NAME : UMAIR KHAN

I.D : 14596

SECTION : A

SEMESTER : 4th BS(SE)

SUBJECT : APPLIED PHYSICS

INSTRUCTOR : M. KHALID HAMID

Q1
a) What is the differance between reflaction and refraction?

REFLECTION:-

The property of a propagated wave being thrown back from a surface (such as mirror), something such as an image is termed as reflection. It is the bouncing back of wave while striking through a surface

TYPES:-

Reflaction is categorized into two types:-
Specular reflection
and diffuse reflection.

SPECULAR REFLECTION:-

It is the type of reflaction through or from a smooth surface.

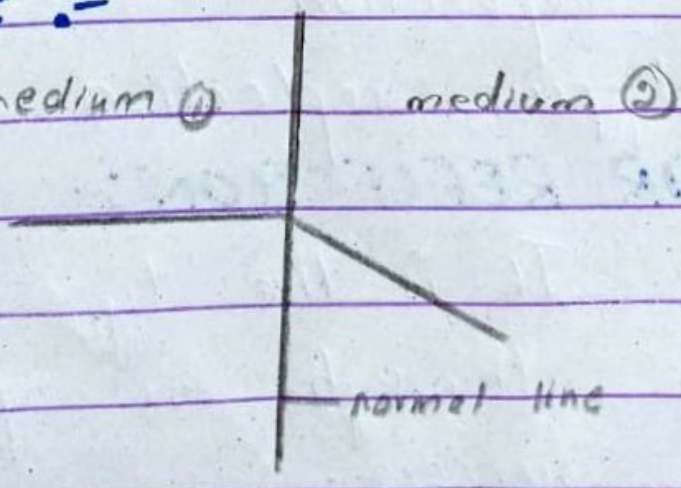
DIFFUSE REFLECTION :-

It is the type of reflection from rough surfaces.

REFRACTION :-

When light waves passes from one medium to another i-e from rare medium to denser medium or denier medium to rare medium, the ray changes its original path and move towards or away from the normal line.

FIGURE :-

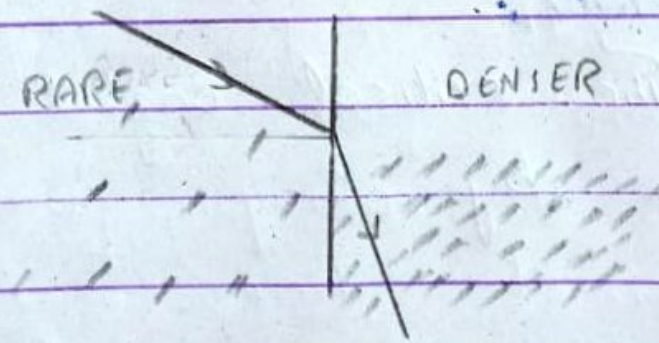


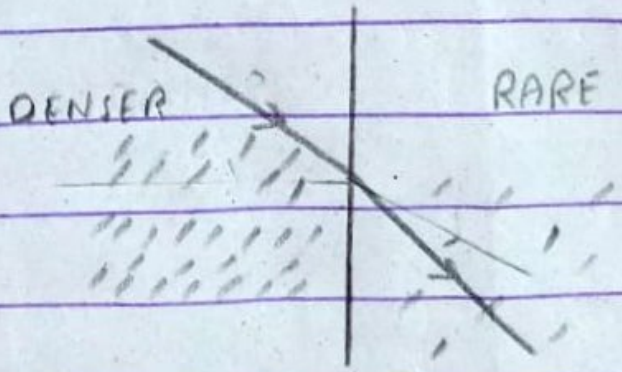
TOWARDS THE NORMAL :-

When the light wave passes from rare medium to denser medium it bends towards the normal line

AWAY FROM THE NORMAL :-

When the light wave passes from denser medium to rare medium, it bends away from the normal.





