UNIT I ELECTROSTATICS 8 MARKS

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2007

Q1. What is quantization of charge? 1

Q2. Four capacitors of equal capacitances when connected in series have a net capacity C_s and when connected in parallel have a net capacity c_p. what will be the value of C_s/C_p? 2

Q3. State Gauss's theorem. Derive the expression for electric field of a uniformly charged infinite plane sheet. Does it depend on distance? OR 1+3+1=5

What is potential of a capacitor? Derive the expression for energy stored in a capacitor. Calculate energy stored in a capacitor of 10μF when it is charged to a potential of 200V. 1+3+1=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2008

Q1. How many excess electrons must be removed from a body to give it a positive charge of 1×10^{-8}C? 1

Q2. Force between two charges kept at a distance 'd' apart in air is F. If the charges are kept at the same distance apart in water, how does the force between them change? 2

Q3. Find the expression of torque acting on an electric dipole placed in a uniform electric field. What is the net force acting on it? Under what condition will the the torque become maximum? 3+1+1=5

OR

State Coulomb's law in electrostatics. Deduce the expression for the electric field intensity at any point due to a point charge by applying Gauss's theorem. 1+4=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2009

Q1. State the significance of Coulomb's law. 1

Q2. A metal surface has a positive charge of 10^{-10}C. How much electrons would have been removed from the metal surface? 2

Q3. Use Gauss's theorem to find electric field intensity at a point near an infinite plane sheet of charge, only one side being charged. OR 5

What is capacitor? Derive an expression for capacitance of a parallel plate capacitor, without dielectric. 1+4=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2010

Q1. Obtain the expression for the equivalent capacitance for three capacitors C_1, C_2 and C_3 connected in series. 3

Q2. Define electric field intensity. Obtain the expression for the electric field intensity at a point on the equatorial line of an electric dipole. Or 1+4=5

Define electric potential. Obtain the expression for the electric potential at a point due to an electric dipole. 1+4=5

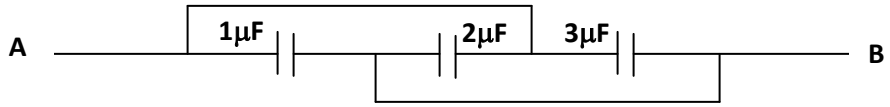
Q3. A sphere encloses an electric dipole. The electric flux on the sphere is 1

(a) zero (b) $2q/\varepsilon_o$ (c) q/ε_o (d) $1/\varepsilon_o$

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2011

Q1. What is the numerical value of charge of a proton? 1

Q2. From the fig. given below, calculate the equivalent capacitance across AB 2



3. Define electric potential. Derive the expression for electric potential of a point charge 'Q' in a medium of dielectric constant 'K' at a point 'P' whose distance from the charge is 'X'. 1+4=5

OR

State Gauss's law. Using it, derive the expression for the electric field intensity outside a uniformly charged spherical shell. 1+4=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2012

Q1. Define an equipotential surface in electrostatics. 1

Q2. Derive an expression of equivalent capacitance for 2(two) parallel plate capacitors connected in series. 2

Q3. Derive an expression for the energy of a parallel plate capacitor. In what form of field is the energy of a capacitor stored? OR 4+1=5
Find the expression for the electric field of a point due to an infinite plane sheet with uniform charge density. What is the value of the electric field outside a charged parallel plate capacitor? 4+1=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2013

Q1. How do we represent the direction of electric field at any point on the line of force? 1
Q2. Calculate the Coulomb force between two alpha particles separated by a distance of 3.2×10^{-15}m in air. 2
Q3. How a polarized dielectric reduces the external electric field inside it? 2
Q4. Obtain an expression for the electric potential at any point due to a point charge. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2014

Q1. What is superposition of charge? 1
Q2. The electric field at a point due to a point charge is $20NC^{-1}$ and the electric potential at that point is 10V. What is the distance of the point from the charge? 2
Q3. Define electric field intensity and electric potential. Derive for the potential energy of an electric dipole in an electric field. Or 2+3=5
What are polar and non-polar dielectric? Derive an expression for the energy stored in a capacitor. 1+4=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2015

Q1. State the principle of conservation of electric of charge? 1
Q2. Find the coulomb's force between a proton and an electron separated by 0.8 x 10 -15 m in vacuum. 2
Q3. Define electric flux and give its S.I. unit. Derive an expression for electric field intensity due to an infinitely long uniformly charged wire. Or 1+1+3 =5
Define capacitance of a capacitor and write its S.I. unit. Derive an expression for capacitance of a parallel plate capacitor when air is filled between the two plates. 1+1+3=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2016

Q1. Define electric potential at a point. 1
Q2. A uniform charge conducting sphere of 0.7m diameter has a surface charge density of $100\mu cm^{-2}$. Calculate the charge on the sphere and total electric flux passing through the sphere. 2
Q3. Show that the electric field is always directed perpendicular to an equipotential surface. 2
Q4. Deduce an expression for electrical potential energy of a system of two point charges. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2017

Q1. State the principle of superposition of charges? 1
Q2. State gauss law in integral form and write its equation. 2
Q3. What is a capacitor? Derive an expression for capacitance of a parallel plate capacitor partly filled with a dielectric. Or 1+4 = 5
In what form of field is the energy of a capacitor stored? Derive an expression for energy of a parallel plate capacitor. 1+4 = 5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2018

Q1. Define an electric dipole. 1
Q2. Derive an expression of equivalent capacitance for 2 parallel plate capacitor connected in parallel. 2
Q3. What is an electric field? Derive an expression for the electric field due to an electric dipole at any point along its equatorial line. Or 1+4 = 5
What is an electric potential? Derive an expression for electric potential at a point due to an electric dipole such that the line joining the point from the centre of dipole makes a certain angle from the axis of dipole. 1+4 = 5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2019

Q1. Obtain the expression for the energy stored in a parallel plate capacitor of capacitance C and potential V. 2
Q2. A point charge of $4.427\mu C$ is at the centre of a cubic Gaussian surface 9 cm on the edge. Find the net electric flux on the surface? 2

Q3. Three charges of 1nC, 2nC and 3nC are at the corners of an equilateral triangle of side $\sqrt{3}$. Calculate the electrostatic potential at a point equidistant from the three corners of the triangle. 3

Q4. If a charge q is placed at the centre of the line joining two equal charge Q such that the system is in equilibrium, then q is (a) Q/2 (b) –Q/2 (c) Q/4 (d) –Q/4 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2020

1. Define dipole moment vector of an electric dipole. Give the direction of the vector.

11. Find the area in sq km of the plates of a parallel plate capacitance 2F, given that the separation between the plates is 0.5cm.

28. Using Gauss's law of electrostatics obtain the expression for electric field at a point near an infinitely long thin straight wire with uniform linear change density λ.

Or

Obtain the expression for the electric potential due to an electric dipole (consisting of two charge q and -q separated by a small distance 2a)at a point far away from the dipole.

UNIT II CURRENT ELECTRICIY 7 MARKS

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2007

Q1. Obtain the principle of Wheatstone`s bridge with the help of Kirchhoff's laws. 3

Q2. P and Q are two points on a uniform ring of a resistance X. The angle PCQ=θ where C is the centre of the ring. What is the equivalent resistance between P and Q. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2008

Q1. Define electrical conductivity of a material. Give its S.I. unit. 1+1=2

Q2. A current of 5A exists in 10Ω resistor for 4 minutes. Find the charge and number of electrons that pass through any cross section of the resistor in this time. 2

Q3. A current of 1μA flows through a conductor when a potential difference of 2V is applied across its ends, then the resistance of the conductor is

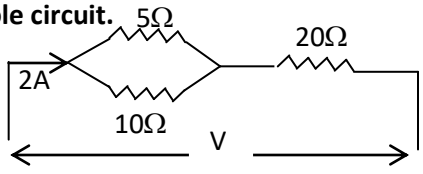
(a)$10^6\Omega$ (b) $2\times10^6\Omega$ (c) $3\times10^6\Omega$ (d) $4\times10^6\Omega$ 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2009

Q1. State Kirchhoff`s laws of conductors. 1

Q2. How many electrons pass through a wire in 2 minutes, if the current passing through the wire is 200mA? 2

Q3. Two wires of 10Ω and 5Ω are in parallel and arranged in series with 20Ω wire (fig.). If the current in 5Ω wire is 2A, calculate the current in 10Ω wire and potential difference V across the whole circuit.



