PHYSICS

BOOKS - MBD -HARYANA BOARD

MODEL TEST PAPER - 2

Set A Multiple Choice Type Questions

1. When the distance between two charged particles is halved, the force between them will become

A. one - fourth

B. half

C. double

D. four times

Answer:

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2. A charge Q is situated at the corner of a cube, the electric flux passing through all the six faces of the cube is :

A. $\dfrac{q}{\varepsilon_0}$

B. $\dfrac{q}{6\varepsilon_0}$

C. $\dfrac{q}{8\varepsilon_0}$

D. $\dfrac{q}{3\varepsilon_0}$

Answer:

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3. On increasing temperature the specific resistance of a semiconductor -

A. increases for both

B. decarease for both

C. increases, decreases respectively

D. decrease, increases respectively.

Answer:

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4. Kirchhoff's first law i.e., $\sum I = 0$ at a junction is based on the law of conservation of

A. Charge

B. energy

C. momentum

D. angluar momentum

Answer:

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5. An inductor may store energy in

A. its electric field

B. its coils

C. its magnetic field

D. both in electric and magnetic field

Answer:

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6. Electrimagnetic waves are transverse is nature is evident by

A. polarization

B. interference

C. reflection

D. diffraction

Answer:

7. INTERFERENCE OF THE WAVES

A. longitudinal

B. transverse

C. electromagnetic

D. all of these

Answer:

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8. The velocity of light is maximum in ____

A. diamong

B. water

C. glass

D. vacuum

Answer:

9. The energy of a photo of wavelenght λ is :

A. $hc\lambda$

B. hc/λ

C. λ/hc

D. $\dfrac{h.\lambda}{c}$

Answer:

10. Atomic hydrogen has a life period of :

A. one day

B. one minute

C. a fraction of a second

D. one hour

Answer:

11. The potential barrier, in the depletion layer,

is due to

    A. lens

    B. holes

    C. electrons

    D. forbidden gap

Answer:

12. In the process of modulation, the radio frequency wave is known as

    A. modulating wave

    B. modulated wave

    C. carrier wave

    D. none of the above

Answer:

13. An electric dipole when placed in a uniform electric field E will have minimum potential energy, if the positive direction of dipole moment makes the following angle with E

    A. zero

    B. π

    C. $\dfrac{\pi}{2}$

    D. $\dfrac{3\pi}{2}$

Answer:

14. How much current is flowing throught a 1k Ω rsistor when a potential difference of 2V is applied across its end ?

A. $2\mu A$

B. $2mA$

C. $2A$

D. $1A$

Answer:

Set A Very Short Answer Type Questions

1. Give three properties of electric charges.

2. Point out the right statements about the validity of, Kirchhoff's junction rule

3. Why do we prefer potentiometer with a longer bridge wire?

4. Calculate the work done in rotating a magnet of magnetic moment $3 \cdot 0 J T^{-1}$ through an angle of $60°$ from its position along a magnetic field of strength $0 \cdot 34 \times 10^{-4} T$.

▶

5. Sketch a graph to show how the reactance

of(i) a capacitor (ii) an inductor varies as a

function of frequency ?

6. Even though an electric field $\vec{E}$ exerts a

force $a\vec{E}$ on a charged particle yet the electric

field of an EM wave does not contribute to the

radiation pressure (but transfer energy). Explain.

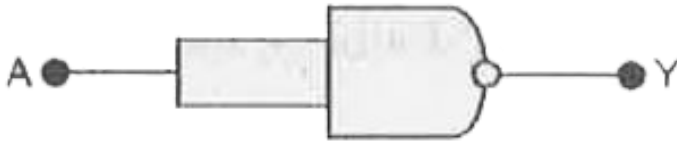**7.** Define focal length of a lens and give its relation with power of the lens.

8. Write the truth table for the circuit shown in the following figure . This circuit acts like

which gate ?

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9. The condition under which a point charge moving through a magnetic field, experiences maximum force (in terms of magntiude) is

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1. State Gauss's law in electrostatics. Using this law derive an expression for the electric field due to a uniformly charged infinite plane sheet.