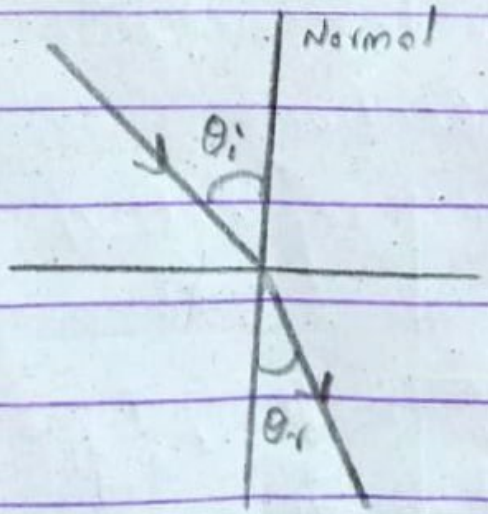
b) What is meant by critical angle ?

CRITICAL ANGLE :-

When a light ray passes from denser medium to rare medium and the angle of incidence for which the angle of refraction becomes 90° is called critical angle.

REPRESENTATION :-

The critical angle is represented by c.



c) What is the main function of angle of incidence?

ANGLE OF INCIDENCE:-

DEFINITION:-

Angle of incidence is the angle between the incident ray and the line perpendicular to the surface at the point of incidence called the normal.

MAIN FUNCTION:-

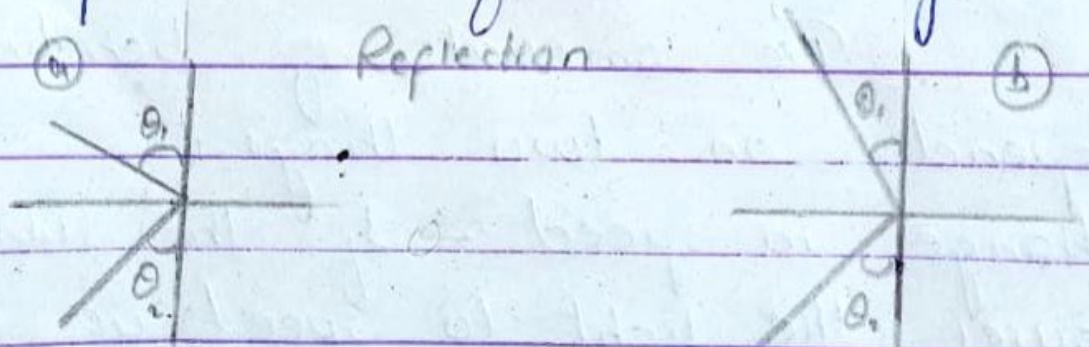
The amount of bending depends on two things:-

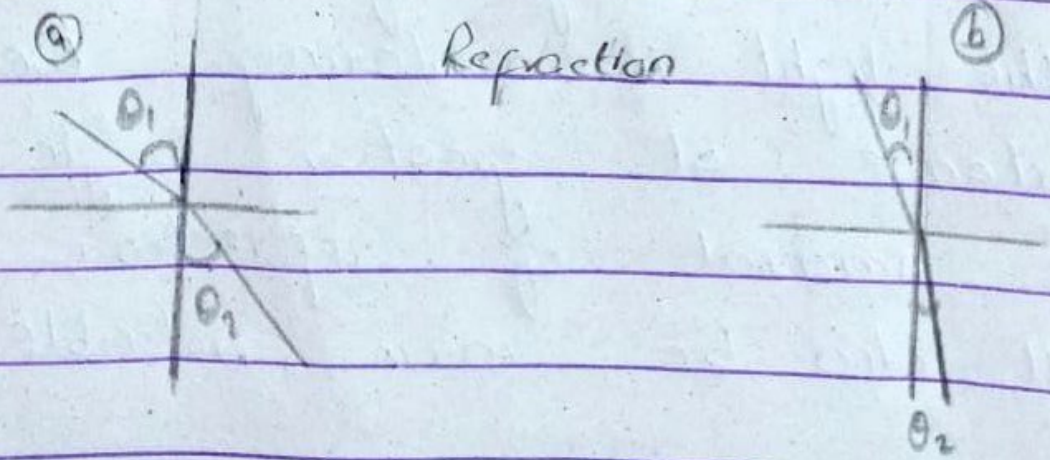
① Change in speed - If the substance causes the light to speed up or slow down. ② Angle of incidence - If the light is entering the substance at greater angle, the amount of refraction will also be more noticable.

