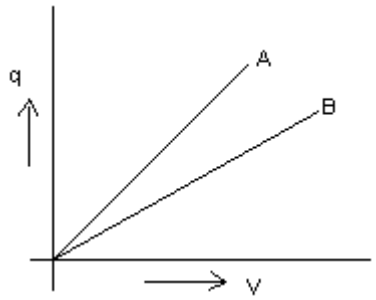
ELETROSTATICS
DELHI BOARD-2006

1. Define the term 'dielectric constant' of a medium in terms of capacitance of a Capacitor [1]

2. The electric field and electric potential at any point due to a point charge kept in air is 20 NC^{-1} and 10 JC^{-1}respectively. Compute the magnitude of this charge. [2]

3. The given graph shows the variation of charge q versus potential difference V for two capacitors C_1 and C_2. The two capacitors have same plate separation but the plate area C_2 is double than of C_1. Which of the lines in the graph correspond to C_1 and C_2 and why? [2]

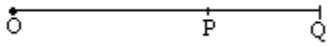


4. What is electric flux? Write its S.I. units.
Using Gauss's Theorem, deduce an expression for the electric field at a point due to a uniformly charged infinite plane sheet.

ELETROSTATICS
ALL INDIA-2006

1 Define the term 'electric dipole moment'. Give its unit. [1]

2 A point charge 'q' is placed at O as shown in the figure. [2]



Is $V_P - V_Q$ positive or negative when (i) $q > 0$, (ii) $q < 0$? Justify your answer.

3. Two capacitors of capacitance 6 μF and 12 μF are connected in series with a battery. The voltage across the 6 μF capacitor is 2V. Compute the total battery voltage. [2]

OR

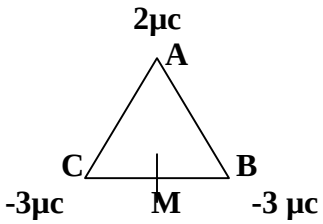
A parallel plate capacitor with air between the plates has a capacitance of 8 pF. The A separation between the plates is now reduced by half and the space between them is filled with a medium of dielectric constant 5. Calculate the value of capacitance of the capacitor in the second case.

4. Using Gauss's theorem, shown 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. Why do you expect the electric field inside the shell to be zero according to this theorem?

ELETROSTATICS

DELHI BOARD-2005

1. Three point charges of +2μc ,-3μc and -3μc are kept at the vertices A,B,C respectively of an equilateral triangle of side 20 cm as shown in the fig. [1]



2. What should be sign and magnitude of the charge to placed at the mid point (M) of the side BC so that the charge at A remains in equilibrium [2]

3. An electric dipole of dipole moment 20 X 10^{-6} C m is enclosed by a closed surface. What is the net flux coming out of the surface? [1]

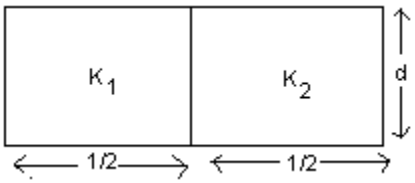
4. A charge q is place at the centre of the line joining two equal charge Q. show that the system of the charges will be in equilibrium if q = - Q/4 [2]

5. Two fixed point charges +e and +e units are separated by a distance **a** where should the third point charge be placed for it's to be in equilibrium. [2]

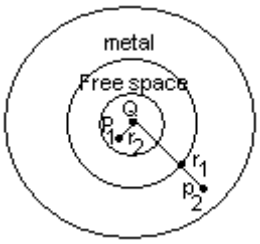
6. A parallel plate capacitor with air between the plates has a capacitance of 8 pf. What will be the capacitance if the distance between the plates be reduced by half and the the space between them is filled with a substance of dielectric constant of K= 6? [2]

7. Why does the electric field inside a dielectric decreases when it is placed inside an external electric field? [1]

8. Two dielectric slabs of dielectric constants k_1 and k_2 are filled in between the plates each of area A_1 of the parallel plate capacitor as shown in the figure. Find the net capacitance of the capacitor [2]



9. A small metal sphere carrying charge +Q is located at the centre of a spherical cavity in a large uncharged metal sphere as shown in the figure. Use Gauss's theorem to find electric field at point P_1 and P_2. [2]



ELETROSTATICS

ALL INDIA-2005

1. An electrostatic field line cannot be discontinuous. Why ?

2. 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 the line joining the two charges.

3. State Gauss' theorem. Apply this theorem to obtain the expression for the electric field intensity at a point due to an infinitely large, thin; plane sheet of charge.

OR

A 5 μF capacitor is charged by a 100V supply. The supply is then disconnected and charged capacitor is connected to another uncharged 3μF capacitor. How much electrostatic energy of the first capacitor is lost in the process of attaining the steady situation?

4. A parallel plate capacitor is to be designed with a voltage rating 1 KV using a material of dielectric constant 3 and dielectric strength about 10^7 Vm^{-1}. For safety we would like the field never to exceed say 10% of the dipole strength. What minimum area of the plates is required to have a capacitance of 50 pF.

OR

A 4 μF capacitor is charged by a 200 V supply. The supply is then disconnected and the charged capacitor is connected to another uncharged 2 μF capacitor. How much electrostatic energy of the first capacitor is lost in the process of attaining the steady situation.

5. State the 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.

6. How does the Coulomb force between two point charges depend upon the dielectric constant of the intervening medium?

7. A charge q is placed at the centre of the line joining two equal charges Q. Show that the system of three charges will be in equilibrium if $q = -Q/4$.

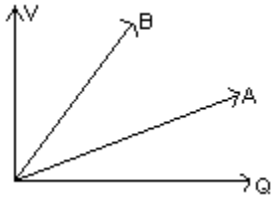
OR

A 5μF capacitor is charged by a 100V supply. The supply is then disconnected and charged capacitor is connected to another uncharged 3μF capacitor. How much electrostatic energy of the first capacitor is lost in the process of attaining the steady situation?

8. State Gauss' theorem. Apply this theorem to obtain the expression for the electric field intensity at a point due to an infinitely large, thin; plane sheet of charge.

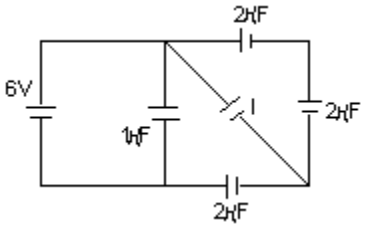
ELETROSTATICS
DELHI BOARD-2004

1. The graph shows the variation of voltage V across the plate of two capacitor A and B verses increasing of charge Q store on them, which of the two capacitors has higher capacitance? Give reason for your answer. [2]



2. State Gauss's theorem .Derive an expression for the electric field intensity at any point outside a uniform charged thin spherical shell. [3]

3 Find the total energy store in the capacitor in given network [3]



Set-II

4 State Gauss's theorem. Find electric field due to long straight wire (infinitely) [3]

5 X and Y are two parallel capacitors having the same area of the plate and same separation between the plates, X has air between the plate and Y contain a dielectric medium of €r = 5. [5]

a Calculate the potential difference between the plate of X and Y.

b What is the ratio of electrostatic energy stored in X and Y

ELETROSTATICS
ALL INDIA--2004

1. An electric dipole of length 4 cm, when placed with its axis making an angle 60^0 with a uniform electric field experiences a torque of $4\sqrt{3}$ Nm. Calculate the

(i) magnitude of the electric field. [2]

(ii) Potential energy of the dipole, if the dipole has charges of ±8 n C.

2. State Gauss 'theorem of electrostatics. Using this theorem, derive an expression for the electric field intensity due to an infinite plane sheet of charge density σ C/m^2. [3]

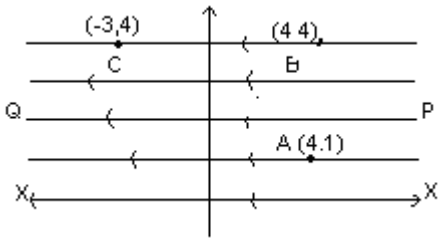
3. A 10μF capacitor is charged by a 30V d.c supply and then connected across a uncharged 50μF capacitor .Calculate (i) the final potential difference across the combination, and (ii)the initial and final energies. How will you account for the difference in energy ?

4. State Gauss' theorem in electrostatics. Using this theorem, derive an for the electric field intensity at any point outside a uniformly charged spherical shell. [3]

ELETROSTATICS
DELHI BOARD-2003

1. Mention any two properties of electric lines of force. Sketch them for an isolated positive point charge. [2]

2. what is an equipotential surface?
A uniform electric E of 300 N/C is directed along PQ. A, B, and C are three points in the field having x and y coordinates in (meters) as shown in the figure. Calculate potential difference between the points (I) A and B (ii) Band C. [3]



3. Write the principle, construction, working and theory of Van de Graff generator ? [3]

4. What is electric line of force? Sketch line of force due to two equal positive charges places at a small distance apart in air. [2]

ELETROSTATICS
ALL INDIA- -2003

1. Write the S.I unit of (i) electric field intensity and (ii) electric dipole moment. [1]

2. Two point charges q_A =+3μC and q_B= -3μC are located 20 cm apart in vacuum.
(i) Find the electric field at the midpoint of the line AB joining the two charges,
(ii) If a negative test charges of magnitude $1.5x10^{-9}$C is placed at the centre, find the force experienced by the test charge. [2]

3. Give the principle of working of a Van de Graff generator. With the help of a diagram, describe its construction and working. How is the leakage of charge minimized from the generator?

OR

Obtain the expression for the capacitance of a parallel capacitor. Three capacitors of capacitances C_1,C_2,and C_3 are connected (i) in series, (ii) in parallel. Show that the energy stored in the series combination is the some as that in the parallel combination. [5]

SET II

4. Sketch a graph to show how the charge 'Q' acquired by a capacitor of capacitance 'C' varies with increase in potential difference between its plates. [2]

SET-III

5. Name the physical quantity which has joule coulomb $^{-1}$ as its unit. Is it a scalar or a vector quantity ? [2]

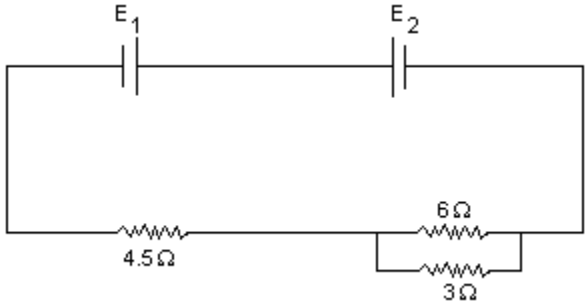
CURRENT ELECTRICITY

DELHI BOARD- 2006

1. Sketch a graph showing variation of resistively of carbon with temperature. [1]

2. Write the mathematical relation between mobility and drift velocity of charge carriers in a conductor. Name the mobile charge carries responsible for conduction of electric current in (i) an electrolyte (ii) an ionized gas. [2]

3. Two cells E_1 and E_2 in the given circuit diagram have an emf. of 5V and 9V and internal resistance of 0.3Ω and 1.2Ω respectively. [2]
Calculate the value of current flowing through the resistance of 3Ω.