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2. Show that current and volatge are in phase when an a.c source is connected to a pure resistor .

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3. Derive lens formula for a concave lens.

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4. PHOTOELECTRIC EMISSION

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5. In the Bohr's hydrogen atom model, the radius of the stationary orbit is directly proportinal to ($n =$ principle quantum number)

6. (a) Explain the phenomenon of self - inductance .

(b) Define coefficient of self - induction and give its unit.

Set A Long Answer Type Questions

1. (a) With the help of a diagram , explain the principle and working of a moving coil galvanometer .

(b) What is the importance of a radial magnetic field and how is it produced ?

(c) Why is it while using a moving coil galvometer as a voltmeter a high resistance in

series is required whereas in an ammeter a shunt is used ?

2. (a) Define a wavefront. Use Huygen' principle to shown diagrammatically the propagation of a plane wavefront from the intant $t_1 = 0$ to later time t_2.

(b) State briefly two features which can distinguish the characteristic features of an

interference pattern from those observed in the diffraction pattern due a single slit.

Set B Multiple Choice Type Questions

1. An electric dipole is placed in a uniform electric field. It may experience

    A. a force as well as torque

    B. a torque but no force

C. a force but no torque

D. Neither a force nor a torque .

Answer:

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2. In which property of free electrons causes increase in the resistance of a conductor with rise in temperature ?

A. decreases

B. increases

C. remains are

D. may increases or decrease

Answer:

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3. When high power heater is used at homes all bulbs being used become dim. Why?

A. current drop

B. potential drop

C. no current drop

D. no potential drop

Answer:

4. An electric charge in uniformmotion produces

A. an electric field only

B. a magnetic field only

C. both electric only

D. no such field all

Answer:

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5. The working of dynamo is based on principle of

A. heating effect of current

B. magnetic effect of current

C. chemical effect of current

D. electromagnetic induction.

Answer:

6. The core of transformer is laminated so that

A. reduce eddy current losses

B. increase magnetic flux

C. increases , strength of magnetic field

D. increase residual magnetismm

Answer:

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7. Mirage' is a phenomenon due to

A. Diffraction

B. Reflection

C. Refraction

D. Total internal reflection

Answer:

8. The penetration of light into the region of geometrical shadow is called

    A. Polarisation

    B. Interference

    C. Diffraction

D. Refraction .

Answer:

9. The energy released in a typical nuclear fussion reaction is approximately:

A. 25 MeV

B. 200 MeV

C. 800 MeV

D. 1050 MeV

Answer:

10. A PN - junction has a thickness of the order of

A. $10^{-12}m$

B. $10^{-6}m$

C. 1 mm

D. 1 cm.

Answer:

11. In common emitter circuit, current gain is :

A. zero

B. Same as in other configuration

C. Lowest

D. Highest.

Answer:

12. The message signal is usually of:

    A. Audio frequency range

    B. Radio frequency range

    C. Audio or rabio frequency range

    D. Mixture of both

Answer:

13. SI unit of electrostatic potential is

A. ohm

B. coulomb

C. volt

D. ampere

Answer:

14. When length of a metal wire is doubled and area of cross - section is reduced to half them the resistance will be :

A. Double

B. Four times

C. No Change

D. Half

Answer:

1. State the limitation of Coulomb's law in electrostatics.

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2. Define electrical energy and electrical power. Give their respective SI unit also.

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3. If an electron is not deflected in passing through a certain region of space can we be sure that there is no magnetic field in that region?

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4. What is electromagnetic induction? State Faraday's laws of electromagnetic induction.

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5. Define critical angle.

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6. de-Broglie concept of wave is related to :

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7. What is the source of energy in nuclear fission and fusion ?

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8. What are semi-conductors ? Describe the two main types of semi- conductors.

9. Define modulation and demodulation. Explain the need for modulation.

10. A charged particle moving in a magnetic field experiences a resultant force

Set B Short Answer Type Questions

1. Briefly explain the principle of a capacitor. Derive an expression for the capacitance of a parallel plate capacitor, whose plates are separated by a dielectric medium.

