm apart in vacuum, (i) Find the electric field at the mid point of the line AB joining the two charges, (ii) If a negative test charge of magnitude $1.5 \times 10^{-9} \text{ C}$ is placed at the centre, find the force experienced by the test charge.
67. In a given circuit, inductor L and resistor R have identical resistance. Two similar electric lamps B_1 and B_2 are connected as shown. When switch S is closed, (i) which one of the lamps lights up earlier, (ii) will the lamps be



equally bright after some time? Justify your answer.

68. Write the mathematical relation for the resistivity of a material in terms of relaxation time, number density and mass and charge of charge carriers in it. Explain, using this relation, why the resistivity of a metal increases and that of a semi-conductor decreases with rise in temperature.
69. Name the gate obtained from the combination of gates shown in the figure. Draw its logic symbol. Write the

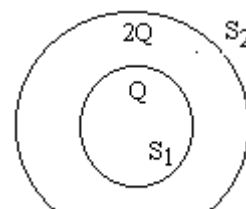


truth table of the combination.

70. Force of attraction between two point charges placed at a distance 'd' apart in a medium is 'F'. What should be the distance in the same medium so that the force of attraction between them becomes 9F ?
71. Two bulbs whose resistances are in the ratio of 1 : 2, are connected in parallel to a source of constant voltage. What will be the ratio of power dissipation in these?
72. Write two properties of a material used as a suspension wire in a moving coil galvanometer.
73. A plane electromagnetic wave of frequency 25 MHz travels in free space along the x-direction. At a particular point in space and time the electric vector is $\vec{E} = 6.3 \hat{j} \text{ V/m}$. Calculate \vec{B} at this point.
74. Define the term 'activity' of a radionuclide. Write its SI unit.
75. At what angle of incidence should a light beam strike a glass slab of refractive index $\sqrt{3}$, such that the reflected and the refracted rays are perpendicular to each other ?
76. A carrier wave of peak voltage 12 V is used to transmit a message signal. What should be the peak voltage of the modulating signal in order to have a modulation index of 75 %?
77. Which mode of propagation is used by short wave broadcast services having frequency range from a few MHz up to 30 MHz?
78. Derive an expression for the energy stored in a charged parallel plate capacitor with air as the medium between its plates.
79. A bar magnet of magnetic moment 1.5 J/T lies aligned with the direction of a uniform magnetic field of 0.22 T.
80. What is the amount of work required by an external torque to turn the magnet so as to align its magnetic moment, normal to the field direction, & Opposite to the field direction?

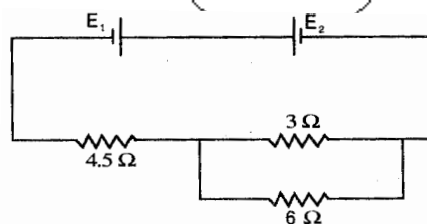
81. Define self – inductance and give its S.I. unit.
82. Derive an expression for self inductance of a long, air-cored solenoid of length l , radius r and having N number of turns.
83. Name the radiations of electromagnetic spectrum which are used in
- Warfare to look through fog.
 - Radar and geostationary satellites.
 - Studying the structure and properties of atoms and molecules.
 - To photograph internal parts of a human body.
84. The work function of cesium metal is 2.14 eV. When light of frequency 6×10^{14} Hz is incident on the metal surface, photoemission of electrons occurs. What is the Maximum kinetic energy of the emitted electrons.
85. An electron beam projected along $+X$ axis, experiences a force due to a magnetic field along the $+Y$ -axis. What is the direction of the magnetic field?
86. The instantaneous current from an ac source is $i = 6 \sin 314t$. What is the rms value of the current?
87. A bulb connected in series with a solenoid is lit by ac source. If a soft iron core is introduced in the solenoid, will the bulb glow brighter?
88. Which part of the electromagnetic spectrum is used in operating RADAR? Give its wavelength range.
89. Two thin lenses $+6D$ and $-2D$ are in contact. What is the focal length of the combination?
90. The ionization potential of hydrogen is 13.6 V. calculate the energy of its first excited state.
91. How does the collector current change in a junction transistor, if the base region has larger width?
92. How does the conductivity change of a semiconductor with increase of temperature?
93. Define the term temperature coefficient of resistivity. Draw a graph showing the variation of resistivity with temperature for copper.

