SHEET NO. 1

Answer Book for Theory Examination

Attention : No Provision for Supplementary Answer Book

(To be filled by the candidate)

[Write only the desired information. Any other information provided on the sheet in order to disclose identity will be treated as unfair means]

Name of Semester Examination : 1st Sem (2022-23) Reappear

Branch : Information Technology

Name of Subject/ Paper : Engineering Physics

Subject / Paper Code : 3 1 0 2

(Subject code should be the last four digits of the code as printed on top left corner of question paper)

Day & Date of Examination : 31st March Friday

Facsimile Signature of Controller of Examinations

SHEET NO. 3

Evaluation Sheet

Marks Obtained									
Q. No.	Part A	Part -B a	Part -B b	Part -B Total	Part -C a	Part -C b	Part -C c	Part -C d	Part -C Total
1									1
2									
3									
4									
5					1				1
6									
7									
8									
9									
10									
Total									2

Grand Total (in words)	Grand Total (in figure)
Two	02

1

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PART-A

A1) Excessively thin film appears dark because ~~is~~ diameter of fringes reduces as we move closer and closer to the air film.

A2) The ability to see two close objects as separate or individual making it easy to differentiate is known as resolvance. Resolving power of an optical instrument can be defined as the maximum power ~~or ability to see two close objects~~ or ability of an optical instrument to see two close objects as separate is known as resolving power of an optical instrument.

A3) Normalised wave function or a wave function can be defined as when particles in a motion ~~flowing~~ moving in a direction follows along a wave flowing in the same direction, so this wave flowing along the particles in motion is known as wave function. It can be represented as:

$$\int_{-\infty}^{\infty} |\Psi(x, y, z, t)|^2 \, dx\,dy\,dz$$

Here, x, y, z are the particles and t is the time.

Orthogonal wave function:

Ψ_i and Ψ_j

When 2 waves flowing along the particles having the wave function nearly equal to each other they can be represented by

$$\psi_i(x,y,z,t) = \psi_j(x,y,z,t)$$

$$\therefore \quad \psi = \psi\psi^* \qquad \psi_i = \psi_j \qquad i \neq 0$$

A4) Total Internal reflection:

~~When 2 light~~

When light ~~waves~~ rays strikes on a polished surface it gets ~~strike~~ bounce back. This phenomenon of bouncing or striking back of a light wave is known as reflection. So when a light ray is made to inclined in an optical fibre so it bounces multiple times due to reflection. So the number of times these rays gets reflected is called total internal reflection.

A5) Einstein's Coefficients :

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A 6) ~~Define a semiconducting~~

Hall effect :

When a semiconducting plate is placed in the magnetic field then potential difference is developed in the perpendicular direction of current and magnetic field can be experienced at the 2 opposite ends of the semiconducting plate. This effect is known as Hall effect.

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A7) A field having only the magnitude or the quantities that have magnitude only or scalar quantities is known as scalar field.

A field having the magnitude and direction or carrying the quantities that have magnitude and direction is known as vector field.

A8) Divergence of vector :

- When vector quantities are differentiated then the resultant of that is divergence
- Divergence is denoted by div

$$\text{div}(\text{vector}) = \frac{\partial(\text{vector})}{\partial x}$$

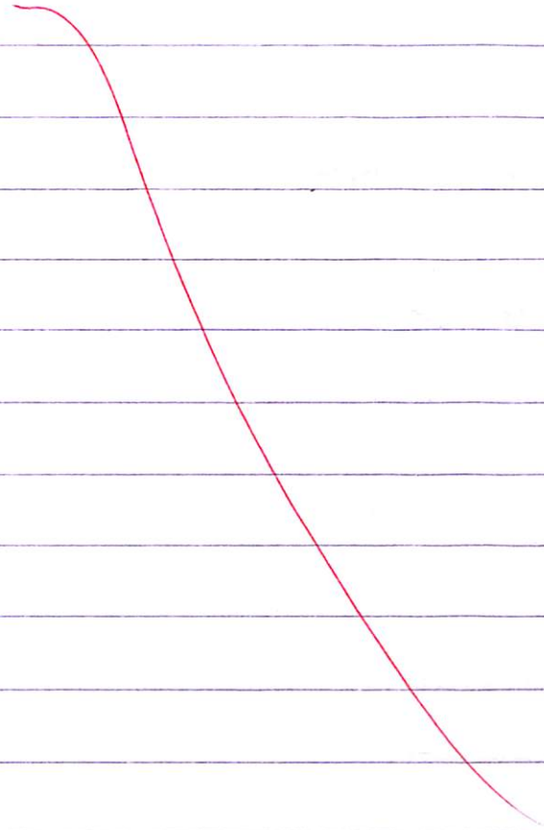
Curl of a vector :

- Curl of a vector is denoted by ∇.
- ~~Curl of~~ If a vector undergoes integration, then its resultant is known as the curl of the vector.

