Shri Swami Vivekanand Shikshan Sanstha's

Vivekanand College, Kolhapur (Empowered Autonomous).

Department of Physics

Date: 01/03/2024

Internal Examination Notice

The students of M.Sc. I and II are hereby informed that the internal examination of current semester is scheduled as per following time table:

Sr. No.	Class and Sem	Paper Code.	Title of the paper	Date and time
1.	M.Sc. I, SEM II	DSC-III	Quantum Mechanics	12/03/2024 12:00 to 01:00 pm
2.	M.Sc. I, SEM II	DSC-IV	Condensed Matter Physics	13/03/2024 12:00 to 01:00 pm
3.	M.Sc. I, SEM II	OEC -II	Solid State Physics II	14/03/2024 12:00 to 01:00 pm
4.	M.Sc. II, SEM IV	CP-1118D	Experimental Techniques	12/03/2024 12:00 to 01:00 pm
5.	M.Sc. II, SEM IV	CP-1119D	Electronic Devices and applications	13/03/2024 12:00 to 01:00 pm
6.	M.Sc. II, SEM IV	CP-1120D	Solid State Physics- III (Physical Properties of Solid)	14/03/2024 12:00 to 01:00 pm
7.	M.Sc. II, SEM IV	CP-1121D	Solid State Physics-IV (Energy Conversion and Storage Devices)	15/03/2024 12:00 to 01:00 pm

(M.Sc. Co-ordinator)

HOD

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DEPARTMENT OF PHYSICS
VIVEKANAND COLLEGE, KOLHAPUR
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Shri Swami Vivekanand Shikshan Sanstha, Kolhapur

Vivekanand College, Kolhapur (Autonomous)

Department of Physics

M.Sc. Part-I SEM II Internal Examination (2023-24)

Quantum Mechanics

Paper code:DSC12PHY21

Date: - 12-03-2024 Time: - 12.00 to 1.00 pm Total Marks: 20

Day: - Tuesday

Instructions: -

1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of log table and calculator is allowed.

Q.1 Select Correct Alternative: (05)

1) Two eigenfunctions ψ_n &ψ_m are said to be orthogonal if .....

(a) $(\psi_n, \psi_m) = -1$ (b) $(\psi_n, \psi_m) = 1$

(c) $(\psi_n, \psi_m) = 0$ (d) $(\psi_n, \psi_m) \neq 0$

2) An operator which can obtain differential function from any given function is .....

(a) linear operator (b) Hermitian operator

(c) Hamiltonian operator (d) none of these

3) A vector of magnitude 1 is called a ..... vector.

(a) unit (b) orthogonal (c) position (d) none of these

4) Wave function in quantum mechanics is ..... & ..... valued function.

(a) continuous, double (b) discontinuous, single

(c) continuous, single (d) discontinuous, double

5) Hilbert's space is ..... dimensional space.

(a) finite (b) infinite

(c) zero (d) none of these

Q.2 Attempt any one (10)

1) What is sequential Stern-Gerlach experiment. Explain it by making analogy with polarization of light.

2) Outline the different postulates of quantum mechanics.

Q.3 Attempt any one (5)

1) What is linear vector space.

2) Define Hermitian operator in detail.

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95

Name: Vedaja Ajay Yadav

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1.5/20

SUPPLIMENT

Signature of Supervisor	

Suppliment No. : 1

Roll No. : 1313

Class : M.Sc I

Subject : Quantum Mechanics

Test / Tutorial No. : Internal Examination

Div. :

Q.1.

1) b) $(\psi_n, \psi_m) = 0$

2) a) linear operator

3) a) unit

4) c) continuous and single

5) b) infinite.