94. S_1 and S_2 are two hollow concentric sphere enclosing charges Q and $2Q$ respectively as shown in fig. What is the ratio of electric flux through S_1 & S_2 ?



95. How will the electric flux through the sphere change, if a medium of constant ϵ is introduced in the space inside S_1 in place of air?

96. Two cells E_1 and E_2 in the given circuit diagram have an emf of $4V$ and $8V$ respectively. Calculate the current flowing through the resistance of 3Ω .



97. How will a dia & ferro magnetic material behave when non-uniform external field? Give two examples each.

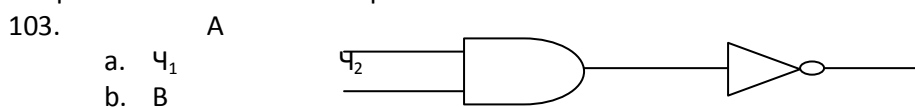
98. Write two applications of each, microwaves and infrared

99. A double concave lens of glass of RI 1.6 has radii of $40cm$, $60cm$. Calculate its focal length. Also find the focal length of the lens if the lens is immersed in a liquid of RI 1.3 .

100. Show that the de-Broglie wavelength λ of electrons of energy E is given by the relation $\lambda = \frac{h}{\sqrt{2mE}}$

101. An electrical element x , when connected to an alternating voltage source, has the current through it leading the voltage by $\pi/2$ radian. Identify x and write an expression for its reactance.

102. Identify the logic gate 1 and 2 in the logic circuit given. Also, write the truth table for the final output for all possible combination of inputs A and B .



104. What is the angle between the directions of electric field at any (i) axial point and (ii) equatorial point due to an electric dipole?

105. Why should the spring/suspension wire in a moving coil galvanometer have low torsional constant?

106. The de-Broglie wave lengths, associated with a proton and a neutron, are found to be equal. Which of the two has a higher value for kinetic energy?

107. Why does a metallic plate become very hot when it is surrounded by a coil carrying high frequency alternating current?

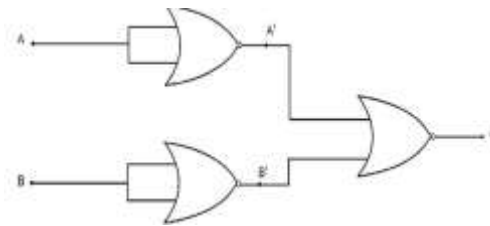
108. Name the characteristics of electromagnetic waves that (i) increases (ii) remains constant.

109. Four nuclei of an element fuse together to form a heavier nucleus. If the process is accompanied by release of energy, which of the two – the parent or the daughter nucleus would have a higher binding energy/nucleon?

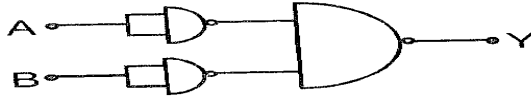
110. Two large parallel thin metallic plates are placed close to each other. The plates have surface charge densities of opposite signs and of magnitude $20 \times 10^{-12} \text{ C/m}^2$. Calculate the electric field intensity (i) in the outer region of the plates and (ii) in the interior region between the plates.
111. The following table gives the values of work function for a few photosensitive metals. If each of these metals is exposed to radiation of wave length 300 nm, which of them will not emit photo electrons? Why?

112. S. No	113. Metal	114. Work Function (ev)
115. 1	116. Na	117. 1.92
118. 2	119. K	120. 2.15
121. 3	122. Mo	123. 4.17

124. The value of ground state energy of hydrogen atom is -13.6 eV. What does the negative sign signify?
125. Calculate De-broglie wavelength of an electron beam accelerated through a potential difference of 60 volt.
126. An electric lamp, connected in series with a capacitor and a.c source, is glowing with certain brightness. How does the brightness of lamp change on reducing the capacitance?
127. Sketch a graph to show how the capacitance C of a capacitor varies with the charge Q given to it.
128. What is the significance of the negative energy of electron in the orbit?
129. A parallel beam of light reflects from concave mirror. Show the reflected wave front.
130. If the colour bands on a resistor are in the order of red, yellow, orange and silver. What is the resistance of the resistor?
131. A carrier wave of peak voltage 20 V is used to transmit the message signal. What should be the peak voltage of the modulating signal in order to have a modulation index of 80%?
132. Inputs A and B applied to the logic gates set up as shown below. Write the truth table and the name of gate formed by this set up.