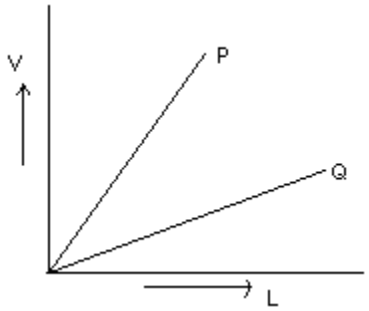


4. A 10 m long wire of uniform cross-section and 20Ω resistance is used in a potentiometer. The wire connected in series with a battery of 5V along with an external resistance of 480Ω. If an unknown e.m.f. E is balanced at 6.0m length of the wire, calculate: [3]
(i) the potential gradient of the potentiometer wire
(ii) the value of known e.m.f. E

CURRENT ELECTRICITY

ALL INDIA -2006

1. The variation of potential difference V with length *l* in case of two potentiometers P and Q is as shown. Which one of these two will you prefer for comparing emfs of two primary cells?



2 Draw a circuit diagram using a metre bridge and write the necessary mathematical relation used to determine the value of an unknown resistance. Why cannot such an arrangement be used for measuring very low resistances? [2]

3 There are 'n' resistors, each of resistance 'r'. These are first connected to get minimum possible resistance. In the second case, these are again connected differently to get maximum possible resistance. Compute the ratio between the minimum and maximum value of resistance so obtained. [3]

4. Which one of the two, an ammeter or a millimeter, has a higher resistance and why? [1]

5. State Faraday's saws of electrolysis. Express these in mathematical notation. Name any two applications of electrolysis. [2]

CURRENT ELECTRICITY

DELHI BOARD 2005

1. Draw V-I graph for ohmic and non ohmic material. Give one example for each. [2]

2. A galvanometer with a coil of resistance 120 Ω shows full scale deflection for a current of 2.5 mA . How will you convert the galvanometer into an ammeter of an range 0 to 7.5 A ? Determine the net resistance of the ammeter. When an ammeter is put in a circuit does it read slightly less or more than the actual current in the original circuit? Justify your answer. [3]

3. Define the term resistivity and write its S.I unit. Derive the expression form the resistively of a conductor in terms of the number density of free electrons and relaxation time. [3]

4. State the principle of potentiometer. Draw a circuit diagram used to compare the emf of two primary cells. Write the formula used. How can the sensitivity of a potentiometer be increased? [3]

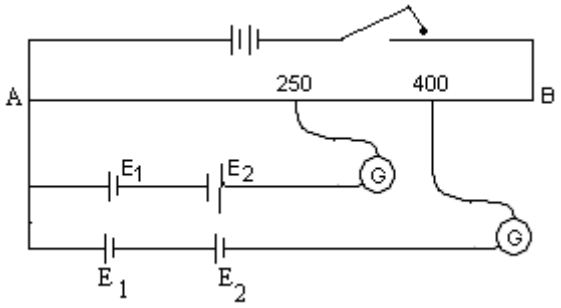
SET-II

5. A voltage 30 V is applied across a carbon resistor with first, second and third ring of blue , black and yellow colours respectively .Find the value of current through resistor. [2]

6. A heating element using nichrome connected to a 230 V supply draws an initial current of 3.2 A which after a few seconds at steady value of 2.8 A. What is the steady temperature of the heating element if the room temperature is 27˚C? temperature co-efficient of resistance of nichrome arranged over the temperature range involved is $1.7 \times 10^{-4}\ \alpha^{-1}$. [3]

SET –III

7. Two primary cell of emf E_1 and E_2 ($E_1 > E_2$) are connected to the potential wire AB as shown in the fig. If the balancing lengths for the two combinations of the are 250 cm, and 400 cm .Find the ratio of $E_1$and E_2. [2]



8. What is button cell? Name any two types of button cells. [2]

9. In a meter bridge the balance point is found to be at 39.5 cm from the end A, when the resistant Y is of 12.5 ohm. Determine the resistance of X. Why are the connections between resistors in a meter bridge made of thick copper strips? What happen if the galvanometer and cell are interchanged at the balance point of the bridge? Would the galvanometer show any current? [2]

10. Define the terms resistivity and conductivity and state their S.I units. Draw a

graph showing the variation of resistivity with temperature for a typical semiconductor. [3]

11. State the principle if potentiometer with the help of circuit diagram, describe a method to find internal resistance of primary cell

CURRENT ELECTRICITY

ALL INDIA -2005

1. How does the receptivity of :
(i)a conductor and
(ii)a semiconductor vary with temperature ? Give reason for each case.

2. Two cell of emf 1.5 volt and 2 volt and internal resistance 1ohm and 2ohm respectively are connected in parallel to pass a current in the same direction through an external resistance of 5 ohm..
(a) Draw the circuit diagram
(b) Using kirchhoff 's laws. Calculate the current through each branch of the circuit and P.D across the 5 ohm resistor

3. What is See beck effect. Plot a graph showing the variation of thermo emf with temperature of the hot junction (keeping the cold junction at 0^0C). of a thermo couple How will the
(a) neutral temperature (b) inversion temperature of the thermocouple change when the
(c)temperature of the cold junction is increase.

OR

State Faraday's law of electrolysis.
How does one infer from these laws that the charge per ion of any chemical element (species) is an integral multiple of e where e is the charge on an electron

4. Establish a relation between current and drift velocity.

5. The potential difference across the terminal of a battery of emf 12V and internal resistance 2 ohm drop to 10V when it is connected to a silver voltameter.
Calculate the silver deposited at the cathode in half an hour. Relative atomic mass silver is 108.

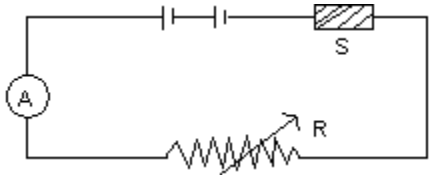
6. How do you convert a galvanometer into an ammeter? Why is an ammeter always connected in series

7. A series battery of 6 lead accumulators of emf 2.0V and internal resistance of 0.5Ω is charged by a 100V d.c. supply. What series resistance should be used in the charging circuit in order to limit the current to 8 A? Using the required resistor, obtain (i) the power supplied by the d.c. source and (ii) the power dissipated as heat.

CURRENT ELECTRICITY

DELHI BOARD -2004

1. The diagram shows a piece of pure semiconductor S in series with a variable resistor R and a source of constant voltage V, would you increase or decrease the value of R to keep the reading of ammeter when S is heated ? Give reason. [3]



2. Deduce the condition for balance Wheatstone bridge. Using the principle of Whetstone bridge, describe the method to determine the specific resistance of a wire in the laboratory. Draw the circuit diagram and write the formula used. Write any two precautions you would observe while performing the experiment. [5]

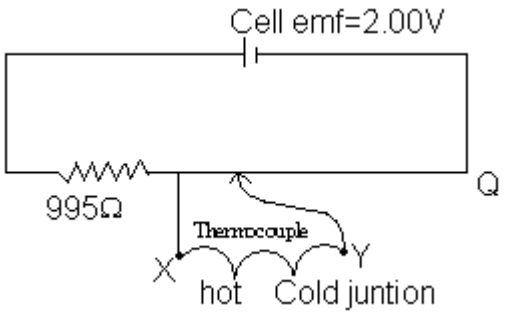
CURRENT ELECTRICITY

ALL INDIA -2004

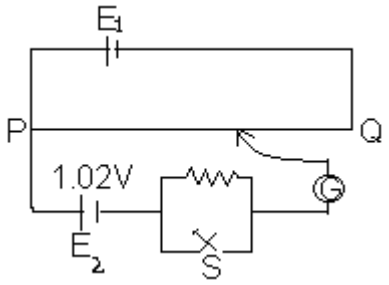
1. Explain how does the resistively of a conductor depend upon
(i) number density 'n' of free electrons, and
(ii) relaxation time 'λ [2]

2. Define the term 'electrochemical equivalent'. Deduce the relation connecting electrochemical equivalent chemical equivalent and Faraday. [3]

3. The circuit diagram shows the use of a potentiometer to a measure a small emf produced by a thermocouple connected between X and Y. The cell C of emf 2V, has negligible internal resistance. The potentiometer wire is 1.00 m long and has resistance 5Ω. The balance point s is found to be 400 mm from P. Calculate the value of emf V, generated by the thermocouple. [3]



4. Potentiometer wire, PQ of 1 m length is connected to a standard cell E_1 . Another cell, E_2 of e.m.f. 1.02V is connected as shown in the circuit with a resistance '*r*' and a switch, S. With switch, S open, null position is obtained at a distance of 51cm from P. Calculate (i) potential gradient of the potentiometer wire and (ii) e.m.f. of the cell E_1. (iii) When switch S is closed, will null point move towards P or towards Q? Give reason for your answer. [3]

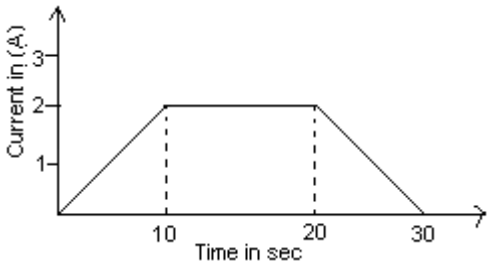


CURRENT ELECTRICITY
DELHI BOARD-2003

1. Define electrical conductive of a conductor and give its S.I. unit. [1]

2. What happen to the power dissipation if the value of electric current passing through a conductor of constant resistant is doubled? [1]

3. In a copper voltameter, a varying electric current, as shown in graph, is passed. The mass of copper deposited at the end of 30 seconds is m grams. Using the graph, find the value of e.c.e .of copper in g C^{-1} [2]



4. What is meant by drift velocity of the free electron? Derive Ohm's law on the basis of the theory of electron drift . [3]

(OR)

5. What is Whetstone bridge? Deduce the condition for which Wheatstone bridge is balanced [3]

6. What is meant by the sensitivity of a potentiometer? [1]

CURRENT ELECTRICITY
ALL INDIA -2003

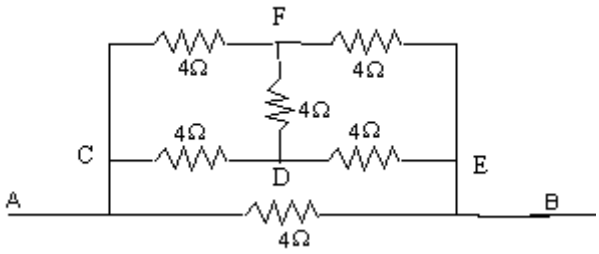
1. What is button cell? Name any two types of button cells. [2]

2. What are super conductors? [1]

3. Name the temperature of a thermocouple at which its (i) thermo emf changes its sign (ii) thermoelectric power becomes zero [2]

4. Write the equations for chemical reactions place at the (i) anode (ii) cathode of a lead accumulator during its charging. [2]

5. Six resistors, each of the value 4Ω, are joined together in a circuit as shown in the figure. Calculate equivalent resistance across the points A and B. If the cell of emf 2V is connected across AB, compute the current through the arms AB and DF of the circuit [2]



MAGNETIC EFFECT OF CURRENT AND EARTH MAGNETISM
ALL INDIA 2006

1. Steel is preferred for making permanent magnets whereas soft iron is preferred for making electromagnets. Give one reason. [1]

2. Draw a neat and labeled diagram of as cyclotron. State the underlying principle and magnetic field at the centre of a circular loop of radius 'R' carrying 'I'. Sketch the magnetic field lines for a current loop clearly indicating the direction of the field.

OR

State Biot-savart's law. Using this law, derive the expression for the magnetic field due to a current carrying element . Use this law to obtain a formula for magnetic field at the centre of a circular loop of radius 'R' carrying 'I'. Sketch the magnetic field lines for a current loop clearly indicating the direction of the field.