03

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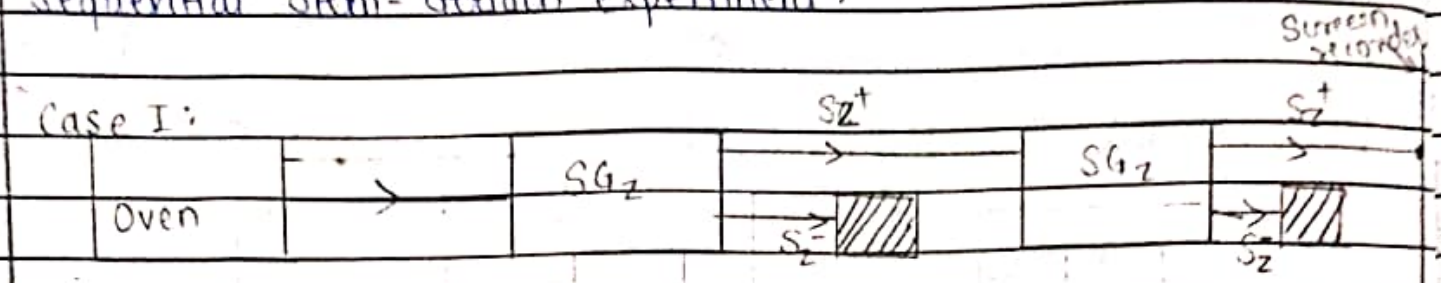
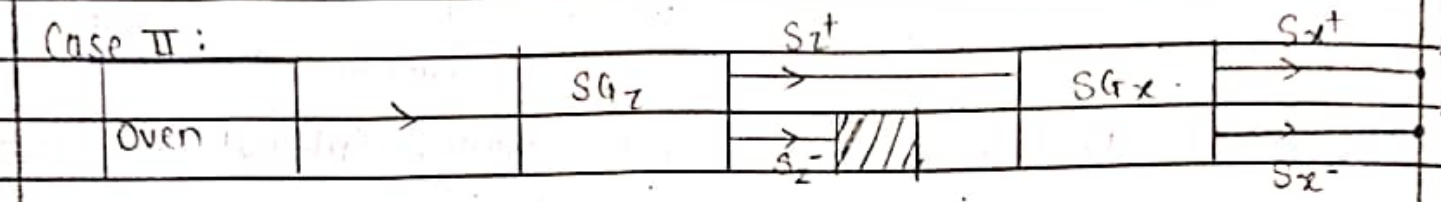
2. i) Sequential Stern-Gerlach experiment:

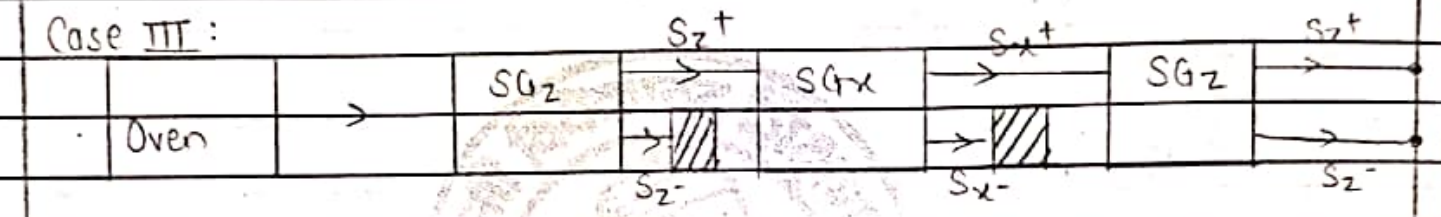
Case I:



Case II:



Case III:



S-G experiment is basically a straight sequential experiment which studies the angular spin momentum of an atom by passing silver beam light by oven.

Case I:

- In 1st case a single beam of light is passed from oven which founds the 1st S-G apparatus which SG_z component
- Light is absorbed by SG_z component and produces two beam of light i.e. S_z^+ and S_z^-. But S_z^- is blocked and S_z^+ is propagated and it found second S-G apparatus. which SG_z.
- Here, the S_z^+ is absorbed and it produces its own beam component i.e. S_z^+ and S_z^- and again S_z^- is blocked and S_z^+ is send to the screen recorder

Case II:

- In 2nd case a beam of light is passed from oven and founds the first S-G apparatus which is SG_z
- SG_z component converts the beam into its own components i.e. S_z^+ and S_z^- And as above S_z^- is blocked and send further toward SG_x apparatus.

- SG_x apparatus absorbs the S_z^+ beam and converts it into its own component i.e. S_x^+ and S_x^-.
- These two component beams S_x^+ and S_x^- is send to the screen recorder
- Hence, here the previous information is vanished.