2. State the working principle of potentiometer. With the help of the circuit diagram, explain how a potentiometer is used to compare the emf's of two primay cells. Obtain the required expression used for comparing the emfs. Write two possible causes for one sided deflection in a potentiometer experiment.

3. Explain the formation of depletion layer and potential barrier in p-n junction.

Draw the circuit diagram of a half wave rectifier and explain its working.

4. The work function of a metal is 2.0 eV. Calculate the wavelenght of incident light if stopping potential is 0.50 V.

5. In the use of transistor as an amplifier

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6. MUTUAL INDUCTANCE

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

Set B Long Answer Type Questions

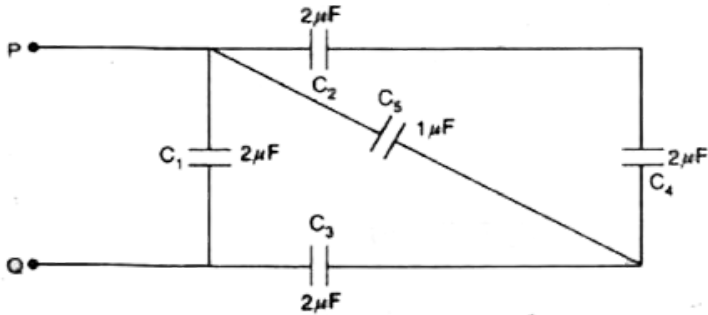**1.** Derive the expression for the electric potential at any point along the axial line of an electric dipole.

Set C Multiple Choice Type Questions

1. Find the equivalent capacitance between P and Q in the circuit shown in the figure :

A. $2\mu F$

B. $4\mu F$

C. $6\mu F$

D. $3\mu F$

Answer:

2. The magnetic field to a small magnetic dipole of magnetic moment M, at distance r from the centre on the equatorial line is given by (in M.K.S. system)

A. $\dfrac{\mu_0}{4\pi} \cdot \dfrac{M}{r^2}$

B. $\dfrac{\mu_0}{4\pi} \cdot \dfrac{M}{r^3}$
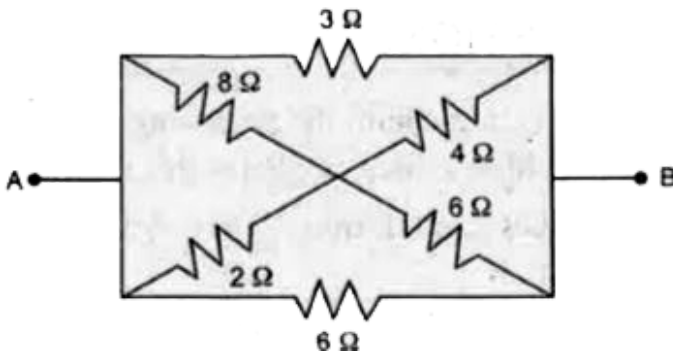
C. $\dfrac{\mu_0}{4\pi} \cdot \dfrac{2M}{r^3}$

D. $\dfrac{\mu_0}{4\pi} \cdot \dfrac{2M}{r^2}$

Answer:

3. In the circuit arragement shown in the figure , the equivalent resistance between points A and B :

A. $\dfrac{27}{14}\Omega$

B. $\dfrac{4}{3}\Omega$

C. 29Ω

D. $\dfrac{24}{17}\Omega$

Answer:

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4. A coil of resistance 10Ω and an inductance $5H$ is connected to a 100 volt battery. Then energy stored in the coil is

A. 31.25 J

B. 62.5J

C. 125 J

D. 250 J

Answer:

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5. The radius of curvature of the path of the

charged particle in a uniform magnetic field is

directly proportional to

A. the charge on the particle

B. the momentum of the particle

C. the strength of magnetic field

D. the energy of the particle .

Answer:

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6. An alternating voltage

$E(\in vo < s) = 200\sqrt{2}$ sin (100t) is

connected to a 1 muF capacitor through an a.c. ammeter. The reading of the ammeter shall be

A. 100 mA

B. 20 mA

C. 40mA

D. 80mA

Answer:

7. Calculate the wavelenght of electromagnetic wave with frequency 30 MHz.

    A. 30 m

    B. 3 m

    C. 10 m

    D. 5 m

Answer:

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8. An electron is moving under a potential difference of 1 volt, what will be the de - Broglie wavelength ?