MAGNETIC EFFECT OF CURRENT AND EARTH MAGNETISM
DELHI BOARD -2006

1. The vertical component of Earth's magnetic field at a place is $\sqrt{3}$ times the horizontal component. What is the value of angle of dip at this place?

2. State the principle of working of a cyclotron. Write two uses two uses of this machine machine ?

3. With the help of a neat and labelled diagram, explain the underlying principle and working of a moving coil galvanometer. What is the function of: [5]
(i) uniform radial field
(ii) soft iron core ; In such a device?

OR

Derive a mathematical expression for the force per unit length experienced by each of the two long current carrying conductors placed parallel to each other in air. Hence define one ampere of current.
Explain why two parallel straight conductors carrying current in the opposite direction kept near each other in air repel?

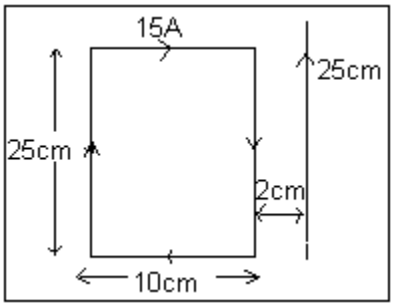
MAGNETIC EFFECT OF CURRENT AND EARTH MAGNETISM
ALL INDIA 2005

1. Two wires of equal lengths are bent in the form of loops. one of loop is square shaped whereas the other loop circular. These are suspended in a uniform magnetic field and the same current is passed through them , which loop will experienced greater torque? Give reasons. [1]

2. Write two characteristic properties to distinguish between diamagnetic and paramagnetic materials. [2]

3. Explain the principle and working of a cyclotron with the help of a labeled diagram. A cyclotron is oscillator frequency is 10mhz what should be the magnetic field for accelerating proton? If the radius of its dee is 60cm.What is the kinetic energy of the proton beam produced by the accelerator? Express your answer in units of MeV: [5]
e=1.6x10 $^{-19}$ c, mass of proton=1.67x10^{-27} kg, 1MeV=1.602x10 $^{-15}$J

4. Depict the magnetic field lines due to two straight long parallel conductors carrying current $I_1$and I_2 in the same direction. Hence deduced an expression for the force acting per unit length on one conductor due to the other. This force is attractive or repulsive?
Figures shows a rectangular current carrying loop placed 2 cm away from a long straight current carrying conductors. What is the direction and magnitude of the net force acting on the loop. [5]



MAGNETIC EFFECT OF CURRENT AND EARTH MAGNETISM

DELHI BOARD- 2005

SET - I

1. Which physical quantity has the unit Wb/m ^{2}? Is it a scalar or a vector quantity ?

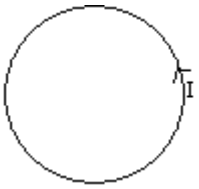
2. Explain with the help of diagram the terms (*i*) magnetic declination and (*ii*) angle of dip at a given place

3. Derive an expression for the torque acting on a loop of N turns, area A, carrying current I, When it is held in a uniform magnetic field B. With the help of circuit, show how a moving coil galvanometer can be converted into ammeter of given range . Write necessary mathematical formula .

OR

With an expression for the force experienced by a charged particle moving in a uniform magnetic field B . With the help of a diagram, explain the principle and working of a cyclotron. Show that cyclotron frequency does not depend on the speed of the particles

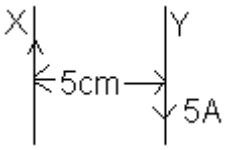
4. In the diagram below is shown a circular loop carrying current I . Show the magnetic field with the help of lines of force .



MAGNETIC EFFECT OF CURRENT AND EARTH MAGNETISM

ALL INDIA- 2004

1. Two long parallel straight wires X and Y separated by a distance of 5 cm in air carry currents of 10A and 5A respectively in opposite direction. Calculate the magnitude and direction of the direction of the force on a 20 cm length of the wire Y.



OR

A circular coil of 100 turns , radius 10cm carries a current of 5A it is suspended vertically in a uniform horizontal magnetic field of 0.5T, the field lines making an angle of 60^0 with the plane of the coil. Calculate the magnitude of the torque that must be applied on it to prevent it from turning.

2. Using Biot-Savart law, deduce an expression for the magnetic field on the axis of a circular current loop. Draw the magnetic field lines due to a circular current carrying loop.

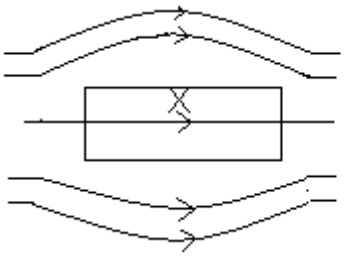
OR

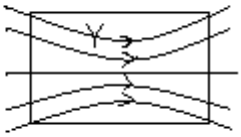
A hydrogen ion of mass 'm' and 'charge 'q' travels with a speed 'ν, in a circle of radius 'r' in a magnetic field of intensity 'B'. Write the equation in terms of these quantities only, relating the force on the ion to the required centripetal force. Hence derive an expression for its time period. [3]

3. A uniform magnetic field gets modified below, when two specimens X and Y are placed in it.

(i) Identify the two specimens X and Y.

(ii)State the reason for the behavior of the field lines X and Y.





4. Using Ampere's circuital law, derive an expression for the magnetic field along the axis of a toroidal solenoid.

OR

A particle of mass '*m*', with charge '*q*' moving with a uniform speed '*v*', normal to a uniform magnetic field 'B', describes a circular path of radius '*r*'. Derive expressions for the (i) time period of revolution and (ii) kinetic energy of the particle.

MAGNETIC EFFECT OF CURRENT AND EARTH MAGNETISM

DELHI BOARD– 2004

1. An electric became projected along +x axis experience a force due to a magnetic field along the +y axis. What is the direction of the magnetic field?

2. Explain with help of diagram the term (i) Magnetic Declination'. and (ii) angle of dip at given place

3. A galvanometer with a coil of resistance 120 Ω, shows full scale deflection for a current of 2.5 mA. How will you connect the galvanometer into the ammeter of range 0 to 0.5A

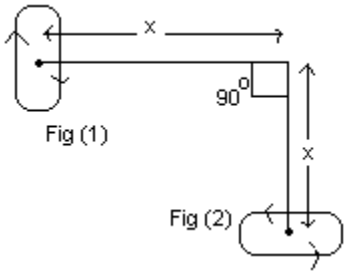
4. (a) With the help of a labeled diagram, explain the principle and working of a moving coil meter.

(b) Two parallel co-axial circular coaxial of equal radius 'R' and equal number of turns 'N' carry equal currents 'I' in the same direction and separated by distance'1R'. Find the magnitude and direction of the net magnetic field produced at the mid- point of the line joining their centers.

OR

(a)State Biot-savart's law. Using this law, derive the expression for the magnetic field due to a current carrying circular loop of radius 'R' at a point which is at a distance 'x' from its centre along the axis of the loop.

(b) Two small identical circular loops, marked (1) and (2) carrying equal currents, are placed with the geometrical axis perpendicular to each other direction of the net magnetic field produced at the point O.



MAGNETIC EFFECT OF CURRENT AND EARTH MAGNETISM

DELHI BOARD-2003

1. How does the (i) pole strength and (ii) magnetic moment of each part of a bar magnet change, if it is cut with two equal pieces transverse to its length?

2. Write S.I. unit of magnetic flux. Is it a scalar or a vector quantity ?

3. Tow straight, parallel, circuit carrying conductors are kept at distance 'r' from each other in air. The direction of current in both the conductors is the same. Find the magnitude and direction of the force between them. Hence, define one ampere.

SET-II

1.How does the (i) pole strength and magnetic movement of each part of a bar magnet changed, if it is cut into two equal peaces along its length?

SET-III

1.Where on the earth surface the value of angle of dip is maximum?

MAGNETIC EFFECT OF CURRENT AND EARTH MAGNETISM

ALL INDIA -2002

SET-I

1. What should be the orientation of a magnetic dipole in a uniform magnetic field so that its potential energy is maximum?

2. Derive an expression for the force acting on a current carrying conductor placed in a uniform magnetic field. Name the rule which gives the direction of the force. Write the condition for which this force will have (i) maximum, (ii) minimum value.

3. Where on the earth's surface is the value of vertical component of the earth's magnetic field zero? The horizontal component of the earth's magnetic field at a given place is 0.4×10^{-4} Wb/m^2 and angle of dip is 30^o. Calculate the value of (i) vertical component, (ii) the total intensity of the earth's magnetic field.

4. Write the S.I unit of (i) magnetic pole strength, (ii) magnetic dipole moment of a bar magnet.

5. Where on the earth's surface is the value of the vertical component of earth's magnetic field zero ? A bar magnet of magnetic moment 1.5 JT^{-1} lies aligned with the direction of a uniform magnetic field of 0.22 T. calculate the amount of work done to turn the magnet so as to align its magnetic moment

(i) normal to the field direction

(ii) opposite to the direction.

ELECTRO MAGNETIC INDUCTION, & ALTERNATING CURRENT

ALL INDIA -2006

1. 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.

2. When an inductor L and a resistor R in series are connected across a 12V, 50 Hz supply, a current of 0.5A flows in the circuit. The current differs in phase from supply, voltage by $\pi/3$ radian. Calculate the value of R. [3]

OR

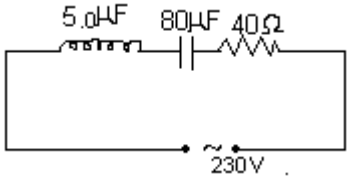
A 0.5 m long metal rod PQ completes the circuit as shown in the figure . The area of the circuit is perpendicular to the magnetic field of flux density 0.15 T. If the resistance of the total circuit is 3 ohm , calculate the force needed to move the rod in the direction as indicated with a constant speed of 2 ms^{-1} .

ELECTRO MAGNETIC INDUCTION, ALTERNATING CURRENT

DELHI BOARD- 2006

1. How is the mutual inductance of a pair of coils affected when:
(i) separation between the coils is increased?
(ii) the number of turns of each coil is increased?
(iii) a thin sheet is placed between the two coils, other remaining the same?
Explain your answer in each case. [3]

2. The given circuit diagram shows a series LCR circuit connected to a variable frequency 230V source:



(a) Determine the source of frequency which derives the circuit in resonance.
(b) Obtain the impedance of the circuit and the amplitude of current at the resonating frequency
(c) Determine the rms potential drops across the three elements of the circuit.
(d) How do you explain the observation that algebraic sum of the voltages across the three elements obtained in (c) is greater than the supplied voltage?

OR

The primary coil of an ideal step-up transformer has 100 turns and the transformation ratio is also 100. The input voltage and power are 220 V and 1100 W respectively.
(i) number of turns in the secondary
(ii) the current in the primary
(iii) voltage across the secondary
(iv) the current in the secondary
(v) power in the secondary

ELECTRO MAGNETIC INDUCTION, ALTERNATING CURRENT

ALL INDIA -2005

1. A bulb and a capacitor are connected in series to a.c source of variable frequency. How will the brightness of the bulb change on increasing the frequency of the a.c source ? Give reason.

2. A circular coil of radius 8 cm and 20 turns rotates about its vertical diameter with an angular speed of 50 rad/ sec in uniform horizontal magnetic field of magnitude 3×10^{-2} T. Find the maximum and average value of the emf induced in the coil.