89) Spectral Purity :

Spectral Purity can be defined as removing the impure particles from ~~the~~ a spectra or spectrum and making it a pure is known as Spectral purity.

Q10) If the film is of H refractive index in Newton's ring experiment the diameter will be double of it.

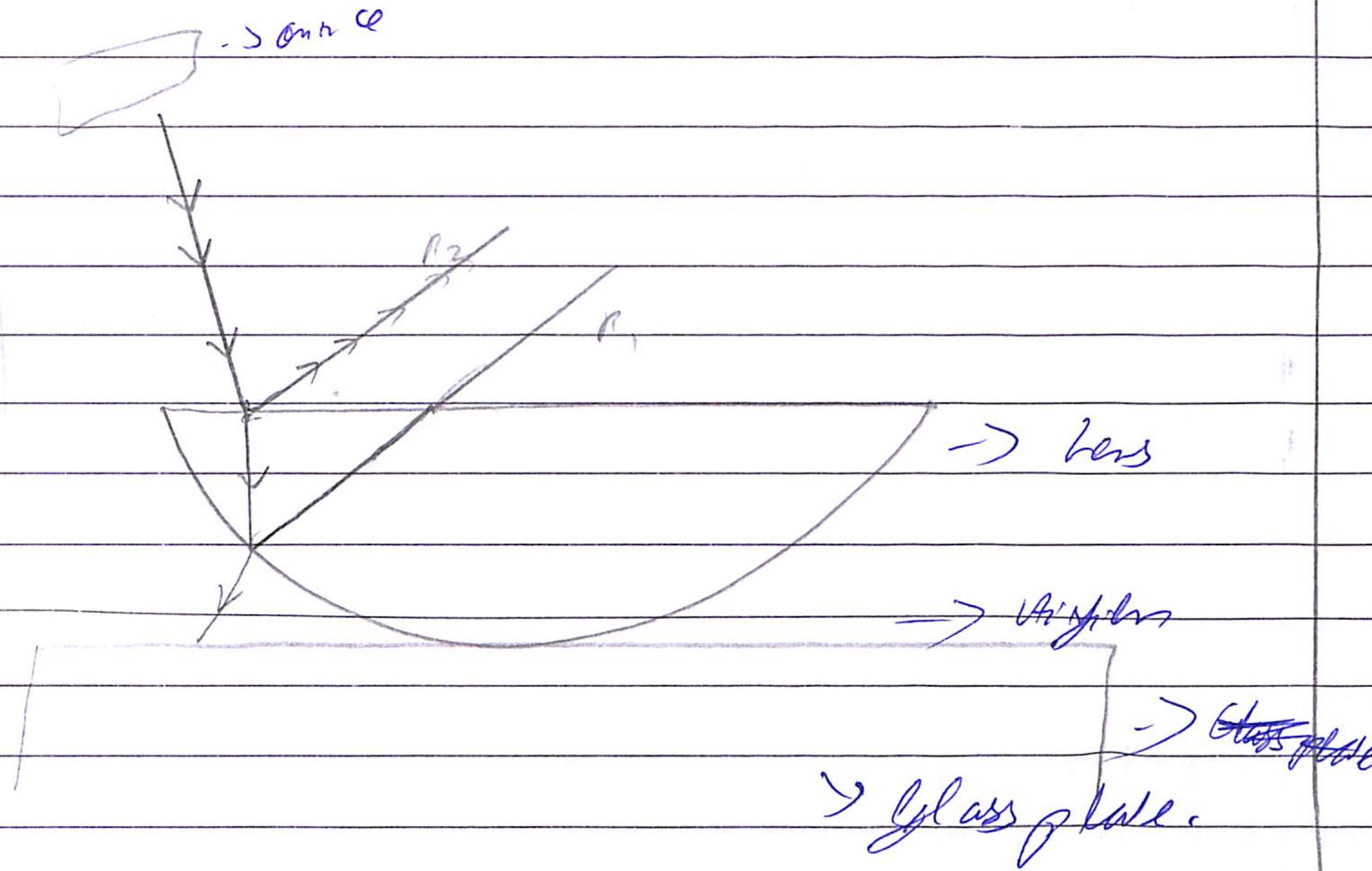


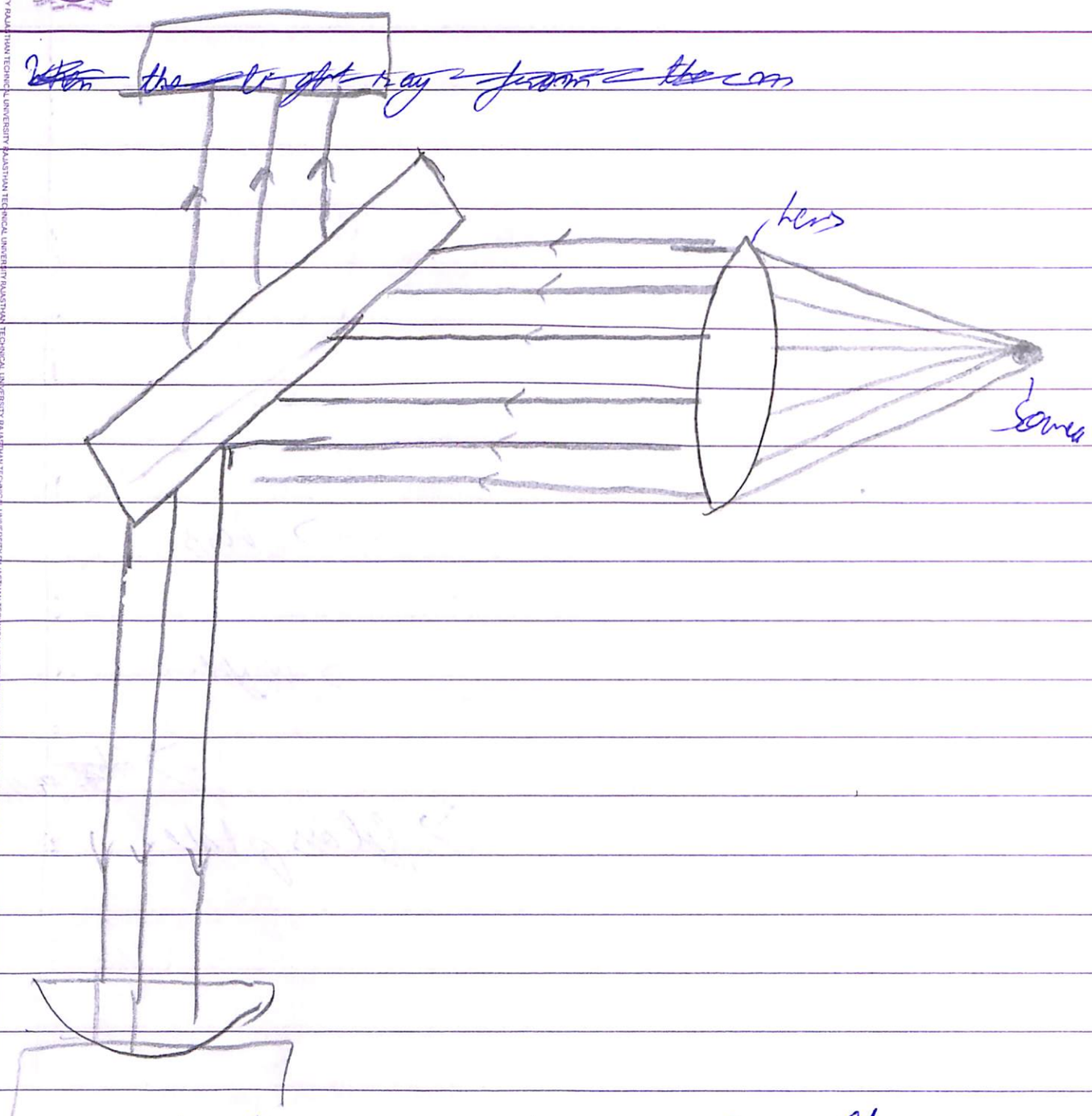
PART - C

(A2) For newton's ring experiment we need a lens a monochromatic light source and an air film.

(A1) For newton's ring experiment we need

- A monochromatic light source
- A lens
- An air film.
- A Glass plate


Source
R2
R1
Lens
Air film
Glass plate



Newton's Ring in single slit.

When a monochromatic light is made to fall on the lens from a monochromatic light source, it reflects the light waves and due to reflection and refraction within the lens two rays are produced i.e. R_1 and R_2 as reflected rays.

Due to this reflection and movement of light rays you will be able to see some rings forming near the air film.

These rings can not be seen by naked eye. You need a microscope to see the newton's rings easily.

These can be used to determine the wavelength of light.

