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**CBSE OLD PAPER PROBLEMS FOR CLASS 12 STUDETNS**

1. State Gauss’ Law in electrostatics. A cube which is each side a is kept in an electric filed given by as shown in the figure, where C is a positive dimensional constant. Find out

1. The electric flux through the cube
2. The net change inside the cube
3. Two charges of 5 nC and -2 nC are placed at points (5 cm, 0, 0) and (23 cm, 0, 0) in the region of space. Where there is no other external field. Calculate the electrostatic potential energy of this charge system.
4. In the figure given below X,Y represent parallel plate capacitance having the same area of plates and the same distance of separation between them. What is the relation between the energies stored the capacitors?

1. Two identical parallel plate (air) capacitors C1 and C2 have capacitance C each. The space between their plates is now filled with dielectrics are shown in the figure. If the two capacitors still have equal capacitance, they obtain the relation between dielectric constants K,K1 and K2

1. Four capacitors of values are connected to a 6 V battery as shown in the figure. Determine the

1. Equivalent capacitance of the network
2. The charge on each capacitor.
3. Two wires of equal length, one copper and the other of manganin have the same resistance. Which wire is thicker?
4. Estimate the average drift speed of conduction electrons in a copper wire of cross-sectional area carrying a current of 1.5 A. Assume the density of conduction electrons to be 
5. A) Define the term ‘drift velocity’ of charge carriers in a conductor obtain the expression for the current density in terms of relaxation time.

B) A 100 V battery is connected to the electric network is shown in the figure. If the power consumed in the 2Ω resistor is 200 W, determine the power dissipated in the 5Ω resistor.

1. A potentiometer wire of length 1 m has a resistance of 10Ω. Determine the emf of the primary cell which gives balance point at 40 cm. (efm battery 6v, internal resistance 5Ω)
2. Write any two factors on which internal resistance of a cell depends. The reading on a high resistance voltmeter, when a cell is connected across it, is 2.2 V. When the terminals of the cell are also connected to a resistance of 5Ω as shown in the circuit, the voltmeter reading drops to 1.8V. Find the internal resistance of the cell.

1. Use Kirchhoff’s rules to determine the value of the current flowing in the circuit shown in the figure.

1. In the electric network shown in the figure, use Kirchhoff’s rule to calculate the power consumed by the resistance R=4Ω

1. Using Kirchhoff’s rule, determine the value of unknown resistance R in the circuit, so that no current flows through 4Ω resistance. Also, find the potential difference between points A and D

1. State Kirchhoff’s rules. Use these rules to write the expressions for the currents  in the circuit diagram shown in the figure below.

1. In a meter bridge, the null point is found at a distance of 60 cm from A. If a resistance of 5Ω is connected in series with S, then null point occurs at 50.0 cm from A. Determine the values of R and S.

1. State Bio-Savart’s law expression it in the vector form. Use it to obtain the expression for the magnetic field at an axial point distance d from the centre of a circular coil of radius a carrying current I. Also, find the ratio of the magnitudes of the magnetic field of this coil at the centre and at an axial point for which 
2. A narrow beam of protons and deuterons, each having the same momentum, enters a region of uniform magnetic field directed perpendicular to their direction of momentum. What would be the ratio of the radii of the circular path described by them?
3. A galvanometer coil of 50Ω resistance shows full scale deflection for a current of 5mA. How will you convert this galvanometer into a voltmeter of range 0 to 15 V?
4. The current flowing in the two coils of self-inductance are increasing at the same rate. If the power supplied to the two coils are equal, find the ratio of
5. Induced voltages ii) the currents and
6. The energies stored in the coil at a given instant.
7. The instantaneous current and voltage of an AC circuit are given by I=(10 sin 300t) A and V=(200 sin 300t) V. What is the power dissipation in the circuit?
8. An inductor 200 mH, capacitor 500μF, resistor 10Ω are connected in series with a 100 V variable frequency AC source. Calculate the
9. Frequency at which the power factor of the circuit is unity.
10. Current amplitude at this frequency
11. Q-factor
12. A 100μF capacitor is in series with a 40 Ω resistor and is connected to a 100 V, 50 Hz AC source. Calculate the following
13. Maximum current in the circuit.
14. time lag between current maximum and voltage maximum
15. A step-up down transformer operated on a 2.5 kV line. It supplies a load with 20 A. The ratio of the primary winding to the secondary is 10 : 1. If the transformer is 90% efficient, calculate.
16. the power output ii) the voltage and
17. the current in the secondary coil
18. In a electromagnetic wave, the oscillating electric field having a frequency of  and an

amplitude of propagates in the positive X-direction.