3. State the condition under which the phenomenon of resonance occurs in a series LCR circuit. Plat a graph showing variation of current with frequency of ac source in a series LCR circuit.

4. 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* numbers of turns.

5. In a series LCR circuit, the voltage across an inductor, capacitor and resistor are 20V, 20V and 40V respectively. What is the phase difference between the applied voltage and current ?

6. Define mutual inductance and give its S.I. unit. Derive an expression for the mutual

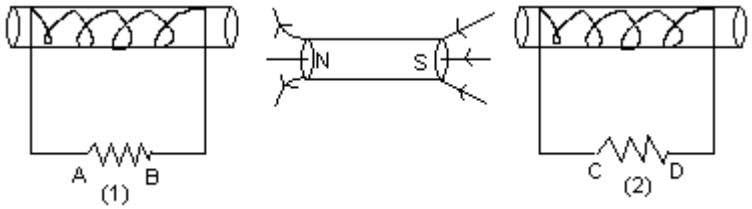
inductance of two long coaxial solenoids of same length would one over the other .Mention the factors on which the resonant frequency of a series LCR circuit depends. Plot graph showing variation of impedance of a series LCR circuit with the frequency of the applied a.c. source.

ELECTRO MAGNETIC INDUCTION, ALTERNATING CURRENT

DELHI BOARD -2005

1. The power factor of an a.c circuit is .5 .What will be the phase difference between voltage and current in this circuit ?

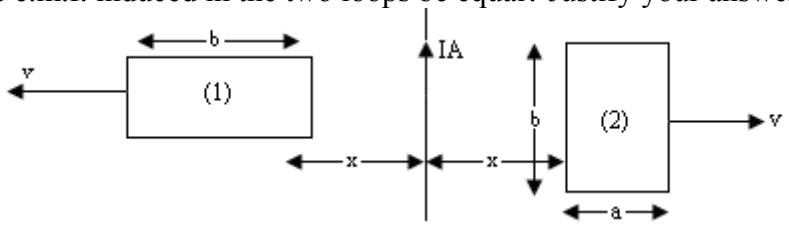
2. In the figure given below, a bar magnet moving towards the right or left induces an e.m.f. in the coil (i) and (ii). Find giving reason, the direction of the induced current through the resistors AB and CD, when the magnet is moving (a) towards the right. (b) towards the left.



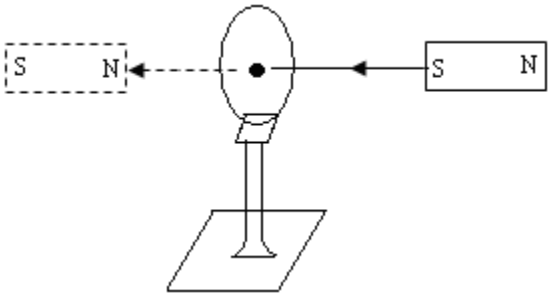
3. (i) Draw the graph showing variation of reactance and capacitive reactance with frequency of applied a.c. source.
(ii) Can the voltage drop across the inductor or the capacitor in series be greater than the applied voltage of the a.c. source? Justify your answer.

4. Explain, with the help of diagram, the principle and working of an a.c. generator. Write the expression for the e.m.f. generated in the principle and working of an a.c. generator. Write the expression for the e.m.f. generated in the terms of its speed of rotation.

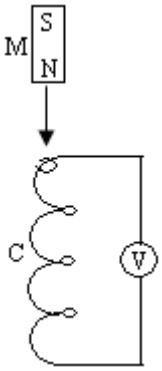
5. The figure shows two identical rectangular loops (1) and (2), placed on a table along with a straight line current carrying conductor between them.
(i)What will be the direction of the induced currents in the loops when they are pulled away from the conductor with same velocity.
(ii)Will the e.m.f. induced in the two loops be equal? Justify your answer.



6. Give the direction in which the induced current flows in the coil mounted on an insulating stand when a bar magnet is quickly moved along the axis of the coil form one side to the other as shown in the figure.



7. Figure shows a bar magnet M falling under gravity through an air cored coil C. Plot a graph showing variation of induced e.m.f. (ε) with time (t). what does the area enclosed by the ε – t curve depict ?



ELECTRO MAGNETIC INDUCTION, ALTERNATING CURRENT

DELHI BOARD - 2004

1. Derive an expression for (i) induced e.m.f. and (ii) induced current, when a conductor of '*l*' is moved with a uniform velocity 'v', normal to a uniform magnetic field B. Assume the resistance of the conductor to be 'R'.

2. Which physical quantity has the unit Wb/m^2? Is it a scalar or a vector quantity ?

3. Two circular coils one of radius *r* and the other of radius R are placed coaxially with their centres coinciding . For R >> *r,* obtain an expression for the mutual inductance of the arrangement

4. A circular coil of N and radius R, is kept normal to a magnetic field, given by $B= B_o \cos \omega t$. Deuce an expression for e.m.f. induced in this coil. State the rule which helps to detect the direction of induced current .

5. In a series R-C circuit, R =30 Ω, C = 0.25μF, V= 100V and ω =10,000 radian per second . Find the current in the circuit and calculate the voltage across the resistor and the capacitor . Is the algebraic sum of these voltage more than the source voltage ? If yes, resolve the paradox.

ELECTRO MAGNETIC INDUCTION, ALTERNATING CURRENT

ALL INDIA-2004

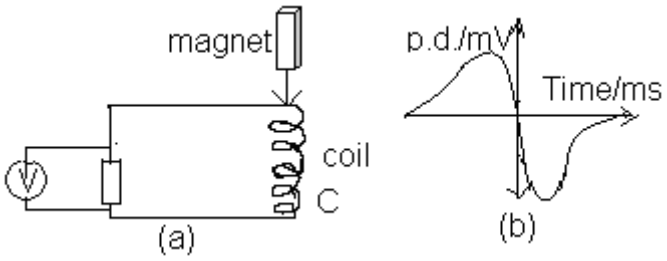
1. A solenoid with an iron core and a bulb are connected to a d.c. source. How does the brightness of the bulb change, when the iron core is removed from the solenoid?

2. Peak value of emf of an a.c. source is E_o. What is its r.m.f value ?

3. A bar magnet M is dropped so that it falls vertically through the coil C. The graph obtained for voltage produced across the coil vs. time is shown in figure (b).

(i) Explain the shape of the graph

(ii) Why is the negative peak longer then the positive peak ?



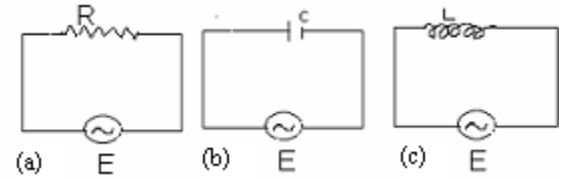
4. What is induced emf? Write Faraday's laws of electromagnetic induction. Express it mathematically. A conducting rod of length '*l*' with one end pivoted, is rotated with a uniform angular speed 'ω' in a vertical plane, normal to a uniform magnetic field 'B'. Deduce an emf induced in this rod.

5. India, domestic power supply is at 220V, 50Hz, while in USA it is 110V, 50Hz. Give one advantage and one disadvantage of 220V supply over 110V supply.

ELECTRO MAGNETIC INDUCTION, ALTERNATING CURRENT
DELHI BOARD -2003

1. An a.c. voltage $E = E_0 \sin \omega t$ is applied across an inductor L Obtain an expression for current I.

2. What is a choke coil ? why is it preferred to resistance in a.c. circuits ? In figures (a),(b)& (c) are shown three a.c. circuits with equal currents . If the frequency of e.m.f. be increased, then what will be the effect on the current flowing in them ? Explain with reason .



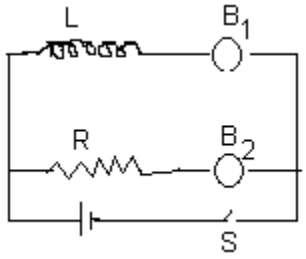
3. Define one henry.

4. What is the power dissipation in an a.c. circuit in which voltage and current are given by: $V = 300 \sin(\omega t + \pi/2)$ and $I = 5 \sin \omega t$? Calculate the current drawn by the primary of transformer , which steps down 200 V or 20V to operate a device of resistance 20Ω . Assume the efficiency of the transformer to be 80%.

5. Derive an expression for the self-inductance of a long solenoid.
An inductor L, a capacitor 20 μF, a resistor 10Ω are connected in series with an a.c source of frequency 50 Hz. If the current is in phase with the voltage, calculate the inductance of the inductor.

ELECTRO MAGNETIC INDUCTION, ALTERNATING CURRENT
ALL INDIA -2003

1. 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 light up earlier,(ii) will the lamps be equally bright after some time? Justify your answer.



1. A pure inductor is connected across an a.c. source. Show mathematically that the current
is lags behind the applied emf by a phase angle of π/2.What is its inductive reaction? Draw a graph showing the variation of inductive reactance with the frequency of the a.c. source.

OR

An alternating emf is applied across a capacitor. Show mathematically that current in it leads the applied emf by a phase angle of π/2. What is its capacitive reactance? Draw a graph showing the variation of capacitive reactance with frequency of the a.c. source.

3. A town situated 20 km away from a power plant generating power at 440V, requires 600kW of electric power at 220V. The resistance of the two wire line carrying power is 0.4Ω pre km. The town gets power from the trough a 3000-220V step down transformer at a substation in the town.
(i) Find he line power losses in the form of heat.
(ii)How much power must the plant supply, assuming there is negligible power loss due to leakage?

ELECTROMAGNETIC WAVE

ALL INDIA-2006

1. Write the order of frequency range and one use of each of the following electromagnetic radiations:
(i) Microwaves
(ii)Ultra-violet rays (iii) Gamma rays [3]

ELECTROMAGNETIC WAVE

DELHI BOARD-2006

2. Draw a labelled diagram of Hertz's experimental set-up to produce electromagnetic waves. Explain the generation of electromagnetic waves using this set-up. [3]

ELECTROMAGNETIC WAVE

ALL INDIA-2005

3. Name the constituent radiation of the electromagnetic spectrum which
(a) is used in satellite communication
(b) is used for studying crystal structure
(c) is similar to the radiations emitted during decay of radioactive nuclei

(d) has its wavelength range between 390 nm and 770 nm
(e) is absorbed from sunlight from ozone layer
(f) produces intense heating effect [3]

ELECTROMAGNETIC WAVE
DELHI BOARD-2005

4. Give the reasons for the following
(i) Long distance radio broadcasts use short–wave bands.
(ii) The small ozone layer on top of the stratosphere is crucial for human survival.
(iii) Satellites are used for long distance TV transmission. [3]

ELECTROMAGNETIC WAVE
ALL INDIA-2004

5. 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.

ELECTROMAGNETIC WAVE
DELHI BOARD-2004

6. What is the name given to that part of electromagnetic spectrum which is used for taking photographs of earth under foggy conditions from great height ?
7. What is the name given to that part of electromagnetic spectrum which is used in 'Radar'?
8. Find the wavelength of electromagnetic waves of 6×10^{12} Hz in free space. Give its two applications.