Q4. Hot wire ammeters are used for measuring

(a)d.c only (b) a.c only (c) neither a.c nor d.c (d) both a.c and d.c

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2010

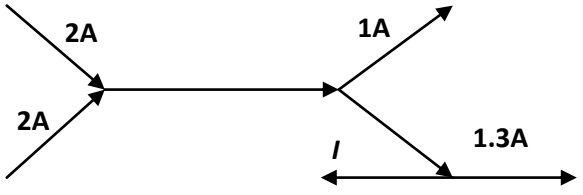
Q1. Define the electrical resistivity of a conductor. 1

Q2. What are the factors on which the the internal resistance of a cell depends? 3

Q4. Differentiate between emf and potential difference by giving three points. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2011

Q1. Find the value of electric current *I* from the following figure given below. 1



Q2. Show that the electric current flowing through a conductor is directly proportional to the drift velocity of electrons. 3

Q3. A wire of resistance 5Ω and resistivity 2×10^{-6} Ωm^{-1} is stretched so that the length becomes 3(three) times its original length. Determine its new resistance and resistivity. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2012

Q1. A, B, C and D represents the four colour rings of a carbon resistor , D being the tolerance. Indicate the corresponding colours of A,B and C to represent 1Ω. 1

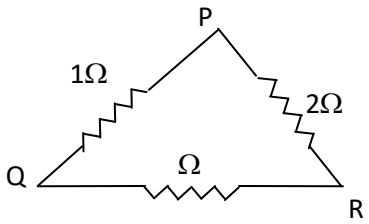
Q2. Calculate the resistivity of a wire 2m long, 0.4mm in diameter and having a resistance of 4Ω. 2

Q3. How can an electric bulb marked 220V–100W be lighted through a 400V electric main without getting fused? 3

Q4. In the figure, the equivalent resistance is least across 1

(a)P and Q (b) R and P

(c) Q and R (d) any two points



COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2013

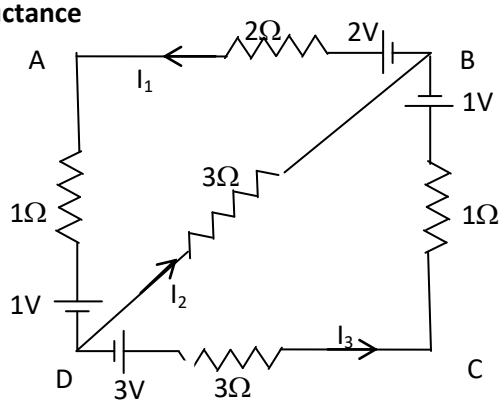
Q1. State Kirchhoff's loop rule for electrical network. 2

Q2. How does resistance of a conductor increases with rise in temperature? 2

Q3. The reciprocal of the resistivity of a material is called 1

(a) resistance (b) reactance (c) conductivity (d) conductance

Q4. In the given circuit, find the values of I_1, I_2 and I_3 3



COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2014

Q1. What length of a manganin wire of cross sectional area 0.01mm^2 would be required to obtain resistance of 1.2KΩ? Resistivity of manganin is 48×10^{-8}Ωm. 2

Q2. Prove that current density of a metallic conductor is directly proportional to the drift speed of electrons. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2015

Q1. Why is effective resistance become more in series combination of resistor? 1

Q2. A battery of e.m.f 10V is connected to an18Ω resistor. If the current in the circuit is 0.5 A, find the internal resistance of the battery. 2

Q3. Define the terms resistance and resistivity and give their S.I units. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2016

Q1. What is mean by drift velocity of free electrons? 1

Q2. A carbon resistor of 42MΩ ± 20% is to be marked with rings of different colours for its identification. Write the sequence of colours. 1

Q3. The length of a conducting wire is 60m and its radius is 0.5 cm. A potential difference of 5V produce a current of 2.5 A in the wire. Calculate the resistivity of the material wire. 2

Q4. Give any two points of difference between emf of a cell and p.d between two points of an electric circuit. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2017

Q1. Why is manganin used for making standard resistors? 1

Q2. Two wires P and Q of same diameter and same length are joined in parallel and the combination is connected across a battery. The resistance of P is greater than Q. Which wire will become hotter? 2

Q3. Show that electric current in a wire is directly proportional to the drift velocity of electrons in the wire. 3

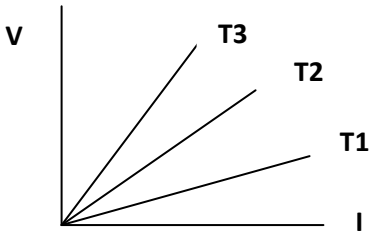
Q4. A charge of 10 mC flows through a wire of cross section 2.5 mm^2 normally in 2 s. the current is 1

(a) 4mA (b) 5mA (c) 20 mA (d) 25mA

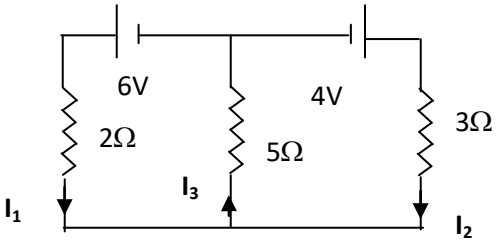
COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2018

Q1. There are only 2Ω carbon resistors in stock. A circuit needs 3Ω resistance. How can you connect the resistors to get the required resistance using minimum numbers? 1

Q2. The fig shows graph between p.d and current of a metallic wire at three different temperatures T1, T2 and T3. Which of them will have the least value of temperature? 2



Q3. In the given figure, find the values of I_1, I_2 and I_3 using Kirchhoff's laws 3



Q4. Potentiometer is preferred to voltmeter top measure emf of a cell because 1

(a) both draws same current from the source

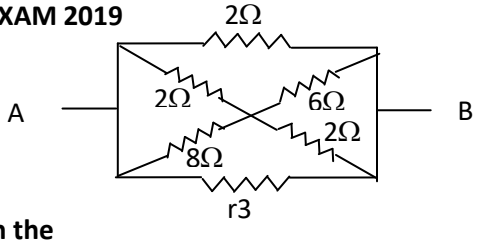
(b) potentiometer draws more current than voltmeter from the source

(c) potentiometer draws less current than voltmeter from the source

(d) potentiometer draws no current but voltmeter draws current from the source

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2019

Q1. In the network shown, the equivalent resistance between A and B is 4/3 Ω. Find the value of r. 2



Q2. State Kirchhoff's law for electrical network. Using this law obtain the Wheatstone Bridge balanced condition. 5

Or Derive with the help of a necessary circuit diagram how to find the specific resistance of a wire using metre bridge? 5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2020

Q1. A resistor is connected across a cell of emf 1.5V having an internal resistance of 1 Ω . If a current of 200 mA flows through the resistor, find the potential difference between the electrodes of the cell.

12. The number density of free electrons in a copper conductor is 8.5×10^{28} m. How long does an electron take to drift from one end of a wire 3.0 m long to its other end ? The area of cross section of the wire is $2.0 \times 10^{-6} m^{-2}$ and it is carrying a current of 3.0A.

21. In the meter bridge, the balance point is found to be 40 cm from the zero end, when a resistor Y is of 50 Ω is connected at right gap. Determine the

(i) resistance X in the left gap

(ii) the balance point of the bridge if X and Y are interchanged .