~~The apparatus used to determine the~~ wavelength

- The thin air film used in newton's ring is real whereas in michelson interferometer there is imaginary air film
- The change in length or length can be determined by newton's ring experiment.
- Two types of fringes can be seen in newton's ring experiment:

① ~~Bright~~ Bright fringes.

② Dark fringes.

Case - 1 :

- If we use refractive liquid instead of air film.

- It will make changes ~~I~~ in the reflection due to change in refractive index thus there will be errors in diameter calculation.

Case 2 :-

- If we use mirror

All the light rays will get reflected no refraction of light waves will occur thus ~~the~~ no rings will be formed.

Case: 3

- If we use normal white light instead of monochromatic light.

Due to varying ~~[illegible]~~ wavelengths and multiple colour formation there will be uncertainty and errors.

Case 4:

- If we use water instead of air film

No rings will be obtained as errors will be there.

Yes | can | be used to measure wavelength of light

Newton's ring can be used to measure wavelength of a light as the light rays reflects at multiple points inside the lens.

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(A5)

(a) Optical Fibre :

~~Optical Fibre is made up of 3 layers~~

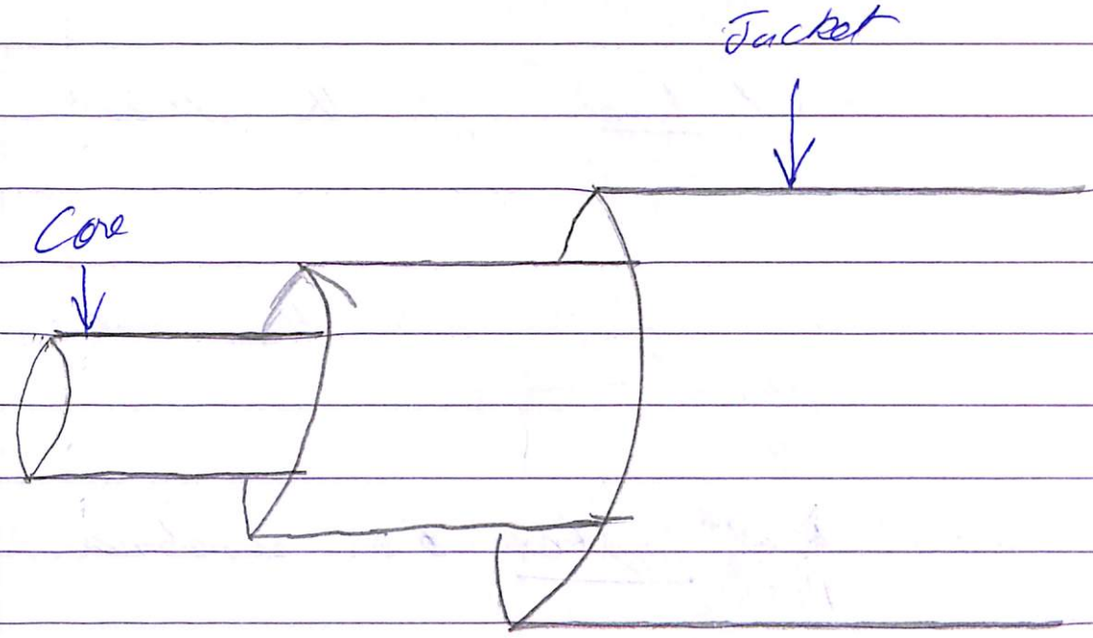
Optical fibre is a thin fibre wire used for propagation of waves. It is made up of 3 different layers varying according to different diametric sizes, different uses and materials.

The three different layer of optical fibre are :

1. Core
2. Cladding.
3. Jacket

① Core : ~~Core~~ ~~is~~ ~~the~~ +

- Core is the innermost layer of the optical fibre
- Core has ~~to~~ diameter length less than that of and Jacket.
- Core is mostly made up of glass ~~o~~ or sometimes shiny plastic.
- Waves propagates inside the core only.