The incidence angle also effect the angle of reflection in reflection phenomenon. If the angle of incidence is greater the angle of reflection will also be more.

CONCLUSION:-

There the angle of incidence determine the angle of refraction and angle of reflection of the rays.





d) What is meant by index of refraction.

REFRACTIVE INDEX:-

The ratio between sine of angle of incidence θ_i and sine of angle of refraction θ_r is known as refractive index.

MATHEMATICALLY:-

According to Snell's law:

$$\eta = \sin\theta_i / \sin\theta_r$$

η = represent refractive index

EXAMPLES:-

→ Refractive index of water = 1.33 at 20°C

→ Vacuum = 1.00000

→ Ice = 1.31

Q2 a) Explain the difference between solenoid and toroide?

SOLENOID:-

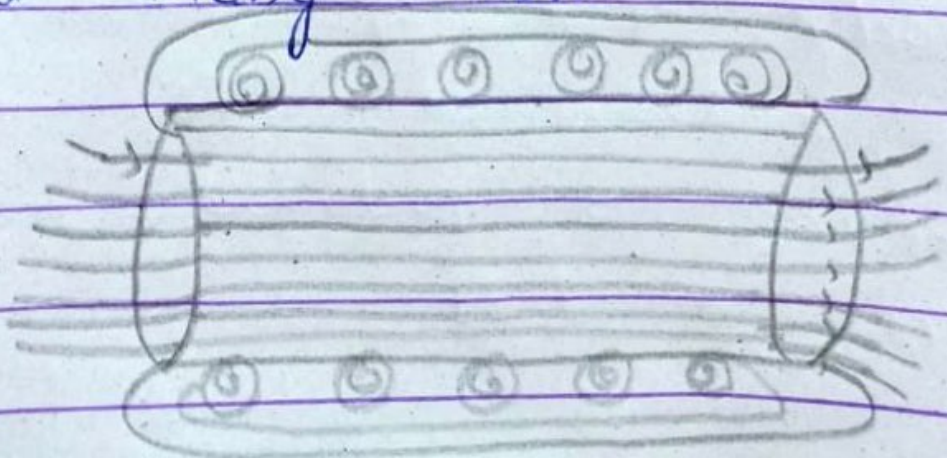
Solenoid is form when we wound a conductor around a cylindrical body. In this case the magnetic field creates two poles i-e North & South.

MAGNETIC FIELD:-

The magnetic field of solenoid is weaker than a toroid due to flux leakage.

USE OF SOLENOID:-

Solenoid is used in inductors, electromagnets, catennas and many more.



TOROID :-

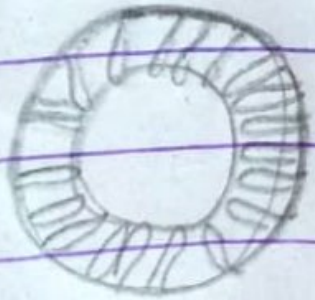
Toroid is a hollow circular ring on which a large number of turns of wire are closely wound.

MAGNETIC FIELD :-

The magnetic field of toroid is stronger as compared to a solenoid. It has more inductance for a given number of turns with a core of same material. There is no flux leakage.