31. Two cells of emf 3Vof internal resistances 1Ω and 2Ω respectively are connected in parallel with their positive terminals together and similarly the negative terminal together. The equivalent emf of the combination would be

A. 8V B. 4V C. 5V D. 10V

UNIT III MAGNETIC EFFECTS OF CURRENT AND MAGNETISM 8 MARKS

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2007

Q1. What is cyclotron? 1
Q2. Name the force which is experienced by the moving charged particle in the magnetic field. 1
Q3. Distinguish between Biot- Savart law and Ampere's circuital law. Give three points each. 3
Q4. Magnetic field at the centre of a single circular coil of diameter 'D' carrying a current I is 1
(a)$\mu_o D/I$ (b) $\mu_o I/D$ (c) DI/μ_o (d) μ_o/DI

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2008

Q1. What is solenoid? 1
Q2. A positive charge particles moving in a straight line enters a strong magnetic field along the field direction but its path and velocity remain unchanged. Explain why? 1
Q3. Explain why two parallel long wires carrying current in the same direction attract each other. 2
Q4. Derive the relation of magnetic intensity at the centre of a circular coil carrying current. 3
Q5. Write the relation of magnetic dipole moment of a current loop of area A, number of turns n and carrying current I. 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2009

Q1. Draw a diagram of the conversion of galvanometer into ammeter with the help of shunt. Describe the effective resistance of ammeter. 2
Q2. A horizontal overhead power line carries a current of 50A in west to east direction. What is the magnitude and direction of the magnetic field 1.5m below the line. 3
Q3. What are dia, para and ferro magnetic substances? 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2010

Q1. Does a magnetic field exert a force on a charge at rest? Justify. 1
Q2. Define angle of dip and angle of declination. 2
Q3. State Right Hand Rule. Using Biot-Savart law, obtain the expression for the magnetic field at the centre of a current carrying circular loop of n turns. OR
State Ampere's Circuital law. Using this law derive an expression for the magnetic field due to current in an ideal toroid. 1+4=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2011

Q1. State the principle of moving coil galvanometer. 1
Q2. A bar magnet of magnetic moment M is bent in the form of a semi circle. Predict the resulting magnetic moment. 2
Q3. Define magnetic field intensity. Obtain the expression for the magnetic field intensity of a bar magnet at a point on its equatorial line. or 1+4=5
Derive an expression for torque experienced by a current carrying loop of n turns in a uniform magnetic field. Under what condition the value of torque is maximum? 1+4=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2012

Q1. What is the nature of magnetic field in a moving coil galvanometer? 1
Q2. Derive an expression for the magnetic field due to a long current carrying straight wire applying Ampere's circuital law. 2
Q3. A straight wire carrying current of 12A is bent in the form of a semi circle of radius 2cm as shown in the fig. find the magnitude and direction of magnetic field at the centre 'O' in the figure due to the current in the wire. 2
Q4. An electron is projected into an uniform field at right angle to the field. How will you decide by observing the path of the electron whether the given field is an electric field or a magnetic field? Predict the changes if the particle is a proton. 2+1=3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2013

Q1. How is voltmeter used in an electric circuit? 1
Q2. A current carrying flexible loop of irregular shape is placed in an external magnetic field. Why does it change to a circular shape? 2
Q3. Derive an expression for the force between two straight long parallel conductors carrying constant currents in the same direction and hence determine one Ampere. or 4+1=5

Derive an expression for the torque acting on a rectangular current carrying loop kept in a uniform magnetic field. 5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2014

Q1. Using Biot Savart law, obtain an expression for the magnetic field intensity at a point on the axis of current carrying circular loop of n turns. or 5

State Ampere's circuital law. Obtain an expression for the magnetic field intensity due to an infinity long straight wire carrying current. Give one limitation of this law. 1+3+1=5

Q2. Define Bohr Magneton. 1

Q3. Define the term magnetic declination and magnetic inclination. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2015

Q1. Define diamagnetic, paramagnetic and ferromagnetic substances. 3

Q2. Define magnetic field intensity. Derive an expression for the magnetic field intensity at a point lying on the equatorial line of a a bar magnet. Or 1+4 =5

Define a solenoid. Derive an expression for magnetic fields due to a long solenoid by using Ampere's circuital law. 1+4=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2016

Q1. What is the value of μ_o in SI unit? 1

Q2. Give two point of difference between the magnetic properties of steel and soft iron. 2

Q3. Derive an expression for the torque experienced on a current carrying rectangular loop kept in a uniform magnetic field. Under what condition is this torque maximum? Or 4+1=5

Derive an expression for the torque experience on a magnetic dipole placed in a uniform magnetic fields. Under what condition is this torque maximum? 4+1=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2017

Q1. State Ampere's circuital law? 1

Q2. What are the primary function of electric and magnetic field in a cyclotron? 2

Q3. Why does not the energy of a charge particle moving in a uniform magnetic field change? 2

Q4. How will you convert a galvanometer having 100Ω resistance which requires 1mA current for its full deflection into an ammeter to read upto 1A? 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2018

Q1. Two similar insulated wires are bent in the form of a circle of radius 1cm carrying 1A current each in the direction shown in the figure. Which one will have stronger magnetic field at the centre? Justify. 3

Q2. What is magnetic dipole moment? Derive an expression for torque on a bar magnet placed in a uniform magnetic field. Or 1+4 = 5

What is a solenoid? Derive the expression for the magnetic field due to a long current carrying solenoid by using Ampere's circuital law. 1+4 = 5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2019

Q1. From the expression for force experience by a charge in a magnetic field define the SI unit for magnetic field. 1

Q2. Where on the surface of earth the vertical component of earth's magnetic field is zero? 1

Q3. A horizontal overhead power line carries a current of 30A in the east to west direction. What is the magnitude and direction of the magnetic field due to the current at a point 1.5m below the line? 2

Q4. Derive how a galvanometer can be converted into an ammeter. 3

Q5. A charge particle of mass m and charge q moves along a circular path of radius r that is perpendicular to a magnetic field B. the time taken by the particle to complete one revolution is 1

(a) $2\pi mq/B$ (b) $2\pi q^2B/m$ (c) $2\pi qB/m$ (d) $2\pi m/qB$

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2020

3. A current of $1/\pi$ ampere flows in a circular loop of radius 10cm.Find the magnetic dipole moment of the loop.

13. Distinguish between paramagnetic and diamagnetic materials in terms of (i) susceptibility and (ii) their behavior in an external non- uniform magnetic field.

14. In a chamber,a uniform magnetic field of 6.5×10^{-4} T is maintained . An electron is shot into the field with a speed of 4.8×10^{6} m/s normal to the field. Determine the radius of the circular orbit of the electron.

22. A circular loop of radius 5 cm carrying a current of $10/\pi$ A is held in a vertical plane containing north to south direction. The sense of current is clockwise for an observer looking at the coil facing east. Give the magnitude and direction of the magnetic field due to the coil at the centre .

29. Arectangular wire of side 10cm and 5cm with a small cut is moving out of a region of uniform magnetic field of magnitude 0.5T directed normal to the loop. What is the emf developed across the cut if the velocity of the loop is 1cm /s in a direction normal to the (a)longer side,(b)shorter side of the loop? For how long does the induced voltage last in each case

Or

A sinusoidal voltage of peak value $230\sqrt{2}$ V with variable frequency is applied to a series LCR circuit in which R= 5Ω, L = $250/\pi$ mH and C = $400/\pi$ μF.

(a)Find the frequency of the source at which resonance occurs.

(b) Calculate the impedance, the r.m.s current and the power dissipated at resonance condition.