OPTICS
GUESS QUESTIONS-2007

1 Explain the phenomenon of total internal reflection .What are the conditions for the total internal reflection ?
2 Find relation between critical angle and refractive index of medium.
3 Explain the (a) Optical fibres (b) Totally reflecting glass prism
4 Prove $-\frac{\mu_1}{u}+\frac{\mu_2}{v}=\frac{\mu_2-\mu_1}{R}$. When refraction occurs from rarer to denser medium at a (i) concave (ii) convex spherical refracting surface. All have usual meaning. Write the sign conventions used what happen to the focal length of convex lens when it is immersed in water.
5 Derive lens maker's formula for a thin a convex lens.
6 Obtain an express for focal length of a combination of thin lenses in contact.
7 Discuss the phenomenon of refraction through a prism. Prove that $\delta=(\mu-1)A$, where the symbols have their usual meaning.
8 Prove prism formula $\mu = \frac{(\delta_m + A)/2}{A/2}$
9 Draw a labelled diagram of a compound microscope .Deduce an expression for its magnifying power. How can the magnifying power be increased?
10 Draw a labelled diagram of an astronomical telescope. .Deduce an expression for its magnifying power when the final image is (a) at infinity (b) at least distance of distinct vision.

11 Describe a simple microscope or a magnifying glass. Derive an expression for its magnifying power
12 Describe the reflecting type telescope (a) Cassegrainian type telescope (b) Newtonian type telescope. What are its advantages?
13 Explain (a) Danger signals are red .(b) The sun looks reddish at time of sun rise and sun set (c) the colour of sky is blue.
14 The image of a candle is formed by a convex lens on the screen. If the lower half of the lens is painted black to make it completely opaque, will the full size image be obtained?
15 To a fish under water viewing obliquely a fisherman standing on the bank of a lake, does the man look taller or shorter than what he actually is?
16 A lens shown in fig. is made of two different materials. A point object is placed on the principal axis of the lens. How many images will be obtained.

17 How does focal length of a lens change when red light is replaced by the blue light ?
18 An equiconvex lens of focal length 15 cm is cut into two equal halves in thickness. What is the focal length of each half ?
19 For same angle of incidence the angles of refraction in medium P,Q , and R are 35^0, 25^0 ,15^0 respectively. In which medium will the velocity of light be minimum?

20. Draw a graph to show the variation of the angle of deviation 'δ' with angle of incidence '*i*' for a monochromatic ray of light passing through a glass of refracting angle 'A'.

WAVE OPTICS

1. What is meant by fringe width .Derive an expression for fringe width in interference pattern?
2. What is meant by diffraction of light.
3. In a single slit diffraction pattern, how is the angular width of central bright maximum changed when (i) the slit width is decreased (ii) the distance between the slit and screen in increased .(iii) light of smaller wavelength is used.
4. Derive condition for brightness or constructive in single slit experiment.
5. Define resolving power of an optical instrument. Briefly discuss resolving power of a microscope and telescope.
6. What are Polaroids? Write some of its uses.
7. What is meant by plane polarized light?
8. State and explain Brewster's law.
9. Staten Huyghen's principle and prove the (i) laws of reflection and (ii) law of refraction on the basis of wave theory.
10. What is meant by interference of light? Discuss young's double slit experiment to demonstrate interference of light.
11. Derive the conditions for constructive and destructive interference.
12. What is meant by coherent sources of light.

OPTICS
ALL INDIA -2006

1. Draw a labelled ray diagram to show the image formation in a refracting type astronomical telescope. Why should the diameter of the objective of as telescope be large? [2]

2. A beam of light converges to a point P. A lens is placed in the path of the convergent beam 12cm from P. At what point does the beam converge, if the lens is
(a) a convex lens of focal length 20cm,
(b) a convex lens of focal length 16cm?
Do the required calculation. [3]

3. What are coherent source of light? State two conditions for two light source to be coherent.
Derive a mathematical expression for the width of interference fringes obtained in Young's double slit experiment with the help of a suitable diagram. [5]

OR

State Huygens' principle. Using the geometrical construction of secondary wavelets, explain the refraction of a plane wavefront incident at a plane surface. Hence verify Snell's law of refraction.
Illustrate with the help of diagram the action of (i) convex lens and (ii) concave mirror on a plane wavefront incident on it. [5]

OPTICS
DELHI BOARD-2006

1. Draw a labelled ray diagram of a reflecting type telescope. Write its any one advantage over refracting type telescope. 2

2. A convex lens made up of glass of refractive index 1.5 is dipped, in
(i) medium A of refractive index 1.65.
(ii) medium B of refractive index 1.33. 3
Explain, giving reasons, whether it will behave as a converging lens or diverging lens in each of these two media.

3. What is interference of light ? Write two essential conditions for sustained interference pattern to be produced on the screen. 5

4. Draw a graph showing the variation of intensity versus the position on the screen in Young's experiment when (a) both the slits are opened and (b) one of the slits is closed.

5. What is the effect on the interference pattern in Young's double slit experiment when:
(i) screen is moved closer to the plane of slits?
(ii) separation between two slits is increased.
Explain your answer in each case.

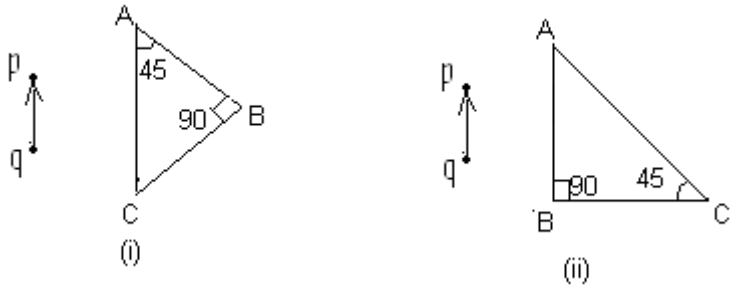
OR

What is diffraction of light? Draw a graph showing the variation of intensity with angle in a single diffraction experiment. Write one feature which distinguishes the observed pattern from the double slit interference pattern.
How would the diffraction pattern of a single slit be affected when:
(i) the width of the slit is decreased?

(ii) the monochromatic source of light is replaced by a source of white light.

OPTICS
ALL INDIA -2005

1. A right angle crown glass prism with critical angle 41^0 is placed before an object PQ in two position as shown in the figure (i) and (ii). Trace the path of the race from P and Q passing through the prism in the two cases



2. Using Huygen's principle, draw a diagram to show propagation of wave-front originating of a monochromatic point source.
Describe diffraction of light due to a single slit. Explain of a pattern of fringes obtained on the screen and plot showing variation of intensity with angle θ in single slit diffraction.

OR

What is meant by linearly polarized light? Which types of waves can be polarized. Briefly explain a method for producing polarized light.

3. Two Polaroid are placed at 90^0 to each other and the intensity is of transmitted light is 0. what will be the intensity of transmitted light when 1 more Polaroid is placed between these two bisecting the angle between them. Take intensity of unpolarised light as I_0. A double convex lens made of glass of refractive index 1.6 has its both surfaces of equal radii of curvature of 30 cm each. An object of 5 cm height is placed at a distance of 12.5cm from the lens. Find the position, nature and size of the image.

4. A double convex lens made of glass of refractive 1.5 has its both surface of equal radii of curvature of 20 cm each. An objects of 5 cm height is placed at a distance of 10 cm from the lens. Find the position, nature and size of the image.

OPTICS
DELHI BOARD-2005

1. The image of the candle is formed by a convex lens on a screen. The lower half of the lens is painted black to make it completely opaque. Draw the ray diagram to show the image formation. How will image be different form the one obtained when the lens is not painted black? [2]

(i)A figure divided into square, each of the size $1mm^2$, is being viewed at a distance

of 9 cm through a magnifying lens of focal length 10 cm, held close to the eye.
(a)Draw the ray diagram to show the formation of the image.
(b)What is the magnification produced by the lens? How much the area of each square in the virtual image
(c) What is angular magnification of the lens? [3]

Wave optics

1. Waterfront when (i) light diverges from a point source (ii) light emerges out of a co.
(a) How is a wavefront different from ray? Draw the geometrical shape of convex lens when a point source is at place at its focus.

2. State the Huygens principle. With a suitable diagram; prove Snell's law refraction using Huygen's principle .

(OR)

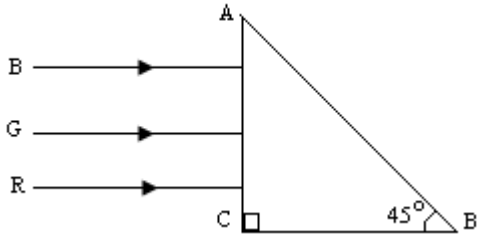
3. (a) In young double slit experiment, deduce the condition for (i) constructive and (ii) destructive interference at a point on the screen. Draw a graph showing variation of the resultant intensity in the interference pattern against position x on the screen.
(b)Compare and contrast the pattern which is seen with two coherently illuminated narrow slits in the Young's experiment with that seen for a coherently illuminated single slit producing diffraction. [5]

SET-II

4. A converging lens of focal length of 20cm in air. It is made of material of refractive index 1.6 If it is immerge in liquid of refractive index 1.3, what will be its new focal length? How is does the nature of the lens change if lens is immerge in liquid of refractive index 1.8? [3]

SET-III

5. Three rays of light red (R), green (G) and blue (B) are incident on the face AB of a right angled prism ABC .The refractive index of the material of the prism for red, green and blue wavelengths are 1.39 ,1.44, and 1.47 respectively. Trace the path of the rays through the prism. How will the situation change if these rays were incident normally on one of the faces of an equilateral prism? [3]



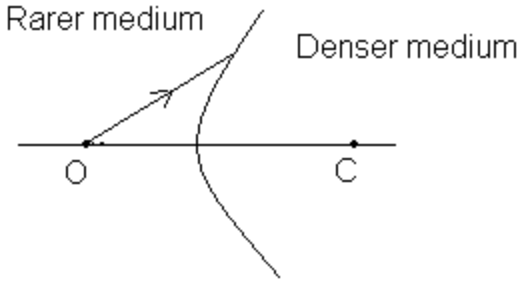
OPTICS
ALL INDIA -2004

1. Draw a ray diagram of an astronomical telescope in the normal adjustment position. write down the expression for its magnifying power.

2. Two narrow slits are illuminated by a single monochromatic source. Name the pattern obtained on the screen. One of the slits is now completely covered. What is the name of the pattern now obtained on the screen? Draw intensity pattern obtained in the two

cases. Also write two differences between the pattern obtained in the above two cases.

3 A spherical surface of radius of curvature R, separates a rarer and a denser medium as shown in the Figure. Complete the path of incident ray of light, showing the formation of a real image. Hence derive the relation connecting object distance '*u*', image '*v*', radius of curvature R and the refractive indices n_1 and n_2 of the two media. Briefly explain, how the focal length of a convex lens changes, with increase in wavelength of incident light.



OPTICS
DELHI BOARD-2004

1. A compound microscope with an objective of 1.0 cm focal length and an eye piece of 2.0 cm focal length has a tube length of 20cm. Calculate the magnifying power of the microscope, if the final image is formed at the near of the eye.