1. What is the wavelength of the electromagnetic wave?
2. Write down the expression to represent the corresponding magnetic field.
3. A ray of light falls on a transparent sphere with centre C as shown in the figure. The ray emerges from the sphere parallel to the line AB. Find the angle of refraction of A if the refractive index of material of sphere is .

1. Calculate the speed of light in a medium whose critical angle is 
2. The radii of curvature of the faces of a double convex lens are 10cm and 15cm. If focal length of the lens is 12 cm, find the refractive index of the material of the lens.
3. 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 from 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 and position of the image formed.
4. A converging lens has a local length of 20 cm in air. It is made of a material of refractive index 1.6. It is immersed in a liquid of refractive index 1.3. Calculate its new focal length.
5. Find the position of the image formed of the object O by the lens combination given in the figure.

1. Two convex lenses of focal length 20 cm and 1 cm constitute a telescope. The telescope is focused on a point which is 1 m away from the objective. Calculate the magnification produced and the length of the tube if the final image is formed at a distance 25 cm from the eyepiece.
2. In Young’s double slit experiment, monochromatic light of wavelength 6:30 nm illuminates the pair of slits and produces an interference pattern in which two consecutive bright fringes are separated by 8.1 mm. another source of monochromatic light produces the interference pattern in which the two consecutive bright fringes are separated by 7.2 mm. find the wavelength of light from the second source. What is the effect on the interference fringes, is when monochromatic source is replaced by a source of white light?
3. The ratio of the intensities at minima to the maxima in the Young’s double slit experiment is 9:25. Find the ratio of the widths of the two slits.
4. If the angle between the axis of polarizer and the analyser iswrite the ratio of the intensities of original light and the transmitted light after passing through the analyser.
5. I) Ultraviolet light of wavelength 2271 from a 100W mercury source is incident on a photocell made of molybdenum metal. If the stopping potential is 13 V, estimate the work-function of the metal.
6. An electron is revolving around the nucleus with a constant speed of  Find the de-Broglie wavelength associated with it.
7. An α-particle and a proton are accelerated from rest by the same potential. Find the ratio of their de-Broglie wavelength.
8. An electron is accelerated through a potential difference of 100 V. What is the de-Broglie wavelength associated with it? To which part of the electromagnetic spectrum does this value of wavelength correspond?
9. Find the ratio of energies of photons produced due to transition of an electron of hydrogen atom from its i) second permitted energy level to the first permitted level and

ii) Ratio of the highest permitted energy level to the first permitted level.

1. What is the ratio of radii of the orbit corresponding to first excited state and ground state, in a hydrogen atom?
2. In Bohr’s theory of hydrogen atoms, calculate the energy and wavelength of the photon emitted during a transition of the electron from the first excited state to its ground state. Write in which region of the electromagnetic spectrum this transition lies.

Given Rydberg constant, 

1. Two nuclei have mass numbers in the ratio 1:8. What is the ratio of their nuclear radii?
2. The half-life of a radioactive substance is 30s. Calculate
3. The decay constant and
4. Time taken for the sample to decay by 3/4th of the initial value.
5. The half-life of undergoing α-decay is  Determine the activity of 10g sample of , Given that 1g of  contains  atoms.
6. The input waveforms A and B and the output waveform Y of a gate are shown below. Name the gate it represents. Write its truth table and draw the logic symbol of this gate.

1. Identify the equivalent gate represented by the circuit shown in the figure. Draw its logic symbol and write the truth table.

1. The typical output characteristicsversusof an *n-p-n* transistor in CE configuration is shown in the figure. Calculate

1. The output resistance and
2. The current amplification factor 
3. Anuj made a rough estimate about the height of the antenna to be about 20 m from the ground . Calculate the maximum distance up to which radiations from the tower are likely to reach. Use the value of radius of the earth 
4. A carrier wave,  is amplitude modulated by a modulating signal  The maximum and minimum amplitudes of the resulting AM wave are found to be 16 V and 4 V, respectively. Calculate the modulation index.
5. A message signal of frequency 10 kHz and peak voltage of 10 V is used to modulated frequency of 1 MHz and peak voltage of 20 V. Determine the
6. Modulation index
7. The sidebands produced