A. 1 m

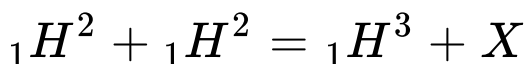B. $1.277m$

C. 12.27Å

D. 1.277Å

Answer:

9. What does X stand for in the following nuclear reaction .

$$_1H^2 + {}_1H^2 = {}_1H^3 + X$$

A. Neutron

B. Electron

C. Positron

D. Proton

Answer:

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10. In a communication system, noise is most likely to affect the signal

    A. at the transmitter

    B. at the transmission medium

    C. in the information source

    D. at the destination .

Answer:

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11. SI unit of electric charge is :

A. ampere

B. coulomb

C. volt

D. None

Answer:

▶ **Watch Video Solution**

12. The S. I unit of resistivity is :

A. Ω

B. $\Omega - m$

C. m

D. A

Answer:

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Set C Very Short Answer Type Questions

1. A cylindrical wire is stretched to increase its length by 10%. Calculate the percentage increase in resistance.

2. Calculate the electrical conducitivity of the material of a conductor of length 3 m, area of cross- section $0.02mm^2$, having a resistance of 2Ω.

3. An electric bulb is rated at 110 W 220 V supply . Find the r.m.s curret flowing through the bulb.

4. What is the power of a convex lens of focal length 0.5 m?

5. Photoelectric Emission

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6. During a nuclear fission reaction,

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7. Draw symbol and truth table for AND gate .

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8. Derive a relation between current gain of common emitter amplifier.

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9. What is the function of the radial magnetic field in the moving coil galvanometer?

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Set C Short Answer Type Questions

1. A 600pF capacitor is charged with 100 V battery . Calculate the energy stored and charge on the capacitor .

2. The horizontal component of earth's magnetic field at a place is 3.0×10^{-4} T . What is force acting per unit length of an conductor placed in east - est direction and carrying a current of 5A ?

3. Define electromagnetic waves. State the characteristics of e.m.waves.

4. For a diven medium, the polarising angle is $60°$. What will be the critical angle for this medium ?

5. What are main logic gates? How many types are they? Draw their symbols and truth tables.

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6. What is phase difference between the e.m.f and current when a capacitor is connected across an a.c.source ?

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7. Intrinsic and extrinsic semiconductors .

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Set C Long Answer Type Questions

1. Derive an expression for the capacitance of a parallel-plate capacitor filled with a dielectric.

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2. A galvanometer can ber converted into an ammeter by connecting

3. Find the force between two parallel conductors carrying currents (i) in the same direction (ii) in opposite directions and hence define one ampere.

4. Prove that $\dfrac{-\mu_1}{u} + \dfrac{\mu_2}{v} = \dfrac{\mu_2 - \mu_1}{R}$ when refraction occurs from rarer to denser medium at a concave spherical refracting surface.

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5. Derive lens formula for a concave lens.

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Set D Multiple Choice Type Questions

1. Unit of capacitance is

A. volt

B. ampere

C. coulomb

D.