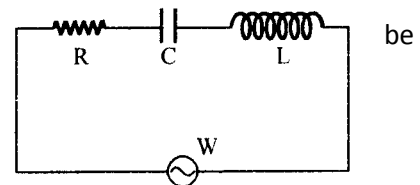


133. Use Ampere's circuital law to derive the formula for the magnetic field due to an infinitely long straight current carrying wire.
134. A copper rod of length L rotates with an angular speed ω in a uniform magnetic field B. Find the induced emf developed across the two ends of a rod. The field is perpendicular to the motion of a rod.
135. Draw a labelled circuit diagram for a simple amplitude demodulator.
136. Obtain the B.E. of an α -particle in MeV. Given
137. Mass of proton = 1.007825 a.m.u, Mass of neutron = 1.00865 a.m.u, Mass of He nucleus = 4.002800 a.m.u, $1 \text{ a.m.u} = 931 \text{ MeV}$.
138. What is the frequency of radio waves?
139. Define SI unit of Electric flux.
140. A photon and an electron both have same energy E. What is the Ratio of their wavelength?
141. What orientation of an electric dipole in a uniform electric field corresponds to its stable equilibrium?
142. If distance between two charges is doubled and their individual charges are also doubled. What would happen to the forces, between them.
143. The potential difference across a conductor of uniform cross-section is doubled. What happen to the drift velocity of electrons inside the conductor?
144. Define space wave propagation?
145. Draw circuit diagram of NOR gate.
146. If Coulomb's law involved dependence (instead of $\frac{1}{r^2}$), would Gauss's law still true?
refractive index of the material of an equilateral triangular prism is μ . Find the angle of minimum deviation for a monochromatic ray passing through it.
147. Prove that - $I = Ane Vd$.
148. Write the truth table of the following logic gate.



a.

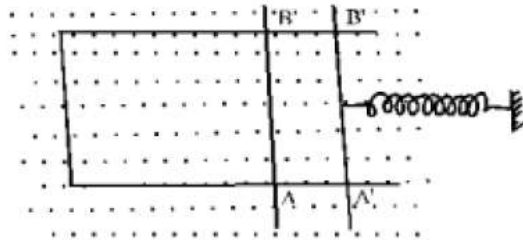
149. In a hydrogen atom, an electron revolves around a proton. Which of these two exerts a greater electrostatic force on the other?
150. What is the force experienced by a positively charged particle Q moving at right angles to a uniform electric field E .
151. What is the order of voltages that can be built up using a Van De Graff generator?
152. What is the angle b/w Electric field and Dipole moment at an axial point?
153. Define gyromagnetic ratio. What is its value?
154. State the condition in which terminal voltage across a secondary cell is equal to its emf.
155. The dielectric strength of air is 3×10^6 V/m. What is the maximum charge that can be safely stored on a sphere of radius 10m ?
156. Name two types of commercially available resistors.
157. On the same graph plot the variation of E versus R and V versus R for a point charge.
158. Define mobility and mention its SI unit
159. Two resistors are connected in parallel b/w A and B to give a net resistance of 2 ohms. When one of these resistors is broken, the net resistance becomes 3 ohms. What is the resistance of the resistor that was broken?
160. Using a suitable graph, explain why nichrome is used in standard resistance coils.
161. A velocity selector is to be designed for particles of velocity 10m/s . What magnetic field should be employed if the electric field in it is 100 N/C
162. Draw an equipotential surface for a uniform electric field.
163. In a certain arrangement a proton does not get deflected while passing through a magnetic field region. Under what condition is this possible?
164. Why does a metallic piece become very hot when it is surrounded by a coil carrying high frequency alternating current?
165. What is the focal length of a convex lens of focal length 30cm in contact with a concave lens of focal length 20cm ?
166. Ultraviolet radiations of different frequencies ν_1 and ν_2 are incident on two photosensitive materials having work functions W_1 and W_2 ($W_1 > W_2$) respectively. The kinetic energy of the emitted electrons is same in both the cases. Which one of the two radiations will be of higher frequency? Draw the voltage current characteristics of a Zener diode.
167. Define electric field intensity. Write its S.I. unit. Write the magnitude and direction of electric field intensity due to an electric dipole of length $2a$ at the mid point of line joining the charges.
168. Define the term magnetic dipole moment of a current loop. Write the expression for the magnetic moment when an electron revolves at a speed v around an orbit of radius r in hydrogen atom.
169. In the circuit shown below, R represents an electric bulb. If the frequency ν of the supply is doubled, how should the values of C and L be changed so that the glow in the bulb remains unchanged?