USE OF TOROID :-

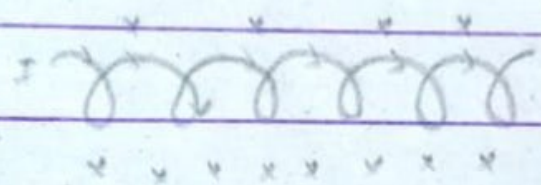
Toroids are used in electronic circuits especially at low frequencies.



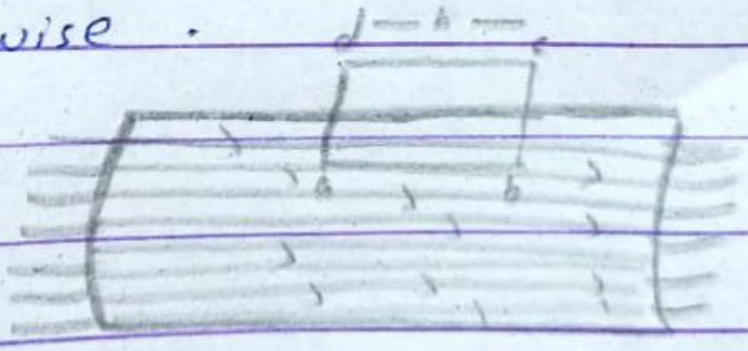
b) Explain the magnetic field of a solenoid?

EXPLANATION:-

When current passes through a solenoid, it behave like a magnetic bar. The magnetic field produce in solenoid is uniform i-e stronger inside and weaker outside.



In this solenoid the current is clockwise.



We apply amperian loop at one side of the solenoid.

Now by applying Ampere's law

$$\sum B \cdot \Delta L = \mu_0 \times I$$

$$\vec{B}\cdot\vec{l_1} + \vec{B}\cdot\vec{l_2} + \vec{B}\cdot\vec{l_3} + \vec{B}\cdot\vec{l_4} = \mu_0 \times I$$

$$Bl_1\cos 0^\circ + Bl_2\cos 90^\circ + Bl_3\cos 180^\circ + Bl_4\cos 90^\circ = \mu_0 I$$

$$\hookrightarrow \quad Bl_1 + 0 + 0 + 0 = \mu_0 \times I$$

$$\boxed{Bl_1 = \mu_0 \times I} \rightarrow (*)$$

Let there are n-number of turns in solenoid

$$\boxed{N = nL_1} \rightarrow (1)$$

Since each turn carries current I so total current enclosed

$$= \boxed{IN = InL_1} \rightarrow (2)$$

by putting (2) in (*) we get

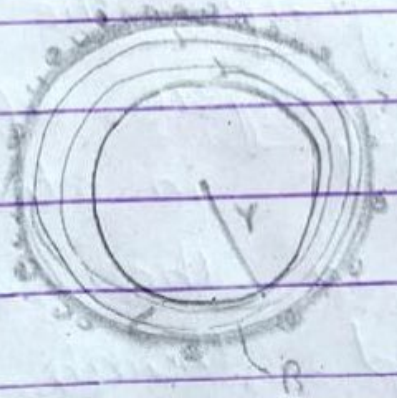
$$BL_1 = \mu_0 \times InL_1$$

$$\boxed{B = \mu_0 I}$$

c) Explain the magnetic field of a toroid?

EXPLANATION:-

We conceder a toroid of n-number of turns. Let we choose a concentric circle of radius r as an Amperian loop and transverse it in the clockwise direction.



By Applying Ampere's law

$$\boxed{(B)(2\pi r) = \mu_0 I N}$$

Where I is the current in the toroid windings and N is to total number of turns.

$$B = \frac{\mu_0 I N}{2\pi} \frac{1}{r}$$

In contrast to solenoid, B in not constant over the cross section of a toroid.

The direction of magnetic field within a toroid follows from our curled-straight right hand-rule.

We grasp the toroid with the fingers of right hand curled in the direction of current in the windings, the extended thumb gives the direction of magnetic field.