UNIT IV ELECTROMAGNETIC INDUCTION AND A.C 8 MARKS

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2007

Q1. What is the peak value of 220V A.C? 1

Q2. An electric heater is heated turn by turn with d.c. and a.c. keeping alternating potential difference across the ends of the heater . Will the rate of production of heat in the two cases be same? Explain. 3

Q3. Differentiate between self and mutual induction. 3

Q4. In an ideal capacitor, contained in an A.C. circuit, the current . 1

(a)leads the e.m.f by π (b)lags the e.m.f by $\pi/2$ (c)is in phase with e.m.f. (d)leads the e.m.f by $\pi/2$.

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2008

Q1. Distinguish between the term reactance and impedance for an a.c. circuit. 2

Q2. Define magnetic flux. Name the S.I. unit of it. 2

Q3. Explain why direct current is blocked by a capacitor and allows to pass alternating current. 3

Q4. Two coils, one primary and another secondary, which do not have electrical contact. But the transferring of electrical energy can be done from primary coil to secondary coil and condition becomes due to 1

(a)electromagnetic induction (b)self induction (c)mutual induction (d)induction coil

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2009

Q1. The peak value of A.C. is $4\sqrt{2}$ ampere. What its r.m.s. value ? 1

Q2. Define mutual inductance? 1

Q3. Draw a diagram of a.c. circuit containing inductance, capacitance and resistance and plot a need graph of resonance curve. 3

Q4. Detail out any three possible losses of energy in a transformer. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2010

Q1. Calculate the self inductance of a coil when a change of current 0 to 2A in 0.05 sec induces an emf of 40V. 1

Q2. What is electrical resonance? State the condition under which the phenomenon of resonance in a series LCR circuit. 1+1=2

Q3. State Faraday's laws of electromagnetic induction. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2011

Q1. Define r.m.s value of an a.c. 1

Q2. Distinguish between alternating current and direct current by giving two points. 2

Q3. Draw a neat labelled diagram of an A.C generator. 2

Q4. Can an ideal inductor can be used to controlled d.c? Justify your answer. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2012

Q1. Define mutual induction of two coils. 1

Q2. Why does the acceleration of a freely falling bar magnet decrease when it passes with its length through a copper ring held horizontally? 2

Q3. An alternating voltage $E=E_0\sin\omega t$ is applied to a pure inductor. Show mathematically and drawing a wave diagram that alternating voltage is ahead of a.c by phase of 90°. Why does an inductor blocks a.c? 1+4=5

or

An alternating emf is applied to a circuit containing capacitance only. Show mathematically and drawing a wave diagram that the alternating current leads the emf by phase angle of $\pi/2$. Why does a capacitor blocks d.c? 4+1=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2013

Q1. A copper and an aluminium wire coils are rotated with same angular speed in a same magnetic field. In which coil induced current be more? 1

Q2. Why a metallic piece becomes very hot when it is surrounded by a coil carrying high frequency alternating current? 1

Q3. Derive an expression for the rms value of alternating emf. What is the peak value of 20A ac? 4+1=5

or

Derive an expression for the average power consumed in series LCR ac circuit for a complete cycle. Show that a pure inductor consumes no power in an ac circuit. 4+1=5

Q4. Which of the following devices does not work on eddy current? 1

(a) induction furnace (b) transformer (c) speedometer (d) electromagnetic brakes

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2014

Q1. State Lenz's law of electromagnetic induction. 1

Q2. A sinusoidal voltage V – 200 sin 314t is applied to a resistor of 10Ω resistance. Calculate rms value of current and voltage. 3

Q3. How can you obtain wattles current in an ac circuit? 1

Q4. A transformer cannot be used to step up dc voltage. Explain why? 2

Q5. Power is dissipated at resonance in LCR circuit, the power factor of the circuit is 1

(a) Zero (b) unity (c) lagging $\pi/2$ (d) leading $\pi/2$

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2015

Q1. What is an alternating current? 1

Q2. Why is induced e.m.f also called back e.m.f? 1

Q3.Dawn the labelled phasors diagram of e.m.f and current of an A.C. circuit having inductance only. 2

Q4. An alternating voltage of 230V is connected across a series combination of LCR were L= 5.0 H, C=80x10-6 and R= 40Ω Find (i) the angular frequency of source which drives the circuit in resonance. 3

(ii) impedance of the circuit in resonance. (iii) peak value of current in resonance.

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2016

Q1. No induced emf is produced in a conductor moving parallel to magnetic field. Explain why? 2

Q2. An alternating e.m.f. $E=E_0\sin\omega t$ is applied across a pure inductor of inductance L. Show mathematically that the current flowing through it lags behind the applied e.m.f by a phase angle of $\frac{\pi}{2}$. What is its inductive reactance?

Or 4+1=5

An alternating e.m.f $E=E^\circ\sin\omega t$ is applied across a pure capacitor of capacitance C. Show mathematically that the current flowing through it leads behinds the applied e.m.f. by a phase angle of $\frac{\pi}{2}$. What is its capacitive reactance?

Q3. The peak value of a.c. is 2A, the effective value of a.c. is (a) 1 (b) $\sqrt{2}$ (c) 2 (d) 0 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2017

Q1. What is induced current? 1

Q2. Differentiate between ac and dc by giving two points. 2

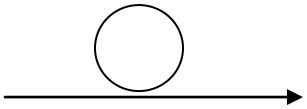
Q3. Draw a common resonance curve for two resistance R1 and R2 (R1<R2) at series LCR circuit at resonant frequency for same values of L and R. 3
Q4. Prove that average power absorbed by an inductor in an ac circuit is zero. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2018

Q1. What is rms value of ac? 1
Q2. An applied emf signal consists of superposition of a d.c source and an a.c source of high frequency. The circuit consists of an inductor L, and a capacitor C in series. Show that dc signal appears across C and ac signal appears across L. 2
Q3. Draw a neat laballed diagram of an ac generator. 2
Q4. How does the L-C circuit produce oscillation? Explain. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2019

Q1. The electric current flowing in the wire from P to Q is decreasing. Find out the direction of magnetic field in the above loop. 1



Q2. Find the reactance of a capacitor having capacitance $1/\pi$ μF at 50 Hz. 1
Q3. Define self inductance and write its Si unit. Derive an expression for the self inductance of a long solenoid. 3
Q4. A series LCR circuit with L = 1mH, R = 1 k Ω and C = 0.001μF is connected to a peak voltage $200\sqrt{2}$ V. When the frequency of the supply equals the natural frequency, what is the average power transferred to the circuit in one cycle. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2020

4. Define the magnetic flux and give its SI unit.
15. Give any reasons for small energy energy losses in transformer and write how these can be minimized.

UNIT V ELECTROMAGNETIC WAVES 3 MARKS

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2007

Q1. Give any two uses of microwaves. 2
Q2. Through which mode of propagation, the radio wave can be sent from one place to another
(a)Ground wave propagation (b) Sky wave propagation 1
(d)Space wave propagation (d) All of them

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2008

Q1. Which quantity is represented by the expression $1/\sqrt{\varepsilon_0\mu_0}$? 1
Q3. If the earth did not have an atmosphere, would the average surface temperature of earth be higher or lower than what it is now? 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2009

Q1. Long distance radio broadcast use short wave bands. Why? 1
Q2. Describe four common properties of electromagnetic waves. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2010

Q1. Give any two uses of microwaves. 2
Q2. Electromagnetic waves are produced by
(a)A static charge (b) a moving charge (c)a chargeless particle (d) an accelerating chares 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2011

Q1. Write one property of γ-ray which is applicable to medical science. 1
Q2. The wavelength of X-rays is 2A°. Calculate its frequency. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2012

Q1. What is the ratio of speed of infrared rays to the speed of ultraviolet rays in vacuum? 1

Q2. Distinguish between γ-rays and X-rays by giving two points. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2013

Q1. Write three characteristics of electromagnetic waves. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2014

Q1. How does the speed of electromagnetic wave in vacuum depend on the absolute permittivity and absolute permeability? 1

Q2. How is food cooked in a microwave oven? 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2015

Q1. Name the electromagnetic radiation used for viewing objects through haze and fog. 1

Q2. What is displacement current? 1

Q3. The electromagnetic radiation which has the shortest wavelength is 1

(a) micro wave (b) gamma rays (c) UV rays (d) X rays

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2016

Q1. Write three properties of electromagnetic waves. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2017

Q1. Write three properties of electromagnetic waves. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2018

Q1. Name the part of electromagnetic wave which is used in radiography. 1

Q2. Arrange the following em waves in ascending order of wavelength light ray, gamma ray, uv ray and x ray. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2019

Q1. The electric field vector of a plane electromagnetic wave oscillates sinusoidally at a frequency of 300MHz. What is its wavelength? 1

Q2. What is displacement current and write the modified Ampere's circuital law. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2020

5. Give the frequency range of FM(frequency modulated) radio band.

16. The magnetic field in a plane electromagnetic wave is given by

$B_y = (2 \times 10^{-7})$ T sin $(0.5 \times 10^3 z - 1.5 \times 10^{11} t)$. Write the expression for the electric field.