OR

The magnifying power of the astronomical telescope in the normal adjustment position is 100. The distance between the objective and the eye piece is 100 cm. Calculate the focal length of the objective and the eye-piece. [2]

2. State the two condition to obtain sustained interference of light.
In the Young's double slit experiment, using light of wavelength 400nm, interference fringe of width X are obtained. The wave length of light is increased to 600nm and the separation between the slits is halved. If one wants the observed fringe width on the screen to be the same in the two cases, find the ratio of the distance between the screen and the plane of the interfering sources in the two arrangements [3]

3. With the help of a ray diagram ,show the formation of the image of a point object by refraction of light at a spherical surface separating two media of refractive indices n_1 and n_2 ($n_2 > n_1$) respectively. Using this diagram, derive the relation

$$n_2 /v - n_1/u = (n_2 - n_1)/R$$

Write the singe conventions used .what happen to the focal length of convex lens when it is immersed in water. [5]

SET-III

4. An astronomical telescope, in normal adjustment position has a magnifying power 5. The distance between the objective and the eye piece is 120cm. Calculate the focal length of the objective and of the eye piece. [5]

(OR)

5. A compound microscope with an objective of the 2.0 cm focal length and an eye piece of 4.0 cm focal length, has the tube of the 40cm . Calculate the focal length of the objective and of the eye piece. [5]

OPTICS

ALL INDIA -2003

1. What is a wave front? What is the geometrical shape of a wave front of light emerging out of a convex lens, when point source is placed at its focus? Using Huygens' principle show that, for a parallel beam incident on a reflecting surface, the angle of reflection is equal to the angle of incidence.

2. Two slits in Young's double slit experiment are illuminated by two different lamps emitting light of the same wavelength. Will you observe the interference pattern? Justify your answer. Find the ratio of intensities at two points on a screen in Young's double slit experiment, when waves from the two slits have path difference of (i) 0, (ii) $\lambda/4$.

3. A converging lens of focal length 6.25cm is used as a magnifying glass. If the near point of the observer is 25cm from the eye and lens is held close to the eye, calculate (i) the distance of the object from the lens, (ii0 the angular magnification (magnifying power). Also find the angular magnification (magnifying power) when the final image is formed at infinity.

(iv)Draw a graph to show the variation of the angle of deviation 'δ' with that angle of incidence 'i' for a monochromatic ray of light passing through a glass of refracting angle 'A'. Hence deduce.

$$\mu = \frac{(\delta_m + A)\ /2}{A/2}$$

5. Define critical angle with reference to total internal reflection. Calculate the critical angle for glass-air surface, if a ray of light which is incident in air on the glass surface is deviated through 15^0, when angle of incidence is 45^0.

6. A convex lens made of glass of refractive index μ_L is immersed in a medium of refractive index μ_M., How will the lens behave when $\mu_L < \mu_M$?

7. A figure divided into squares each of size 1 mm^2 is being viewed at a distance of 9 cm through a magnifying glass of focal length 10 cm, held close to the eye.

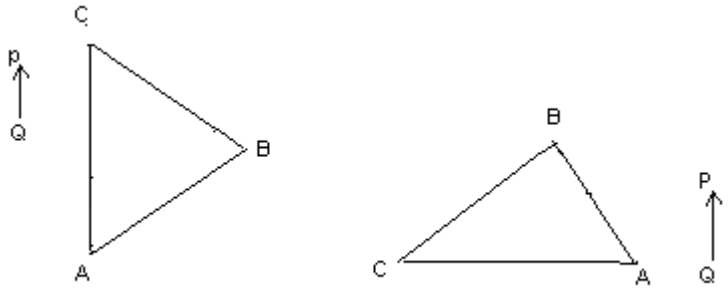
(i) Find the magnification produced by the lens. How much is the area of each square in the virtual image.

(i) What is the angular magnification (magnifying power) of the lens.

OPTICS

DELHI BOARD—2003

1. An object is placed is in front of a right angle prism ABC in the two positions (a) and (b) as shown .The prism is made of crown glass with critical angle 41^0. Trace the path of two rays from P and Q (I), in (a),normal to the hypotenuse and (ii) in (b),parallel to the hypotenuse. [2]



2. State the Huygen's principle . For the reflection of the plane wave front at plane reflecting surface, construct the corresponding reflected wave front. Using this diagram, prove the angle of incident is equal to the angle of reflection [3]

3. What is meant by interference of light?

4. In a double slits experiment with a monochromatic light, fringes are obtain on the screen placed at some distance from the slits. If the screen is moved by $5x10^{-2}$ m toward the slits, the change in the fringe width is $3x10^{-5}$ m, if the distance between slits is 10^{-3} m, Calculate the wave length of light used. [3]

5. Drive the relation between distance of object ,distance of image and radius of curvature of a convex spherical surface ,when refraction take place from a rarer medium of refraction index μ_1 to denser medium of refractive index μ_2 and image produce is real. State assumption and convention of sings used. [5]

(OR)

Draw the ray diagram to show the formation of image of an object placed between the optical centre and focus of the convex lens .write the characteristics of image formed. Using this diagram, derive the relation between object distance, image distance and focal length of a convex lens. Write the assumption and convention of sings used. [5]

SET-II

(i) Why is the interference pattern not detected, when the two coherent source are far apart?

(ii) In a young 's experiment , the width of the fringes obtained with light of wavelength 6000 A^o is 2.0 mm. Calculate the fringe width if the entire apparatus is immerge in a liquid medium of refractive index 1.33. [3]

(iii)In Young's double slit experiment, three lights of blue, yellow and red colour are use successively. The fringe width will maximum for which colour of the light and why?

(iv)In Young's experiment, two coherent sources are 1.5 mm apart and fringes are obtain at a distance of 2.5 m from them. If the wavelength of light is 600 nm; find the number of the fringes in the interference pattern, which is $5x10^{-3}$ m wide. [3]

DUAL NATURE OF MATTER AND RADITIONS & ATOMIC NUCLEUS

GUESS QUESTION-2007

1. State laws of photoelectric emission. Establish Einstein photoelectric relation. Explain the laws of photoelectric emission on the basis of this relation.

2. Explain the terms: stopping potential and threshold frequency in photoelectric emission. Draw a graph showing the variation of stopping potential with frequency of incident light in relation to photoelectric effect.

3. Explain de Broglie dualistic nature of matter and derive de Broglie relationship for wavelength of matter waves. Find the de Broglie wavelength associated with an electron when accelerated. Under a potential difference of V volts
4. Find a relation between cut off potential, frequency of the incident light and threshold frequency.
5. Explain why wave theory of light could not explain the photoelectric effect?
6. How does (i) photoelectric current, and (ii) kinetic energy of the photoelectrons emitted in a photocell vary if the intensity of the incident radiation is doubled? Light of wavelength 400 nm is incident on the cathode of photocell, the stopping potential recorded is 6 V. If the wavelength of incident light is increased to 600 nm, calculate the new stopping potential
7. Define the terms: (i) work function, (ii) threshold frequency and (iii) stopping potential, with reference to photoelectric effect. Calculate the maximum kinetic energy of electrons emitted from a photosensitive surface of work function 3.2 eV, for the incident radiation of wavelength 300 nm.
8. State the dependence of work function on the kinetic energy of electrons emitted in a photocell. If the intensity of incident radiation is double, what changes occur in the stopping potential and the photoelectric current?
9. State how in a photocell the work function of the metal depends on the kinetic energy of the emitted electrons. If the frequency of the incident radiation is doubled what changes occur in the (i) stopping potential, and (ii) photoelectric current.
10. A source of light of frequency $v > v_o$ is placed at 2 m from the cathode of a photo cell. The stopping potential is found to be v_o. If the distance of the light source is halved, state with reason what changes occur in (i) stopping potential (ii) photoelectric current, and (iii) maximum velocity of photoelectrons emitted.

11. Explain the concept of nuclear forces. Discuss their important properties.
12. Explain the concept of nuclear binding energy. Draw a curve between mass number and binding energy.
13. What is meant by natural radioactivity? What types of radiations are emitted? Explain briefly the nature of these radiations
14. State and explain the laws of radioactive disintegration. Hence define disintegration constant and half life period.
15. What is meant by average life of a radioactive element? Derive an expression for it.
16. What is meant by nuclear fission and nuclear chain reaction? Outline the conditions necessary for nuclear chain reaction.
17. Describe Devision and Germer experiment to establish the wave nature of electron. Draw a labelled diagram of the apparatus.
18. Numerical based on radioactivity.
19. Numerical based on mass defect

DUAL NATURE OF MATTER AND RADITIONS & ATOMIC NUCLEUS

ALL INDIA -2006

1. De Broglie wavelength associated with an electron accelerated through a potential difference V is λ. What will be its wavelength when the accelerating potential is increased to 4 V? [1]
2. Sketch a graph between frequency of incident radiations and potential for a given

photosensitive material. What information can be obtained from the value of the intercept on the potential axis?
A source of light of frequency greater than the threshold frequency is placed at a distance of 1m from the cathode of a photo-cell. The stopping potential is found to be V. If the distance of the light source from the cathode is reduced, explain giving reasons, what change will you observe in the
(i) phoelectric current,
(ii) stopping potential. [3]

3. A neutron is absorbed by a ${}^{6}_{3}Li$ nucleus with subsequent emission of an alpha particle. their S.I. units. Establish the relationship between the two.
(ii) Calculate the energy released, in MeV, in this reaction.
Given: mass ${}^{6}_{3}Li$ = 6.015126 u; mass(neutron) = 1.0086654 u;
mass (alpha particle) = 4.0026044 u and mass(triton) = 3.0100000 u.
Take 1 u = 931 MeV/C^2.

3. Define the terms half-life period and decay constant of a radioactive substance. Write
(i) write the corresponding nuclear reaction.

DUAL NATURE OF MATTER AND RADITIONS & ATOMIC NUCLEUS
DELHI BOARD -2006

1. With what purpose was famous Devision-Germer experiment with electrons performed? [1]

2. Define the term 'threshold frequency' and stopping' for photoelectric 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? [3]

3. Explain, with the help of a nuclear reaction on each of the following cases, how the neutron to proton ratio changes during (i) alpha-decay (ii) beta-decay? [3]

4. Why is the mass of a nucleus always less than the sum of the masses of its constituents, neutrons and protons? [3]
If the total number of neutrons and protons in a nuclear reaction is conserved,

OR

Draw a graph showing the variation of binding energy per nucleon with mass number for different nuclei. Explain, with the help this graph, the release of energy by the process nuclear fusions .

DUAL NATURE OF MATTER AND RADITIONS & ATOMIC NUCLEUS
ALL INDIA -2005

1. Ultraviolet light is incident on two photosensitive materials having work functions W_1 and W_2 ($W_1 > W_2$) . In which case will the kinetic energy of the emitted electrons be greater ? why?

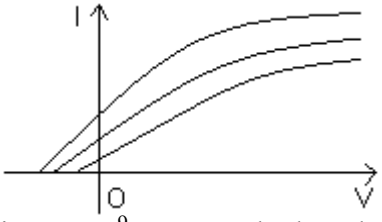
2. Mention the significance of davission- Gamer experiment. An alpha particle and a proton are accelerated from rest through the same potential difference V find ratio of de-broglie wave lance associated with them?

3. Draw the energy level diagram showing the emission of β particles followed by χ rays by a ${}^{60}_{27}Co$ nucleus plot the distribution of kinetic energy of β particle of and state why the energy spectrum is continuous.

4. A radioactive sample contains 2.2 mg of pure ${}^{11}C_{6}$ which half life period of 1224 sec.

Calculate (i) the number of atoms present initially (ii) the activity when 5 μg of the sample will be left .

5. In an experiment on photoelectric effect, the following graphs were obtained between photoelclectric current (I) and the anode potential (V). Name the character of incidence radiation that was kept constant in this experiment.