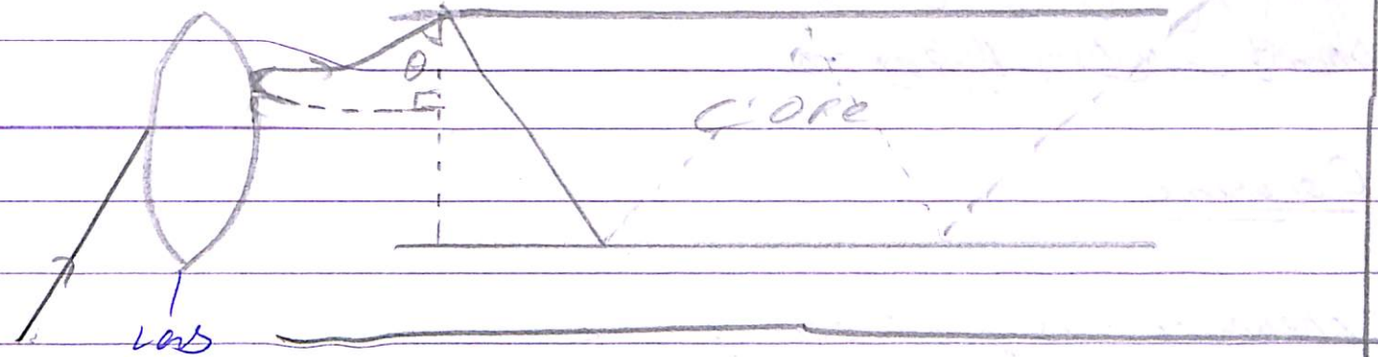


(2) Jacket :

- Jacket is the outermost layer of the optical fibre
- Jacket has the greatest diameter compared to other 2 layers.
- Jacket is made up of plastic
- Jacket is used to protect the fibre layer from environment and other surroundings.

(7) Cladding :

- Cladding is the middle layer of the optical fibre.
- Cladding has the diameter greater than core but less than jacket
- Cladding is also made of plastic.
- Cladding is used to stop light waves from breaking out.



~~Optical fibre~~

Reflection in optical fibre.

01

~~b)~~ ~~Coherence~~ →

~~When two light waves have same wavelength same path difference~~ ..

(b) Coherence

Coherence is produced by collision of two light waves. These light waves are known as coherent waves..

As in Newton's ring the ~~light~~ light rays collapses due to refraction ~~and~~ and collision. Thus ~~making~~ the fringes producing.

Q2

(a) Particles in motion ~~follows~~ moving in a direction always have a wave following them or moving in the same direction along them. So, this wave flowing along the particles in motion is known as wave function (Ψ).

It can be represented by:-

$$\int_{-\infty}^{\infty} |\Psi(x, y, z, t)|^2 dy$$

Here, (x, y, z) are ~~the~~ particle dimensions.

t is the time.

Schrodinger time dependent equation.

(6) Degeneracy can be defined as when the atom from excited state fall back to the ground state after its life time of 10^{-8} seconds. This can be termed as degeneracy of ~~electron~~ atom.

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PART - B

Q1) Interference :-

When 2 light waves superimpose each other the ~~m~~ create modification in amplitude and ~~par~~ ~~_____~~ intensity, this resultant modification in amplitude is known as interference.

Interference is of 2 types :

(1) Constructive Interference.

(2) Destructive Interference

- **Constructive interference**

When the resultant intensity is maximum, then it is called as constructive interference.

- **Destructive interference**

When the resultant intensity is minimum, then it is known as Destructive interference.

$$\frac{I_{max}}{I_{min}} = \alpha$$

$$\Rightarrow (I_{max} - I_{min})^2 = 4\alpha^2$$

$$(I_{max} + I_{min})^2 = (1+\alpha)^2$$

$$\therefore \quad \frac{I_{max} - I_{min}}{I_{max} + I_{min}} = \frac{2\sqrt{\alpha}}{1+\alpha}$$

Hence Proved

(in 2) Diffraction

Diffraction can be termed as spreading of light due to refraction. There are 2 types of diffraction

1. Fraun hoffer diffraction
2. Fresnel diffraction

- In Fraunhoffer diffraction the screen and the source are at infinite distance.

- In Fresnel diffraction the screen and the source are at finite distance.

According to the question the relation b/w d_1 and d_2 will be

$$\boxed{d_1 \propto d_2}$$

Q3 Laser :-

Light Amplification by stimulated emission of radiation.

When a light gets under optical amplification through stimulated emission of electromagnetic radiation a laser is produced which is highly intense. ~~this~~

Properties of laser are :-

1. Highly Coherent
2. Highly Intense
3. Highly Directional.

Q 4) Optical fibre is a thin fibre made up of 3 layers i.e. core, cladding and jacket. It is used to propagate the waves.

Acceptance angle for an optical fibre :-

Acceptance angle of an optical fibre can be termed as the ~~angle~~ angle formed by the wave entering in the optical fibre allowing it to propagate through it.

Ans Semiconductors are both conductors and insulators. There are 2 types of semiconductors.

① Pure semiconductor

② Impure Semiconductor.

Further, here are 2 types of semiconductors in Impure semiconductor i.e.

(a) P-type semiconductor

(b) N-type semiconductor.