UNIT VI OPTICS 14 MARKS

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2007

Q1. Write the expression of equivalent focal length of two convex lenses of focal length F_1 and F_2 when place in contact. 1

Q2. A concave mirror and a convex lens are held in water. What chance, if any, do you expect to find in focal length of either? 1+1=2

Q3. State Huygens's principle. Deduce Snell's law of refraction using Huygens's principle. 1+4=5

Or

What is interference? Derive the expression for the fringe width in interference of light.

Q4. Draw the labelled ray diagram of an astronomical telescope for the final image formed at the least distance of distinct vision. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2008

Q1. What is total internal reflection? State the two essential conditions for total internal reflection? 1+2=3

Q2. Derive lens maker's formula for a thin convex lens. Or 5

What is wave front? Describe briefly Young's double slit experiment to demonstrate interference of light.

Q3. Draw the ray diagram of a simple microscope for the final image formed at the least distance of distinct vision. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2009

Q1. Define critical angle? 1

Q2. Derive the expression for lens maker's formula. 5

Or

What is the angle of minimum deviation? Establish the relation μ=$sin\frac{A+\delta m}{2}/sin\frac{A}{2}$.

Q3. Can our eyes distinguish between polarized and un-polarized light? 1

Q2. A double slit experiment is carried out in air and the entire arrangement is dipped in water. The fringe width

(a)Increases (b)Decreases (c)Remains unchanged (d)Fringe pattern unchanged

Q4. How will you distinguish between a compound microscope and a telescope simply by seeing their objectives? 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2010

Q1. Write the principle of optical fibres. 1

Q2. What are presbyopia and astigmatism? 1

Q3. Define magnifying power of an astronomical telescope. Draw the labeled ray diagram showing the formation of final image at the least distance of distinct vision. 1+2=3

Q4. Prove Snell's law of refraction from Huygens's principle. 5

Or

Obtain the expression for fringe width in interference of light.

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2011

Q1. An equi-convex lens of focal length 10cm is divided into two equal plano convex lenses. Find the focal length of each plano-convex lens. 1

Q2. Give the two conditions for total internal reflection of light. 2

Q3. Differentiate between interference and diffraction of light by giving two points. 2

Q4. Prove that the central maximum in the single slit diffraction experiment is twice as width as the secondary maximum. 3

Q5. State and prove Brewster's law of polarisation of light. The polarising angle of a medium is 60°. Calculate the critical angle for this medium. or 1+3+1=5

Obtain the expression for the angle of deviation for a ray of light passing thtrough an equilateral glass prism of angle A. A ray is incident at an angle of 60° on the first face of a prism of angle 30°. The ray emerging out of the prism makes an angle of 30° with the incident ray. Calculate the anbgle of emergence at the second surface.

Q6. If *I* is the intensity of each single slit in Young's double slit interference experiment, the intensity of bright fringes will be *(a)I* (b) 2*I* (c) 3*I* (d) 4*I* 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2012

Q1. A glass lens is immersed in water. How is the power of the lens affected? 1

Q2. Base on Huygen's principle, draw the incident and refracted wavefronts AB an CD respectively when light travelling from air to a denser medium, incident at an angle of 45° is refracted at an angle of 30°. 2

Q3. A man cannot see objects clearly beyond 75cm from his eyes. Find the focal length and power of the lens to be used by the man in order to see objects at infinity clearly. 2+1=3

Q4. Predict the change in the interference fringe in Young's double slit experiment using a red light if (a)the separation between the two slits be decreased (b) the red light is replaced by a blue light and (c) the distance of screen from the slit be increased. 1+1+1=3

Q5. Establish the relation for refraction at a single spherical convex surface when the ray travels from a rarer medium to denser medium forming a real image. or 5

Derive a relation $I=4I_0$ where I is the resultant intensity of the bright fringes on the screen of Young's double slit experiment and I_0 is the intensity of each single slit. 5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2013

Q1. What will be the colour of the sky in the absence of atmosphere? 1

Q2. Why do bubbles of colourless soap solution appear coloured in sunlight? 1

Q3. Two lenses of focal length 0.2 m and – 0.25 m are placed in contact. Find the total power of the combination. 2

Q4. Where should an object be placed from a convex lens to form an image of the same size? Can it happen in case of concave lens? 1+1=2

Q5. State and prove Brewster's law. 1+2=3

Q6.Draw a neat labeled ray diagram showing the image formation at the least distance of distinct vision by a compound microscope. Write the expression for its magnifying power when the image is formed at infinity. How does the resolving power of a compound microscope change on (i) decreasing the diameter of objective lens (ii) increasing the focal length of its objective lens. or 2+1+1=5

Draw a neat labeled diagram of an astronomical telescope used in the normal adjustment position and write the expression for its magnifying power. Two astronomical telescopes A and B have same magnifying power. The ratio of apertures of their objectives is 3:2. (i) which one of the two produces image of greater intensity? (ii) which one of the two have larger resolving power? 2+1+1+1=5

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2014

Q1. Obtain the relation between critical angle and refractive indices of two media. 3

Q2. The surface of sunglasses is curved, yet their power is zero. Give reasons. 2

Q3. The focal length of a concave mirror is f. If an object is placed at a distance x from the principal focus away from the mirror, what is the ratio of the size of the image to the size of the object? 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2015

Q1. Two thin convex lenses each of focal length 20 cm are placed in contact. Find the focal length of the compound lens. 1

Q2. When light comes from air to glass, the refracted ray is bent towards the normal. Why? 1

Q3. In Young's double slit experiment, the slits have width ratio1:4. Find the ratio of intensity at maxima and minima in the interference pattern. 2

Q4. Show that at polarising angle, the reflected and refracted beam of light are perpendicular to each other. 2

Q5. Draw the labelled ray diagram of a refracting type Astronomical telescope for distinct vision. 2

Q6. What is a Prism? Prove that for a prism, $\mu=\frac{sin(\frac{A+D_m}{2})}{sin\frac{A}{2}}$ where A is angle of prism, D_m is angle of minimum deviation and μ is the refractive index of the materials of the prism. Or 1+4=5

Define a spherical mirror. Derive the relation between the object distance (u), image distance (v) and focal length (f) for a spherical concave mirror 1+4=5

Q7. If the red light is replaced by blue light illuminating the object in a microscope, the resolving power of the microscope (a) gets halved (b) decrease (c) increase (d) remains unchanged 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2016

Q1. The sun looks reddish at sunrise and sunset. Give reason. 2

Q2. Give three advantages of reflecting type telescope over refracting type telescope. 3

Q3. Draw the ray diagrams to show a right-angled prism to turn the rays through (i) 90° (ii) 180°. 3

Q4. Derive the lens maker's formula in case of a double convex lens. Or 5

Derive an expression for fringe width using Young's double slits method for interference of light. 5

Q5. If θ is the polarizing angle, then the refractive index of the materials is 1

(a) sinθ (b) cosθ (c) tanθ (d) cotθ

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2017

Q1. Eye is most sensitive to yellow colour but signals are made of red colour. Why? 1

Q2. Draw a laballed diagram of a compound microscope with image formed at infinity. 2

Q3. Differentiate a between interference and diffraction by giving three points. 3

Q4. A convex lens made of glass of refractive index 3/2 has a focal length f in air. If it is immersed in water of refractive index 4/3, then with calculation predict the new focal length of the lens in water? 3

Q5. Prove the laws of reflection using huygen's lprinciple. 5

Or Prove the laws of refraction using huygen's lprinciple.