6. The half life of $^{238}_{92}U$ against is 4.5×10^9 years. Calculate the activity of 1g sample of $^{238}_{92}U$.

DUAL NATURE OF MATTER AND RADITIONS & ATOMIC NUCLEUS
DELHI BOARD-2005

1.Ultraviolet light of wavelength 2271 A˚ from a 100 watt mercury source radiates a photo cell made of molybdenum metal. If stopping potential is 1.3 V, estimate the work function of the metal. How would the photo cell respond to high intensity (10^5) red light of wavelength 6328 A˚ produced by a He-Ne laser? [3]

2. Plot a graph showing the variation of photoelectric current with anode potential for two light beams of same wavelength but different intensity. [3]

3. Draw a graph showing the variation of potential energy of a pair of nucleons as a function of their separation. Indicate the region in which nuclear force is
(a) attractive, and (ii) repulsive.
(b) Write the two characteristic features of a nuclear force which distinguish it from the Coulomb force. [3]

4. Show that the decay rate R of a sample of a radioactive nuclide is related to the number of radioactive nuclei N at the same instant by the expression $R = \lambda N$. [3]

5. Electron are emitted from a photosensitive surface when it is illuminated by green light but electron emission does not take place by yellow light .Will the electrons be emitted when the surface is illuminated by (i) red light and (ii) blue light. [1]

Set -II

6. Does the stopping potential in photoelectric emission depend up on
(i) The intensity of the incident radiation?
(ii) The frequency of the incident radiation? [2]

DUAL NATURE OF MATTER AND RADITIONS & ATOMIC NUCLEUS
ALL INDIA- 2004

1. Two metals A and B have work functions 2eV and respectively. Which metal has lower threshold Wavelength? [1]

2. Red light, however bright it is, cannot produce the emission of electrons from a clean zinc surface. But even weak ultraviolet radiation can do so, why ?

X-ray wavelength 'λ' fall on a photosensitive surface, emitting electrons. Assuming that the work function of the surface can be neglected, prove that de-broglie wavelength of electrons emitted will be $\sqrt{h\lambda/2mc}$. [3]

3. Define the terms : 'half-life period' and decay constant' of a radioactive sample. Derive the relation between these terms. [3]

4. When a deuteron of mass 2.0141 u and negligible kinetic energy is absorbed by a lithium ($^{6}_{3}Li$) nucleus of mass 6.0155u, the compound nucleus disintegrates spontaneously into two alpha particles, each of mass 4.0026u. Calculate the energy in joules carried by each alpha particle. ($1u=1.66\times10^{-2}$ kg). [3]

5. Calculate the binding energy per nucleon of ^{40} Ca nucleus.

m_n (mass of a neutron)=1.008665 u

m_p(mass of a proton)= 1.007825 u] [3]

DUAL NATURE OF MATTER AND RADITIONS & ATOMIC NUCLEUS
DELHI BOARD -2004

1. Write the nuclear decay process for β -decay of $_{15}P^{32}$. [1]

2. Heavy water is often used as a moderator in the nuclear reactors, give reason? [1]

3. Draw the graph showing the variation of the binding energy per nucleon with mass numbers. Give the reason for the decrease of binding energy per nucleon for nuclei with high mass numbers. [2]

4. Define the term work function of a metal. The threshold frequency of a metal is f_o When the light of frequency of $2f_o$ is incident on the metal plate, the maximum velocity of electrons emitted is v_1. When the frequency of the incident radiation is increased to $5\ f_o$, the maximum velocity of electrons emitted is v_2 .Find the ratio of v_1 and v_2. [3]

5. Give the mass number and atomic number of electron on the right hand side of the decay process, $_{86}Ru^{220} \rightarrow Po + He$. [3]

The graph show how the activity of a sample of random - 220 changes with time. Use the graph to determine its half life. Calculate the value of decay constant of random--220. [3]

ALL INDIA- 2003

1. Derive the expression for the Broglie wavelength of an electron moving under a potential difference of V volt.

Describe Davission and Germer experiment to establish the wave nature of electrons. Draw a labelled diagram of the apparatus used.

DUAL NATURE OF MATTER AND RADITIONS & ATOMIC NUCLEUS
DELHI BOARD -2003

1 .Explain with an example, whether the neutron – proton ratio in a nucleus increases or decreases due to beta (β) decay. [2]

2 Derive the expression for the de Broglie wavelength of an electron moving under a potential difference of V volt

3 Describe Division and Germer experiment to establish the wave nature of electron. Draw a labelled diagram of the apparatus [5]

SOLIDS AND SEMICONDUCTOR DEVICES
GUESS QUESTIONS-2007

1. Explain the formation of Energy bands in solids and hence define conduction band and valence band.

2. Distinguish between conductors (or metals),semiconductors and insulators on the basis of their energy bands.

3. What do you understand by term 'holes' in a semiconductors ? Discuss how they move under the influence of an electric field ?

4. What are the Intrinsic semiconductors ?Explain how do they work ?

5. What is doping ? State the methods of doping.

6. Distinguish between (i) Intrinsic and Extrinsic semiconductor and (ii) n-type semiconductor and p-type semiconductor.

7. Distinguish between n-type and p-type semiconductors on the basis of energy band diagram .

8. What is p-n junction ? How is a p-n junction made ? How potential barrier is caused in it.

9. Discuss the characteristics of a p-n junction diode and define dynamic resistance of junction diode.

10. How p-n junction can be function as (a) Half wave rectifier (b) Full wave rectifier ?

11. Discuss common emitter amplifier , using n-p-n transistor .Find its current gain , voltage gain and power gain.

12. Explain briefly the use of a junction transistor as an oscillator.

13. With the proper circuit diagram show the biasing of a n p n transistor. Explain the movement of charge carriers through different parts of this transistor . Hence show that $I_e = I_b + I_c$.

14. What is a transistor ? Give symbols of p-n-p and n-p-n transistors .Explain action of a transistor .

15. How are 0R gate ,AND gate NOT gate , realized ? Explain.

16. Describe (i) NAND gate, (ii) NOR gate and (iii) XOR gate.

17. Give the logic symbol , truth table and Boolean expression for AND gate ?

18. Give the logic , truth table and Boolean expression for OR gate . How is it realized in practice ?

19. Give the logic symbol and truth table for NOT gate .

20. The output of a 2-inputs NAND gate is fed to a NOT gate .Write down the truth table for the output of the combination for all possible inputs of A and B.

SOLIDS AND SEMICONDUCTOR DEVICES
ALL INDIA-2006

1. 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. [3]

2. What are energy bands ? How are these formed ? Distinguish between a conductor, an insulator and a semiconductor on the basis of energy band diagram. [5]

OR

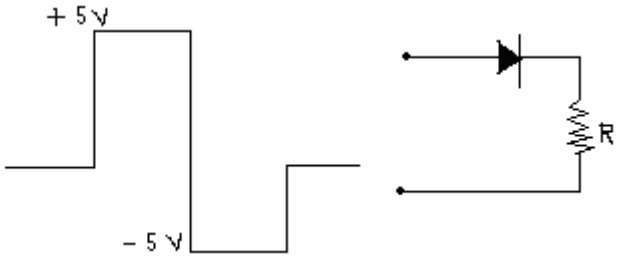
Explain the function of base region of a transistor. Why is this region made thin and using output characteristics. [5]

Draw a circuit diagram to study the input and output characteristics of n-p-n transistor in a common emitter (CE) configuration. Show these characteristics graphically. [5]

Explain how current amplification factor of the transistor is calculated using out put characteristics.

SOLIDS AND SEMICONDUCTOR DEVICES
DELHI BOARD- 2006

1. Draw the output waveform across R, for the input waveform given blew: [2]



OR

Explain how the width of depletion layer in a *n-p* junction diode changes when the junction is (i) forward biased (ii) reverse biased. [2]

2. What is an intrinsic semiconductor? How can this material be converted into (i) P-type (ii) N-type extrinsic semiconductor? Explain with the help of energy band Diagram [3]

3. Draw a circuit diagram for use of NPN transistor as an amplifier in common emitter configuration. The input resistance of a transistor is 1000Ω. On changing its base current by 10 μA, the collector current increases by 2 mA. If a load resistance of 5 kΩ is used in the circuit, calculate

(i) the current gain

(ii) voltage gain of the amplifier 1+2

SOLIDS AND SEMICONDUCTOR DEVICES
ALL INDIA-2005

1. On the basis of the energy band diagrams distinguish between metals insulators and semiconductors.

2.(a) with the help of a circuit diagram explain the working of transistor as oscillators
(b) draw a circuit diagram for a two input OR gate and explain its working with the help of input and output waveforms.

OR

(a) Explain briefly with the help of circuit diagram how V- I characteristics of a *p-n* junction diode are obtained in (i) forward bias, and (ii) reverse bias.
(b) a photodiode is fabricated from a semi conductor with a band gap of 2.8 eV can it detect wavelength of 6000 nm? Justify.

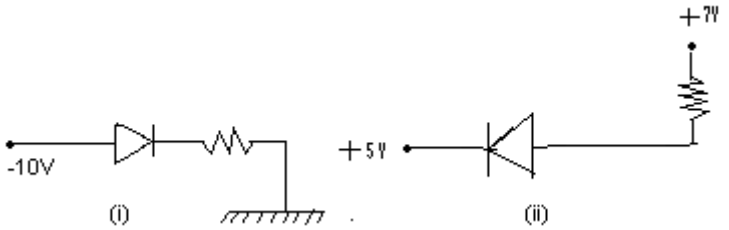
SOLIDS AND SEMICONDUCTOR DEVICES
DELHI BOARD - 2005

1.(a) Distinguish between the metal, insulator and semiconductor on the basis of their energy bands.
(b)Why are photodiodes used preferably in reverse bias condition? A photodiode is fabricated from a semiconductor with band gap of 2.8 eV. Can it detect a wavelength of 6000 nm? [5]

OR

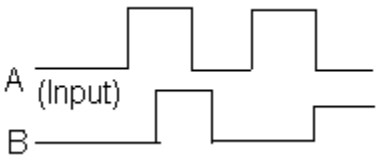
2.(a)Explain briefly, with the help of circuit diagram, how V-I characteristics of the curves obtained in (i) forward bias and (ii) reverse bias . Draw the shape of the curves obtained.
(b)A semiconductor has equal electron and holes concentration of $6x10^{8}$ /m^{3} .On doping with certain impurity, electron concentration increases to $9x10^{12}$ /m^{3} .
(i)Identify the new semiconductor obtained after doping.
(ii) Calculate the new hole concentration. [5]

3. Explain with the a circuit diagram, how the thickness of depletion layer in a p- n junction diode changes when it is forward biased. In the following circuits which one of the two diodes is forward bias and which is reverse biased? [3]



SOLIDS AND SEMICONDUCTOR DEVICES
ALL INDIA-2004

1. Draw the voltage-current characteristic of a zener diode.
2. Give the logic symbol for an OR gate. Draw the output wave form for input wave forms A and B for this gate. [2]

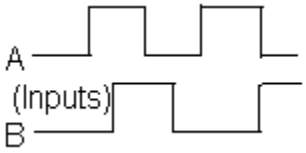


3. With the help if a labeled circuit diagram, explain how an n-p-n transistor can be used as an amplifier in common-emitter configuration. Explain how the input and output voltages are out of phase by 180^{0} for a common-emitter transistor amplifier.

OR

For an a-p-n transistor on the common-emitter configuration, draw a labelled circuit diagram of an arrangement for measuring the for measuring the collector current as a function of collector-emitter voltage for at least two different values of base current. Draw the shape of the curves obtained Define the terms : (i) 'output resistance' and (ii) 'current amplification factor'.