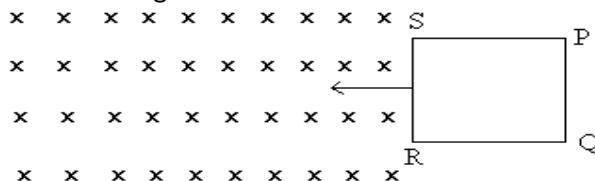
170. Answer the following questions:
- In any ac circuit, is the applied instantaneous voltage equal to the algebraic sum of the instantaneous voltages across the series elements of the circuit? Is the same true for rms voltage?
 - Why is choke coil needed in the use of fluorescent tubes with ac mains? Why can we not use an ordinary resistor instead of the choke coil?
171. What is the equipotential due to an electric dipole at an equatorial point?
172. In a certain arrangement a proton does not get deflected while passing through a magnetic field region. Under what condition is this possible?
173. Define self induction of a coil. Write its S I unit.
174. Name the radiations which are next to IR radiations in electromagnetic spectrum having
175. Shorter wavelength & (ii) Longer wavelength
176. Two thin lenses of power $+6\text{D}$ and -2D are in contact. What is the focal length of the combination?
177. The stopping potential in an experiment on photoelectric effect is 1.5V . What is the maximum kinetic energy of the emitted photoelectrons?
178. Draw the voltage current characteristics of a Zener diode.
179. What is the nuclear radius of ^{125}Fe if that of ^{27}Al is 3.6 fermi?

180. A diverging lens of focal length 'F' is cut into two identical parts each forming a plano-concave lens. What is the focal length of each part?
181. How does resolving power of an astronomical telescope get affected on
- increasing the aperture of objective lens?
 - increasing the wavelength of light used?
182. How does the stopping potential applied to a photocell change, if the distance between the light source and the cathode of the cell is doubled?
183. A $500\mu\text{C}$ charge is at the centre of a square of side 10 cm. Find the work done in moving a charge of $10\mu\text{C}$ between two diagonally opposite points on the square.
184. Zener diodes have higher dopant densities as compared to ordinary p-n junction diodes. How does it affect the
- Width of the depletion layer?
 - Junction field?
185. Name the characteristics of electromagnetic waves that
- Increases
 - remains constant
186. in an electromagnetic spectrum as one moves from radio wave region towards ultraviolet region. What happens?
187. If an electron and a proton having same momenta enter perpendicularly to a magnetic field, how will you compare the nature of the path followed by them?
188. A 50 Hz ac source of 20V is connected to a series combination of resistor R and capacitor C. The voltage across R is 12V, what is the voltage across C?
189. Let the wavelengths of electromagnetic waves used quite often for:
190. killing of germs in a household water purifiers,
- remote sensing &
 - treatment of cancer
 - be labelled as λ_1 , λ_2 & λ_3 . Arrange λ_1 , λ_2 & λ_3 in increasing order.
191. A ray falls on a prism ABC (AB = BC) and travels as shown in the fig 1. What is the least value of refractive index of material of the prism?
192. When photons energy $h\nu$ are incident on the surface of photosensitive material of work function ϕ is the kinetic energy of the ejected electrons?
193. The TV signals have a bandwidth of 4.7MHz. What is the number of channels in a bandwidth of 4700GHz?
194. Two identical charged particles moving with same speed enter a region of uniform magnetic field. If one of these enters normal to the field direction and the other enters along a direction at 30° with the field, what would be the ratio of their angular frequencies?
195. Why does a metallic piece become very hot when it is surrounded by a coil carrying high frequency alternating current?
196. How is a sample of an n-type semiconductor electrically neutral though it has an excess of negative charge carriers?
197. Name the characteristics of electromagnetic waves that (i) increases (ii) remains constant in the electromagnetic spectrum as one moves from radiowave region towards ultraviolet region.
198. How would the angular separation of interference fringes in young's double slit experiment change when the
199. distance of separation between the slits and the screen is doubled?
200. Calculate the ratio of energies of photons produced due to transition of electron of hydrogen atom from its,
- Second permitted energy level to the first level, and
 - Highest permitted energy level to the second permitted level
201. Give expression for the average value of the a c voltage $V = V_0 \sin \omega t$ over the time interval $t = 0$ and $t =$
202. How is the band gap, E_g , of a photo diode related to the maximum wavelength, m , that can be detected by it?
203. Define mobility. What is its S.I unit?
204. Two electric bulbs are marked 220V, 60W and 220V, 100W. Which of the two bulbs has greater resistance? Why?
205. What is the value of angle of dip at a place on the surface of the earth, where the horizontal component of earth's magnetic field is 0.5 times the resultant field at the place?