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2018

Q1. What is the effect on the magnifying power of a telescope if the aperture of the objective lens is increased?1
Q2. Draw a neat laballed diagram of a reflecting type telescope of any type. 2
Q3. Discuss the difference between the refracting type and reflecting type telescope by giving three points. 3
Q4. A man suffering from defective vision cannot see objects clearly which is kept within 50 cm from his eye. Predict by calculation the power of the lens required to correct this defect. 3
Q5. Prove that superposition of two waves from two coherent sources having displacements $y_1 = a \sin \omega t$ and $y_2 = a \sin (\omega t + \varphi)$ at a point produce the resultant intensity $I = 4a^2 \cos^2 \varphi/2$ or 5
Prove the prism formula where the symbols have their usual meanings.

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2019

Q1. The refractive index of plastic is $\sqrt{3}$. Calculate the angle of refraction for a ray of light incident at polarizing angle. 2
Q2. Write three points of difference between inference and diffraction. 3
Q3. Draw ray diagram to show how a right angled prism can be used to deviate a ray of light through (i) 90° (ii) 180°. 3
Q4. Derive the Lens maker formula for a double convex lens. Or 5
Derive the mirror formula for a concave lens.
Q5. A laser operating at 3×10^{14} Hz passes through an aperture of 10^{-2}m. the angular spread in radian is 1
(a) 10^{-2} (b) 10^{-4}m (c) 10^{-6}m (d) 10^{-8}m

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2020

6. Assume that light of wavelength 0.5 μm is coming from a star. What is the limit of angular resolution in radians of a telescope whose objective has a radius 122cm?

17. Explain why thin clouds look white while clear sky looks blue.

23. A small bulb is placed at the bottom of a tank containing water to a depth of 98 cm. What is the area of surface of water through which light from the bulb can emerge out. Refractive index of water is 4/3. (consider the bulb to a point source).
24. Draw a neat ray diagram showing the formation of final image by a compound microscope.
30. The radii of curvature of the faces of a double convex lens made of glass are 10 cm and 15 cm. Its focal length is 12 cm (a)Find the refractive index of glass. (b)Calculate its new focal length if lens is completely immersed in water (Refractive index of water is 4/3)

Or

In a Young's double slit experiment, two coherent sources each of wavelength 500nm are placed 0.5 mm apart and the screen is placed 1m away.
(a)Find the fringe width of the interference observed on the screen
(b)Find the distance of the second dark fringe and the fourth bright fringe from the central fringe.
32. A laser produces monochromatic light of wavelength 530 .4nm. The power emitted is 3.0 mW. The number of photons emitted per second on an average is
A. 8.0×10^{15} B. 5.0×10^{15} C. 8.0×10^{16} D. 5.0×10^{16}

UNIT VII DUAL NATURE OF MATTER AND RADIATION 4 MARKS

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2007

Q1. A photon and electron have same de-Broglie wavelength. Which has greater total energy? Explain. 3

Q2. If the maximum .E.K. of electron emitted by a photo-cell is 4eV, the stopping potential is 1

(a)16 volts (b) 8 volts (c) 4 volts (d) 2 volts

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2008

Q1. What is a photocell? Give one application of it. 2

Q2. Derive Einstein`s photoelectric equation. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2009

Q1. What do you called the device for converting light energy into electrical energy. 1

Q2. Describe Einstein`s photo electric equation. 2

Q3. Photon of frequency f is incidents on a metal surface of threshold frequency f_0. The maximum K.E. of emitted photoelectrons is 1

(a)$h(f-f_0)$ (b) hf (c) $h(f+f_0)$ (d) hf_0

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2010

Q1. What is the threshold frequency for photoelectric emission? 1

Q2. Derive the expression for de-Broglie wavelength for material particles. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2011

Q1. What determines the strength of photoelectric current? 1

Q2. What is de-Broglie wavelength of a 3kg object moving with a speed of $2ms^{-1}$. 2

Q3. The mass of photon at rest is 1

(a)zero (b) 1 a.m.u (c) 1.67×10^{-35}kg (d) 9.1×10^{-31}kg

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2012

Q1. What is a photocell? 1

Q2. The threshold frequency for two metals A and B are 10^{10}Hz and 10^{16}Hz respectively. Show by calculation which metal will emit photo-electrons when light of wavelength 3000×10^{-10}m falls on them. 2

Q3. The K.E of an electron which is accelerated to the potential of 100V is 1

(a)1.6×10^{-22}J (b) 1.6×10^{-17}J (c)1.6×10^{-7}J (d)1.6×10^{17}J

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2013

Q1. For what purpose was Davisson and Germer experiment performed? 1

Q2. Define the terms work function and stopping potential in photoelectric effect. 1+1=2

Q3. De Broglie wavelength of a moving particle having energy E is

(a) $\lambda = \frac{h}{\sqrt{2mE}}$ (b) $\lambda = \frac{\sqrt{2mE}}{h}$ (c) $\lambda = h\sqrt{2mE}$ (d) $\lambda = \frac{hE}{\sqrt{2mE}}$ 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2014

Q1. Write Einstein's photo electric equation. 1

Q2. Number of photoelectrons emitted increases with the increase in intensity and not with frequency. Explain why? 2

Q3. Which one of the following statement is not true 1

(a) Photons are deviated by magnetic fields. (b) Photons do not have any charge.

(c) Photons are a packet of energy. (d)Photons are not deflected by electric fields.

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2015

Q1. In an experiment of photoelectric effect, the stopping potential is 1.5v. Calculate the maximum Kinetic energy of photoelectrons emitted. 2

Q2. An electron and a proton are accelerated through the same potential. Explain which one of the two has greater value of de-Broglie wavelength associated with it. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2016

Q1. Why alkali metal are most suitable for photo electric emission? 1

Q2. State the laws of photoelectric emission. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2017

Q1. Write the Einstein's photoelectric equation. 1

Q2. Distinguish between a photon and a electron by giving two points. 2

Q3. The de Broglie wavelength λ of a particle is related to its kinetic energy E by the relation **1**

(a) $\lambda \propto \sqrt{E}$ (b) $\lambda \propto 1/\sqrt{E}$ (c) $\lambda \propto E$ (d) $\lambda \propto 1/E$

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2018

Q1. Light has dual nature. Which nature is supported by photoelectric effect? **1**

Q2. Light of 5000A® falls on a photosensitive plate with work function of 1.9eV. Calculate the K.E of the emitted photoelectrons. **2**

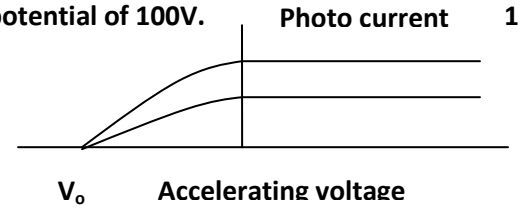
Q3. Light of frequency 1.5 times the threshold frequency is incident on a photosensitive material. If the frequency is halved and intensity is doubled, the photo electric current becomes

(a) quadrupled (b) doubled (c) halved (d) zero **1**

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2019

Q1. Find the de Broglie wavelength of an electron accelerated at an potential of 100V. **1**

Q2. **In the following figure identify which has intensity I_1 and I_2 with $I_1 > I_2$. Also determine why they have same stopping potential.**



COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2020

7. What is the de-Broglie wavelength of an electron with kinetic energy of 100eV?

18. Define threshold frequency in photoelectric effect and describe the failure of wave theory to explain the existence of a photosensitive material .