4.Give the logic symbol for an AND gate. Draw the output wave form for AND gate for input wave forms A and B. [2]



5.Draw the voltage-current characteristic of a p-n junction diode in forward bias.

SOLIDS AND SEMICONDUCTOR DEVICES
DELHI BOARD-2004

1. Draw the circuit diagram of a common emitter amplifier, using an n-p-n transistor. Draw the input and output wave form of the signal. Write the expression for its current gain , voltage gain and power gain. [3]

2. Write the symbol and truth table of the AND gate. Explain how AND gate is realized in practice by using two diodes. [3]

3. With the help of a diagram, show the biasing of a light emitting diode (LED). Give its two advantages over conventional incandescent lamps. [2]

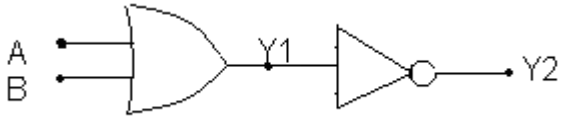
4. Draw a circuit diagram to show how a photo-diode is biased. Draw its characteristic curves for two different illumination intensities.

5. Write the logic gate symbol and truth table for OR gate. Explain how this gate can be realized by using the two diodes. [2]

6. Draw the energy band diagram of p-type and n-type semiconductors.
A semiconductor has equal electron and hole concentration $6x10^{8}$ m^{-3}, On doping with a certain impurity, electron concentration increase to $8x10^{12}$ m^{-3}, Identify the type of semiconductor obtained after doping. [3]

SOLIDS AND SEMICONDUCTOR DEVICES
ALL INDIA-2003

1. Name the gate obtained from the combination of gates shown in the figure. Draw its logic symbol. Write he truth table of the combination.



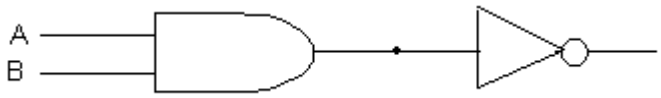
2. How is a p-type semiconductor formed? Name the major charge carriers in it. Draw the energy band diagram of a p-type semiconductor.

3. How is an n-type semiconductor formed ? Name the major charge carries in it. Draw the energy band diagram of an n-type semiconductor.

4. Draw a labelled circuit diagram of a common base amplifier using a n-p-n transistor. Name the purpose for which common base transistor amplifier is preferred over

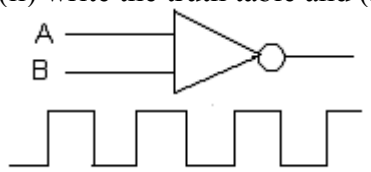
common emitter transistor amplifier.

5. Name the gate obtained from the combination of gates shown in figure. Draw its logic symbol. Write the truth table of the combination.



SOLIDS AND SEMICONDUCTOR DEVICES
DELHI BOARD-2003

1. In the figure below , circuit symbol of a logic gate and input wave form is shown (i) Name the logic gate (ii) write the truth table and (iii) give the output wave form. [2]



2. Draw a circuit diagram of a common emitter amplifier using n-p-n transistor. Show the input and output voltages graphically. The current gain for common emitter amplifier is .59. If the emitter current is 6.0mA, find (i) base current and (ii) collector current. [5]

3. For the digital circuit given below, write the truth table showing the outputs Y_1:Y_2 for all possible inputs at A and B. [2]

4. Draw the diagram of a common bas amplifier using n-p-n transistor. Show input and output signal graphically. The current gain of a transistor in a common base arrangement is 0.95.find the voltage gain and power gain, if the load resistance of the output is 400 k Ω and input resistance is 200Ω. [5]

PRINCIPLES OF COMMUNICATION
Gauss Questions-2007

1. Why is modulation necessary at all ? (Or) Why is modulation required for sending messages?

2. Long distance radio broadcasts use short wave bands. Why ?

3. It is necessary to use satellites for long distance T.V. transmission Why?

4. What is a carrier wave ? Why high frequency carrier waves are employed for transmission.

5. Compare and contrast the frequency and amplitude modulation ?

6. Explain what is meant by demodulation. Give block diagrams of tuned radio A.

7. What are sky waves and space waves ? Discuss their propagation.

8. What is remote sensing? . Mention some of its applications .

9. Distinguish between analog and digital communications.

10. Explain the "green house effect" of earth's atmosphere .

11. What is ground wave ? Why short wave communication over long distance is not via ground wave ?.

12. Explain that microwaves are better carriers of signals than radio waves ?

13. Deduce an expression for the distance from which the T.V signals can directly be received from a T.V tower of height h.

14. State at least four characteristics and uses of lasers .

15. Define the following terms :

(a)Amplitude modulation (b) frequency modulation (c) Fax (d) Demodulation (e) passive satellite (f) active satellite.(g) Cladding (h) population Inversion Inversion (i) Pulse modulation

PRINCIPLES OF COMMUNICATION
ALL INDIA-2006

1. Give any one difference between FAX and e-mail systems of communication . [1]

2. Consider an optical communication system operating at λ-800 nm. Suppose, only 1% of the optical source frequency is the available channel band-width for optical communication. How many channels can be accommodated for transmitting:

(a) audio-signals requiring a band-width of 8 kHz,

(b) video TV signals requiring an approximate band-width of 4.5 MHz ?

Support your answer with suitable calculations. [3]

3. Distinguish between frequency modulation and amplitude modulation. Why is an FM signal less susceptible to noise than an AM signal ? [3]

PRINCIPLES OF COMMUNICATION
DELHI BOARD-2006

1. Define the modulation. Name three different types of modulation used for a message signal using a sinusoidal continuous carrier wave. Explain the meaning of any one of these. [3]

2. Define the term 'critical frequency' in relation to sky wave propagation of electromagnetic waves.

On a particular day, the maximum frequency reflected from the ionosphere is 10 MHz. On another day, it was found to decrease to 8 MHz. Calculate the ratio of the maximum electron densities of the ionosphere on the two days. [3]

PRINCIPLES OF COMMUNICATION
ALL INDIA-2005

1. What is the function of 'cladding' in a typical optical fibre?

2. On the basis of the energy band diagrams distinguish between metals, insulators and semiconductors.

3. Distinguish between analog and digital communication. Write any two modulation techniques employed for the digital data. Describe briefly any one of the techniques use.

4. A ground receivers station is receiving a signal at (a) 5 MHz and (b) 100 MHz transmitted from a ground transmitter at a height of 300 m located at a distance of 100 km identify whether it is coming via space wave or sky wave propagation or satellite transponder.

(Given the value of radius of earth is 6400 km and maximum electron density $N_{max} = 10^{12}\ m^{-3}$).

5. What should be the length of a dipole antenna for a carrier wave of frequency $6x10^8$ Hz ?

6. (a) With the help of a circuit diagram explain the working of transistor as oscillators

(b) Draw a circuit diagram for a two input OR gate and explain its working with the help of input and output waveforms.

OR

(c) Explain briefly with the help of circuit diagram how V- I characteristics of a *p-n* junction diode are obtained in (i) forward bias, and (ii) reverse bias.

(d) A photodiode is fabricated from a semi conductor with a band gap of 2.8 eV can it detect wavelength of 6000 nm? Justify.

PRINCIPLES OF COMMUNICATION
DELHI BOARD-2005

1. Distinguish between analog and digital communications. Write any two modulation techniques employed for the digital data. Describe briefly one the techniques used. [3]

2. Draw a schematics diagram of a single optical fibre structure . Explain briefly how an optical fibre is fabricated . describe in brief , the mechanism of the propagation of the light signal through an optical fibre. [3]

3. What should be the length of dipole antenna for a carrier wave of frequency $3x\ 10^8$ Hz ? [1]

4. Name the type communication systems according to the mode the transmission.

5. Explain the following terms

(i) Ground waves (ii) Space waves (iii) Sky waves

6. Name the appropriate communication channel needed to send a signal of band- width 100 kHz over a distance of 8 Km. [1]

PRINCIPLES OF COMMUNICATION
ALL INDIA-2004

1. Why is shortwave band used for long distance radio broadcast?

2. What is meant by 'remote sensing'? Briefly explain, how it is carried out. Mention any two application of remote sensing.

3. What is an optical detector? State its three essential characteristics. Name the factor which decides how good a detector is. [3]

4. Why is ground wave transmission of signals restricted to a frequency of 1500 kHz ?

5. Explain briefly the principal of transmitting signals using a satellite. State two main advantages of using a satellite for transmitting signals.

PRINCIPLES OF COMMUNICATION
DELHI BOARD-2004

1. Name the type of modulation scheme preferred for digital communication.

2. With the help of a block diagram, explain the principle of an optical communication

system. Give its two advantages over cable communication system .

OR

With the help of relevant diagrams , explain the following terms :

(i) Pulse- position modulation (PPM)

(ii) Pulse- duration modulation (PDM)

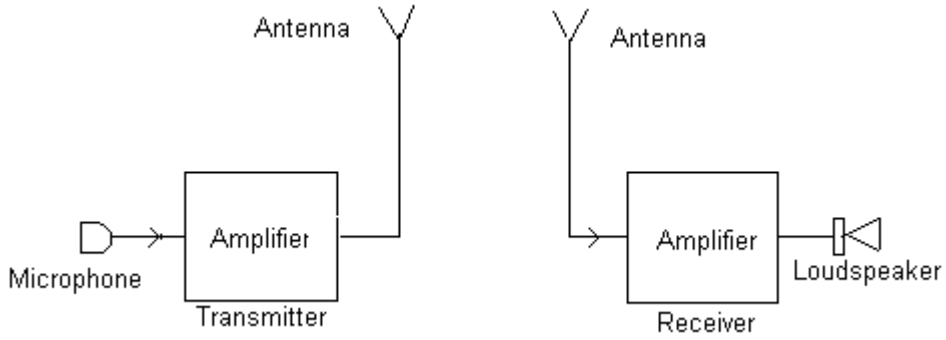
3. Name the device used for data transmission from one computer to another. Justify the name using this device, draw the block diagram for data communication and explain it briefly.

4. Microwaves are used in Radar.' Why?

PRINCIPLES OF COMMUNICATION
ALL INDIA-2003

1. What is an 'analog signal' and a 'digital signal'? How can an analog signal be converted into a digital signal?

2. A schematic arrangement for transmitting a massage signal (20 Hz to 20 kHz) is given below : Given two drawbacks from which this arrangement suffers. Describe briefly with the help of a block diagram the alternative arrangement for the transmission and reception of the message signal.



3. With the help of diagrams, difference between

(i) pulse – amplitude modulation (PAM)

(ii) Pulse position modulation (PPM)

4. With the help of diagrams, differentiate between

(i) Pulse-position modulation (PPM)

(ii) Pulse–duration modulation (PDM)

PRINCIPLES OF COMMUNICATION
DELHI BOARD-2003

1. What is meant by the term 'modulation' ? Explain with the help of a block diagram, how the process of modulation is carried out in radio broadcasts .

2. Write three special characteristics of light source used in optical communication. Name any one optical detector. Explain the meaning of the term 'sensitivity' and 'responsivity' of a detector.

3. How do we make the choice of a communication cannel? A message signal has a bandwidth of 5 MHz. Suggest a possible communication channel for its transmission .

4. What is 'amplitude modulation' ? Represent the process graphically. Write its two

limitations and two advantages