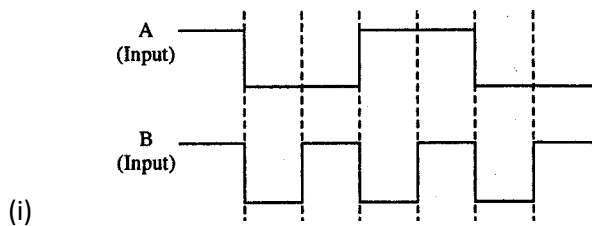
206. An a.c. generator generates an emf 'e' given by: $e = 311 \sin (100 \pi t)$ volt. Find the rms value of the emf generated by the generator.
207. A rectangular wire frame, shown below, is placed in a uniform magnetic field directed upward and normal to the plane of the paper. The part AB is connected to a spring. The spring is stretched and released when the wire AB has come to the position A'B' (t=0). How would the induced emf vary with time? Neglect damping.



208. What is the ratio of speed of γ -rays and radio waves in vacuum?
209. Two nuclei have mass numbers in the ratio 1:8. What is the ratio of their densities?
210. The stopping potential obtained in an experiment on photoelectric effect is 2.5 V. What is the value of maximum kinetic energy of the electrons emitted from the metal?
211. Can two equi-potential surfaces intersect each other? Explain.
212. (b) Two charges $-q$ and $+q$ are located at points A (0, 0, -a) and B (0, 0, +a) respectively. How much work is done in moving a test charge $2 \mu\text{C}$ from
213. point P (7, 0, 0) to Q (-3, 0, 0)?
214. Explain what is meant by quantization of charge and conservation of charge, also give the important property of charge ?
215. State and explain coulomb's law, give the vector form of coulomb law.
216. Explain the concept of electric field . give the relation between electric field strength and force.
217. Derive expression for electric field intensity at a point due to a point charge.
218. Derive an expression for dipole field intensity at any point on (i) axial line (ii) equatorial line of dipole.
219. Derive an expression for torque acting on electric dipole in a uniform electric field
220. Derive an expression for potential energy of an electric dipole in a uniform electric field.
221. Derive an expression for potential at a point due to point charge and due to an electric dipole.
222. State gauss's theorem in electrostatics . how will u prove it for spherically symmetric surfaces.
223. Using gauss's theorem , derive an expression for electric field intensity at a point due to a (i) line charge (ii) a uniformly charged spherical shell (ii) an infinite plane sheet of charge
224. Explain the term electric field intensity .electric field inside conductor is zero. Explain.
225. A force F experienced by a particle of charge q moving with velocity v in a magnetic field B is given by $\vec{F} = q (\vec{v} \times \vec{B})$. Which pair of vectors is always at right angles to each other?
226. The closed loop PQRS is moving into uniform magnetic field acting at right angles to the plane of the paper as shown in the figure. State the direction in which the induced current flows in the loop.

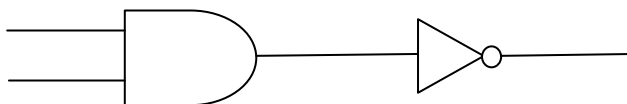


227. Sketch the out put from a NAND gate having inputs A and B as shown following

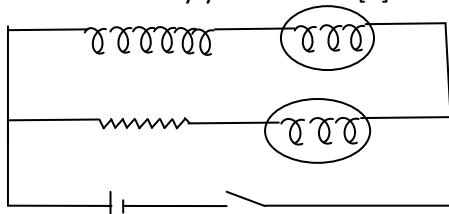


228. The energy of an electron in n^{th} orbit is given by $E_n = -\frac{13.6}{n^2}$ eV. Calculate the energy required to excite an electron from ground state to the second excited state.
229. Which of the following has the shortest wavelength: microwaves, ultraviolet rays and X-rays.
230. What will happen to the image formed by a mirror if half of it is covered with a black paper?