Answer:

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2. For ohmic conductor, the drift velocity v_d and the electric field applied across it are related as

A. $v_d \propto \sqrt{E}$

B. $v_d \propto E$

C. $v_d \propto E^{-3/2}$

D. $v_d \propto E^{-\frac{1}{2}}$

Answer:

3. When a resistance of 2Ω is connected across the terminals of a cell, the current is 0.5 A. When resistance is increased to 5Ω, the current is 0.25 A. the emf of the cell is

A. 0.5Ω

B. 1.0Ω

C. 1.5Ω

D. 2.0Ω

Answer:

4. The magnetic induction at a distance r from a straight, infinitely long wire in air and carrying a current I is given by

A. $\dfrac{\mu_0 I}{2\pi r}$

B. $\dfrac{\mu_0 I}{2r}$

C. $\mu_0 n I$

D. Zero

Answer:

5. A charged particle moves through a magnetic field perpendicular to its direction. Then

    A. always exerts a force on the particle

    B. never exerts a force on the particle

    C. exerts a force, if the particle is moving at right angle to the field .

D. exerts a force , if the particle is moving

along the field .

Answer:

6. What is the ratio of inductive and capacitive

rectance in an a.c circuit ?

A. 1

B. zero

C. W^2L

D. $W^2LC.$

Answer:

7. Which of the following generates a plane wavefront?

A. Extended source

B. Monochromatic source

C. Point source

D. None of the above

Answer:

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8. Light travels faster in air than in glass according to :

A. Wave theory of light

B. Corpuscular theory of light

C. Both (A) and (B)

D. Neither (A) nor (B)

Answer:

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9. If particles are moving with same velocity ,
then maximum de - Broglie wavelength will be
for

A. proton

B. α - particle

C. neutron

D. β - particle

Answer:

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10. when an electron jumps from the fourth

orbit to the second orbit, one gets the

A. second line of Paschen series

B. second line of Balmer Series

C. Ist line of P - fund series

D. second line of Lyman series .

Answer:

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11. Frequencies in the UHF range normally propagate by means of:

A. surface waves

B. sky waves

C. space waves

D. ground waves

Answer:

12. A parallel plate copacitor is first charged and then isolated, and a dielelctric slab is introduced between the plates. The quantity that remains unchanged is.

A. charge q

B. potential V

C. capacity C

D. energy U

Answer:

13. The dimension of magnetic field are :

A. $\left[M^1 L^1 T^{-3}\right]$

B. $\left[M^1 L^2 T^{-2} A^{-1}\right]$

C. $\left[M^1 L^{-1} T^{-1}\right]$

D. $\left[M^1 T^{-2} A^{-1}\right]$

Answer:

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Set D Very Short Answer Type Questions

1. What is Gauss's law for electric flux ?

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2. What is Henry law?

3. A wire of resistance 4Ω is stretched to twice its original length. In the process of stretching, its area of cross-section gets halved. Now, the resistance of the wire is

4. A galvanometer coil has a resitance of 15Ω and the meter shows full scale deflection for a current of $4mA$. How will you convert the meter into an ammeter of range 0 to 6A?

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5. Write Faraday,s law of electronmagnetic induction.

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6. Rutherford's alpha particle scattering experiment led to the discovery of :

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7. In a $P - N$ junction diode :

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8. What are microwaves? Give their uses.

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9. Why can moon be not used as a communication satellite?

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10. An alpha particle is moving with velocity $\vec{v}$ in the direction of magnetic field $\vec{B}$. Find force acting on it .

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1. What is the area of the plantes of a 2 F parallel plate capacitor , give separation between the plates is 0.5 cm.

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2. WHEATSTONE BRIDGE

▶ Watch Video Solution

3. Ampere's circuital law is given by

▶ **Watch Video Solution**

4. What is induction ? Define self and mutual inductance .

▶ **Watch Video Solution**

5. In photoelectric effect

▶ **Watch Video Solution**

6. An electric bulb is rated as 50 W and 200 V . Find : (a) resistance (b) peak votlage of source .

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7. Which of the following is NOT an application of photodiode?

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Set D Long Answer Type Questions

1. The focal lengths of the lenses of an astronomical telescope are $50cm$ and $5cm$. The length of the telescope when the image is formed at the least distance of distinct vision is

2. Discuss the phenomenon of refraction through a prism. Prove that $\delta = (\mu - 1)A$ where the symbols have their usual meaning.

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3. Nuclear fission can be explained by

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4. RATE OF RADIOACTIVE DISINTEGRATION

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