UNIT VIII ATOMS AND NUCLEI 6 MARKS

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2007

Q1. Define one atomic mass unit. **1**

Q2. Compare the radii of two nuclei with mass number 3 and 81. **1**

Q3. What is alpha decay? Write the general expression of alpha decay. **2**

Q4. Draw a neat diagram of nuclear reactor? **2**

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2008

Q1. Define nuclear fission. **1**

Q2. Why is a moderator used in nuclear reactor? **1**

Q3. Briefly explain Rutherford's experiment on scattering of α-particles by a nucleus. **3**

Q4. If the heavy water used in nuclear fission is replaced by ordinary water, neutron produced in fission will **1**

(a) Still be slowed down (b) Not be slowed down (c) Accelerated (d) Not be affected

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2009

Q1. What are the main differences between Rutherford's model and Bohr's model of an atom? **2**

Q2. State and explain nuclear fission. **1+2=3**

Q3. Outside a nucleus (a) Neutron is stable (b) Proton and neutron are stable (c) Neutron is stable (d) Neither neutron nor proton is stable **1**

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2010

Q1. What will be the electric charge on the nucleus of the atom $_8O^{16}$? **1**

Q2. Why does only a slow neutron cause fission of uranium nucleus and not fast one? Give reason? **1**

Q3. Define the terms isotopes and isotones. **1**

Q4. " Mass energy interconversion takes place only in nuclear reaction and never in chemical reaction." Justify the statement is correct or incorrect. **2**

Q5. In hydrogen atom spectrum, the visible region of electromagnetic spectrum lies in the

(a) Lyman series (b) Balmer series (c) Pfund series (d) Brackett series **1**

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2011

Q1. Define mass defect. **1**

Q2. $_{92}U^{235}$ decays to $_{90}Th^{230}$. Predict the number of α and β- particles emitted during the decay. **2**

Q3. State the three postulate's of Bohr's atomic model. **3**

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2012

Q1. Name the series of hydrogen spectrum which has least wavelength. 1

Q2. Differentiate between nuclear fission and fusion by giving two points. 2

Q3. How is radius of a nucleus related to its mass number? Compare the radii of two nuclei with mass no 3 and 81. 1+2=3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2015

Q1. Define impact parameter. 1

Q2. How can you say the energy equivalent to mass defect is the binding energy of the nucleus? 2

Q3. Write the three basic postulates of Bohr's atom model. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2016

Q1. Why do alpha particle have high ionizing power? 1

Q2. What are isotopes and isotones? 2

Q3. Give any two points of difference between nuclear fission and nuclear fusion. 2

Q3. Mass is converted into energy according to the relation 1

(a) E=mc^2 (b) E=mgh (c) E=$\frac{1}{2}mc^2$ (d) E

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2017

Q1. Give one example of isobars. 1

Q2. Why is a nucleus more stable if it has a large value of mass defect? Explain. 2

Q3. How do the mass number and atomic number change in alpha decay? A nucleus X becomes Y as a result of alpha decay. Write the equation. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2018

Q1. Write one drawbacks of Rutherford,s atomic model. 1

Q2. Calculate the shortest wavelength of balmer series. 2

Q3. Show that according to bohr, the radius of an electron revolving in the nth orbit of H atom is $r_n = (\frac{\epsilon_o h^2}{\pi m e^2})n^2$ 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2019

Q1. Write the relation between average life and decay constant. 1

Q2. Write the nuclear reaction of U 235 and calculate how much energy is released in KWh in fission of 50 kg of U235. Or 5

Using Bohr quantization condition calculate the radius of the circular orbit of hydrogen atom.

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2020

Q1. Define atomic mass unit (u).

Q2. Find the shortest wavelength in the in the Balmer series of hydrogen atomic spectrum .
(Rydberg constant ,R=$1.097 \times 10^7 m^{-1}$)

Q3. A heavy nucleus X of mass number 240 and binding energy per nucleon 7.6MeV is split into two nuclei each of mass numbers 120 of binding energies per nucleon 8.5 MeV. Estimate the energy Q released per fission of the nucleus X into two nuclei each of mass numbers 120.

Q4. A laser produces monochromatic light of wavelength 530 .4nm. The power emitted is 3.0 mW. The number of photons emitted per second on an average is

A. 8.0×10^{15} B. 5.0×10^{15} C. 8.0×10^{16} D. 5.0×10^{16}

Q5. A radioactive isotope has a half life of T years .The time taken in years by the isotope's activity to reduce to 3.125%of its original value is

A. 32T B. 5T C. 2T D. 10T

UNIT IX ELECTRONICS 7 MARKS

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2007

Q1. What is a zener diode? 1

Q2. What is integrated circuit? Write the truth tables of 'NAND' and 'NOR' logic gates. 2

Q3. What is transistor? Explain the action of NPN transistor. In a common base transistor amplifier, if the resistance is 300Ω and output resistance is 300kΩ, find the power gain (given that α=0.96) or 5
What is energy band? Distinguish between valence and conduction bands. Compare semi-conductor and insulator on the basis of energy band diagram?

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2008

Q1. When does a diode work as an open switch? 1
Q2. Draw the logic symbol of AND gate. 1
Q3. What is a junction diode? Show with diagrams, how the diode is forward biased and reverse in electronic circuit Or 5
How are N-type and P-type semiconductor formed? Name the dopant and majority charge carrier in each type of semi conductors?
Q4. A semiconductor device is connected in a series circuit to a battery and a resistance. A current is found to pass through the circuit. If the polarity of the battery is reversed, the current drops to almost zero, the device may be (a) A P-type semiconductor (b) A N-type semiconductor (c) A P-N junction (d) An intrinsic semiconductors 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2009

Q1. Distinguish between intrinsic and extrinsic semiconductor. 2
Q2. Draw the circuit diagram of transistor as CE amplifier. Explain the current amplification factor, voltage gain and power gain and their measurement. or 1+4=5
What are logic gates? Explain the OR gates, the AND gates.

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2010

Q1. How can a NAND gate be made? 1
Q2. Draw the I-V characteristics in forward and reverse bias of a junction diode. 1+1=2
Q3. " The electrical conductivity of extrinsic semiconductor is more than that of intrinsic semiconductors.". Give reasons. 2
Q4. Discuss the working of a zener diode as a voltage regulator. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2011

Q1. Distinguish between n-type and p-type semiconductor. 1
Q2. Draw a circuit diagram of an npn transistor in common emitter configuration with proper biasing and showing directions of I_e, I_b, I_c. 2
Q3. Discuss briefly the working of a transistor as an oscillator. 3
Q4. Conversion of a.c to d.c is (a) amplification (b) rectification (c) oscillation (d) inversion 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2012

Q1. Define forbidden energy gap in solids. 1
Q2. Draw the circuit diagram for full wave rectification by using two semiconductor diodes. 2
Q3. Distinguish between conductor, semiconductor and insulator in terms of energy band gap. 3
Q4. The NAND gate AND gate followed by (a) AND gate (b) OR gate (c) NOT gate (d) NOR gate 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2013

Q1. Draw the laballed circuit diagram using zener diode as a voltage regulator. 2
Q2. Give the logic symbol for a two input NOR gate and write its truth table. 1+1=2
Q3. What is a LED? Mention two important advantages of LED over conventional lamps. 1+2=3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2014

Q1. What type of charge carriers flow during reverse biasing of a PN junction diode? 1
Q2. What is a solar cell? Give one uses of it. 1+1=2
Q3. Why is the emitter of a transistor always forward biased? 1
Q4. Draw the circuit diagram to study the CE characteristics of a npn transistor and show the graphical nature of the output characteristics of the transistor. 2+1=3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2015.