233. The frequency of AC is being increased in a circuit containing bulb and a capacitor in series. How will the brightness of the bulb be affected?
234. Derive an expression for electric potential on the axis of a dipole.
235. A cylindrical metallic wire is stretched to increase its length by 5%. Calculate the percentage change in its resistance.
236. Define resistivity and conductivity of a conductor. Write their SI units.
237. Draw graph for ohmic and non ohmic conductor. Write one example of each.
238. What is the dielectric constant of a conductor?
239. Two protons are entering a magnetic field perpendicular to the magnetic field with velocities in the ration 1:2. What is the ratio of their angular frequencies?
240. A magnetic field exits along $-ve$ z-axis .coil A is kept with the magnetic field with the plane of the coil in the x-y plane and coil b is kept with the plane of the coil in x-z plane. In which coil will there be no induced emf when magnetic field varies with time?
241. Write the relationship between amplitudes of electric and magnetic field in free space for an electromagnetic wave.
242. A converging lens and a diverging lens are kept in contact and the combination produces a real image. Which of the lens has longer focal length?
243. Maximum kinetic energy of electron emitted by metal A is 4ev and metal B is 5ev. Which metal has greater work function when exposed to same radiation?
244. $^{23}\text{Ne}_{10}$ decay by β emission to $^{23}\text{Na}_{11}$.write down the decay equation.
245. An electric dipole of dipole moment 20×10^{-6} Cm is enclosed by a closed surface. What is the net flux coming out of the surface?[1]
246. Which orientation of a magnetic dipole in a uniform magnetic field will correspond to its stable equilibrium?[1]
247. Draw a graph to show the variation of capacitive reactance with frequency of an a.c. source.[1]
248. Which part of electromagnetic spectrum has largest penetrating power?[1]
249. Draw a graph showing the variation of intensity of polarized light transmitted by the analyser.[1]
250. Name the experiment, which establishes the wave nature of a particle.[1]
251. State two properties of nuclear forces.[1]
252. Write the truth table for the combination of gates shown here.[1]

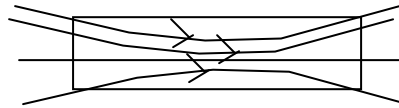
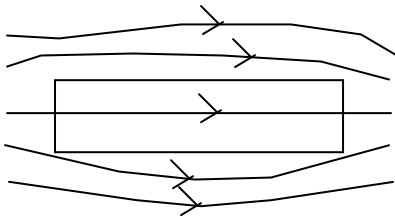


253. A charge q is placed at the center of the line joining to equal charges Q . Show that the system of three charges will be in equilibrium if $q=-Q/4$.
254. Show mathematically that potential at a point on the equatorial line of an electric dipole is zero
255. A storage battery of emf 12 V and internal resistance 0.5Ω is to be charged by a 120 V d.c. supply of negligible internal resistance. What resistance is required in the circuit for the charging current to be 3 A ? What is the terminal voltage of the battery during charging?[2]
256. Using Ampere circuital law derive an expression for the magnetic field along the axis of a torodial solenoid
257. Derive the expression for the self-inductance of a solenoid.[2]
258. In a given circuit inductor L and resister R have identical resistance. Two similar electric lamps B_1 and B_2 are connected as shown. When switch S is closed, (i) which one of the lamps lights up earlier (ii) will the lamps be equally bright after some time? Justify your answer.[2]



259. Define one coulomb of charge.
260. The small ozone layer on the top of the stratosphere is crucial for human survival, why?
261. Why can't a transformer be used to step up dc voltage?
262. What is the nature of the magnetic field in a moving coil galvanometer?
263. The current is set up in a long copper pipe. Is there a magnetic field (i) inside (ii) outside the pipe?