Q1. A PN-junction diode can be used as a rectifier. Why? 1
Q2. Distinguish between conductors, insulators and semiconductors on the basis of energy bands. 3

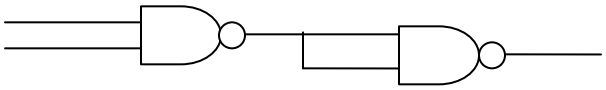
Q3. With the help of circuit diagram explains full wave rectification using PN junction diodes. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2016

Q1. What is meant by doping? 1
Q2. What is the full form of LED? 1
Q3. Draw the symbol for the NOR gate. 1
Q4. Explain the working of a transistor as a switch. 3
Q5. For determining the light intensity we us 1
(a) a photodiode in reserse bias (b) a photodiode in forward bias (c) LED in reverse bias (d) LED in forward bias

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2017

Q1. Define a semiconductor in terms of energy band in solid. 1
Q2. What is a rectifier? Explain the working of a PN diode as a full wave rectifier. or 1+4 = 5
What is an amplifier? Explain the working of a common emitter transistor (npn) as an amplifier
Q3. The combination of NAND gates in the figure is 1
(a) AND gate (b) Or gate (c) NOT gate (d) none

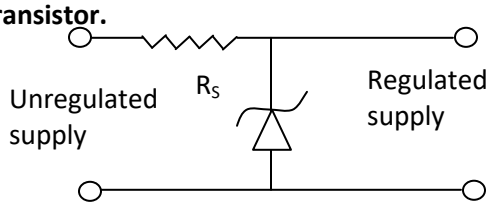


COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2018

Q1. What is potential barrier in pn junction diode? 1
Q2. Write the truth table of two input NAND gate. 1
Q3. What are the basic conditions of biasing the EB and CB junctions of a transistor for its proper functioning? 2
Q4. Differentiate between n type and p type extrinsic semiconductor by giving two points. 2
Q5. For a transistor the emitter current is 0.505 mA and the base current is 5μA. The collector current is
(a) 0.25mA (b) 0.5 mA (c) 0.52 mA (d) 0.55 mA 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM

Q1. Draw a neat laballed diagram 2019for the use of npn transistor as a CE amplifier. 1
Q2. In a transistor I_c = 0.98A , I_b = 20 μA . Find α and β of the transistor. 2
Q3. A zener diode of rating 100mW is used to be used as voltage regulator. If the breakdown voltage is 5V and it has to regulate voltage between 3V and 7V. What is the value of Rs for safe operation? 2



Q4. Pure silicon at 300K has equal number of electrons and holes concentration of $1.5 \times 10^{16} m^{-3}$. Doping by indium increases the hole concentration by $4.5 \times 10^{22} m^{-3}$. The number of electron concentration in doped silicon is 1
(a) 9×10^5 (a) 9×10^9 (a) 2.25×10^{11} (a) 3×10^{19}

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2020

Q1. Define small signal current gain of a transistor in common emitter configuration.
Q2. Explain how a depletion region is formed in a junction diode.
Q3. In the figure, the V_{BB} supply can be varied from 0V to 5.0.V. The transistor has β_{dc} = 250 and R_B = 100Ω, R_C = 1KΩ, V_{CC} = 5V. Assume that when the transistor is saturated, V_{CE} = oV and V_{BE} = 0.8V. Calculate the minimum base current and input voltage for which the transistor will reach saturation.
Q4. The output frequencies of half wave and full wave rectified output respectively of the same sinusoidal input wave of frequency 50 Hz are

A. 50 Hz 50 Hz B. 50 Hz 100 Hz C. 100 Hz 100 Hz D. 100 Hz 50 Hz

UNIT X COMMUNICATION SYSTEMS 5 MARKS

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2007

Q1. What should be the height of the transmitting antenna if the T.V telecast is to cover a radius of 200km? 1
Q2. What do you meant by modulating signal? 1

Q3. What do you mean by optical fiber? Give any two advantages of optical fiber communication. 2
Q4. What is messages signal? What are the two types of the signal? 1
Q5. Through which mode of propagation, the ratio wave can be sent from one place to another place?
(a) Ground wave propagation (b)Sky wave propagation (c) Space wave propagation (d) All of them 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2008

Q1. Distinguish between ground wave, sky wave and space wave propagation . 3
Q2. What is geostationary satellite? State the two basic of requirement of geostationary satellites. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2009

Q1. What is pulse modulation? 1
Q2. What type of modulation is required for T.V broadcasts? 1
Q4. Mention any four application of remote sensing. 2
Q5. Describe LASER? Give various types of LASER. Explain any one of them. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2010

Q1. " Why a low flying aircraft passes overhead, we sometimes notice a slight shaking of the picture over the screen." Give reason. 1
Q2. What is demodulation? 1
Q3. What are space waves? Give its two uses. 2
Q4. A 1000kHz carrier wave is modulated by an audio signal of frequency 5000Hz. Then the band width of the channel in kHz is (a) 10 (b) 20 (c) 30 (d) 40 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2011

Q1. What is modem? 1
Q2. Why ground wave propagation is not suitable for high frequency carrier waves? 3
Q3. Modulation is an essential feature of (a) medium (b) receiver (c) transmitter (d) oscillator 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2012

Q1. Why are sky waves not used in transmission of television signals? 1
Q2. What is frequency modulation? Mention any two advantages of frequency modulation over amplitude modulation. 1+2=3
Q3. Optical fibre rely for their operation on the phenomenon of
(a) reflection (b) refraction (c) dispersion (d) total internal reflection 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2013

Q1. What is space wave propagation? The TV transmission tower at a particular station has a height of 160m. Calculate the coverage range. 1+2=3
Q2. Space wave propagation is used in 1
(a) Very low frequency (b) low frequency (c) medium frequency (d) very low frequency

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2014

Q1. Give three basic needs for modulation. 3
Q2. What is sky wave propagation? 1
Q3. What is the range of audio frequency signal? 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2015

Q1. Derive the expression for the maximum distance upto which the transmission of T.V. signals from tower of height 'h' can be received on the surface of earth. 2
Q2. Define the three essential elements of communication system. 3

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM ,2016

Q1. What is broadcast communication? 1
Q2. What is space wave propagation? Give two uses of it in communication system. 2
Q3. Give two important needs for modulation. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2017

Q1. Why is satellite necessary for long distance TV transmission? 1
Q2. Name any three communication channel. 3
Q4. Radio waves can be sent from one place to another through 1

(a) ground wave propagation (b) sky wave propagation (c) space wave propagation (d) all the above

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2018

Q1. Calculate the wavelength of a signal of frequency 10KHz. 1

Q2. Derive an expression for the maximum distance up to which TV signal can be received from an antenna of height h on the earth's surface. 3

Q3. The device fitted in the satellite which receives signals from the earth station and transmits them in different directions is called (a) transmitter (b) amplifier (c) transponder (d) transformer 1

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2019

Q1. What is sky wave propagation? Mention the frequency used in this propagation. 1

Q2. Write two advantage of FM over AM? 2

Q3. Using block diagram name the components of general communication system. 2

COUNCIL OF HIGHER SECONDARY SCHOOL EXAM 2020

Q1. A message signal of frequency 5 kHz and peak voltage of 10 V is used to modulate a carrier wave of frequency 1MHz and peak voltage of 20 V. Determine modulation index, the side bands produced.

Q2. A transmitting antenna at the top of a tower has a height 32 m and the height of the receiving antenna is 50 m. What is the maximum distance between two such antennas for satisfactory communication in line-of-sight (LOS) mode? (radius of earth 6400 km)