264. Sketch three equipotential surfaces for a pt. charge.
 265. How is the coulomb force between two charges affected by the presence of the third charge?
 266. What is the cause of induced emf?
 267. Why are microwaves used in RADAR?
 268. A uniform magnetic field gets modified as shown below, When two specimens X and Y are placed in it.



identify the two specimens X and Y

269. State the reason for the behaviour of the field lines in X and Y.
 270. Give any one difference between FAX and e-mail systems of communication.
 271. Give the ratio of the number of holes and number of conduction electrons in an intrinsic semiconductor.
 272. How does focal length of a lens change when red light is replaced by blue light?
 273. How does the intensity of central maximum change, if the width of the slit is halved in a single slit diffraction experiment?
 274. How will the photoelectric current change on decreasing the wavelength of incident radiation for a given photosensitive material?
 275. In which series of hydrogen spectra, the transitions involve the longest changes energy?
 276. What is the mass of pion plus (π^+)?
 277. Vehicles moving in foggy weather use yellow colour head-lights. Why?
 278. Name the physical quantity whose S.I. unit is :
 a. Coulomb Per Volt
 b. Volt/ meter.
 279. Force is given by $\mathbf{F} = Q(\mathbf{V} \times \mathbf{B})$. Of these, Name the Pairs of vectors which are always at right angles to each other.
 280. Mention one advantage and one disadvantage of AC over DC.
 281. Name two electro magnetic waves that are emitted by an incandescent bulb.
 282. Mention one advantage of reflecting type telescope.
 283. With what purpose was famous Davisson- Germer experiment with electrons performed?
 284. Draw the symbol of the universal logic gate.
 285. Draw energy band diagram of P-type semiconductor.
 286. Capacitor P, Q and R each have a capacitance 'C'. A battery can charge the capacitor P to a potential V. If after charging P, the battery is disconnected from it and the charged capacitor P is connected in following separate instances to Q and R (i) In parallel to Q and (ii) In series to 'R'
 287. A metal wire is stretched to increase its length by 10% What is the percentage change in its resistance? Will the resistivity of the wire change?
 288. When a battery of emf. 'E' and internal resistance 'r' is connected to a resistance 'R', a current I flows through it. Derive a relation between E, I, r and R.
 289. Mention 2 properties of alloys from which permanent magnets are made.
 290. An inductor of 2mH carries a current of 5A. The direction of current is reversed in it in half a second due to which a voltage is produced across the inductor. What is this phenomenon known as? Find the Voltage Produced.
 291. Plot a graph to show how the following quantities vary with the frequency of the source.
 a. Capacitive reactance
 b. Inductive reactance.
 292. Vehicles moving in foggy weather use yellow color headlights. Why?
 293. Give reasons for :
 (a) The sky appears blue
 (b) Sun appears reddish at sunset and sunrise.
 294. Draw a labeled block diagram for a communication system.
 295. Define electric field intensity at a point. Derive an expression for the electric field intensity at a point on the axial line of a short dipole.

296. Show that the potential on the equatorial line of an electric dipole is zero
297. What is an electric dipole? Derive an expression for the torque acting on an electric dipole, when held in a uniform electric field. Hence, define the dipole moment.
298. State Gauss theorem in electrostatics. Using this theorem, derive an expression for the electric field intensity due to an infinite plane sheet of charge of charge density σ
299. Show mathematically that for any point outside the shell, the field due to a uniformly charged thin spherical shell is the same as if the entire charge of the shell is concentrated at the centre.
300. Apply Gauss theorem to find electric field intensity at a point due to an infinitely long thin, uniformly charged straight wire.
301. Define the capacitance of a capacitor. Give its S.I unit for a parallel plate capacitor, prove that the total energy stored in a capacitor is $\frac{1}{2} cv^2$ and hence derive expression for the energy density of the capacitor.
302. Derive an expression for the capacitance of a parallel plate capacitor when the space between the plates is partially filled with a dielectric medium of dielectric constant k .
303. In a hydrogen atom, an electron revolves around a proton. Which of these two exerts a greater electrostatic force on the other?
304. What is the force experienced by a positively charged particle Q moving at right angles to a uniform electric field E .
305. What is the order of voltages that can be built up using a Van De Graff generator?
306. What is the angle between Electric field and Dipole moment at an axial point?
307. Define gyromagnetic ratio. What is its value?
308. State the condition in which terminal voltage across a secondary cell is equal to its emf.
309. The dielectric strength of air is 3×10^6 V/m. What is the maximum charge that can be safely stored on a sphere of radius 10m?