Case III :

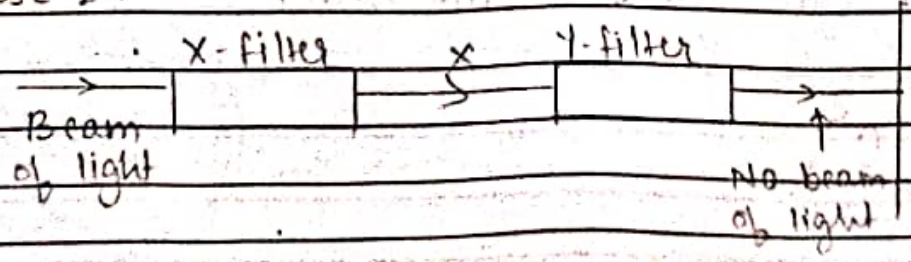
- In case III the procedure is same as above two cases.
- Here also a beam is passed through oven and finds 1st S-G apparatus which is SG_z.
- SG_z component absorbs the light and produces its own component beams S_z^+ and S_z^-. Here S_z^- beam is blocked and S_z^+ beam is send to the second SG apparatus.
- S_z^+ beam is received by SG_x component and it also converts its own beam i.e. S_x^+ and S_x^-.
- Here also S_x^- beam is blocked and S_x^+ beam is passed towards third SG apparatus i.e. SG_z.
- When S_x^+ founds SG_z, then SG_z produces S_z^+ and S_z^- and these two beams are send to the screen recorder.

Assumptions : The previous information vanishes due to angular spin momentum of an atom.

Analogy of S-G experiment with polarization of light :

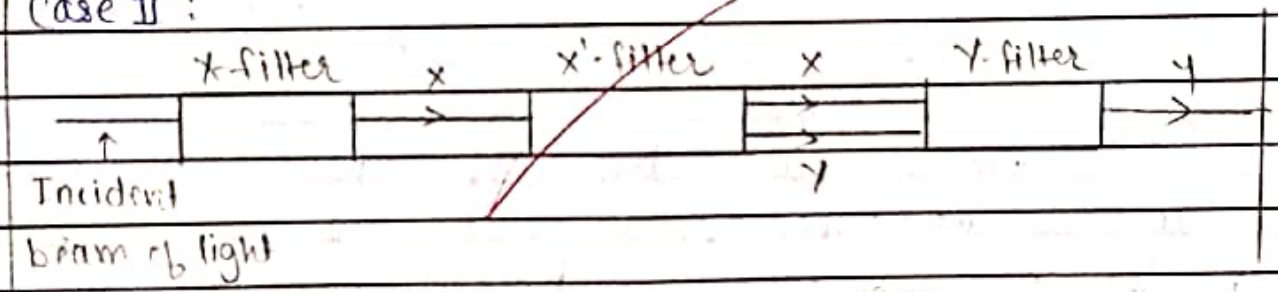
Here a single beam of light i.e. monochromatic light is passed through the X and filters.

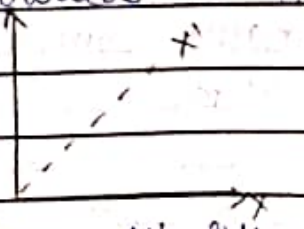
Case I :



- In case I, a monochromatic beam of light is passed through X- filter.
- X- filter absorbs the light beam and converts it into its component form i.e. X polarized light beam.
- Now, this X- polarized light beams founds the Y-filter and Y- filter blocks the X-polarized light.
- As a result, there is no passing of any beam of light through Y- filter

Case II :



- In case II, a beam of light is passing through X- filter.
- X- filter absorbs this light and converts it into its component i.e. X- polarized light and it is send towards X' filter.
- 

X' filter is mounted in 45° along X-direction and it is made up of both X- and Y filters.
- Hence, X' filter produces both components i.e. X-polarized light and Y-polarized light.
- These two beams are send towards the Y-filter and Y-filter blocks the X- polarized light and passes Y-polarized light towards the screen.

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Name : Vedaja Ajay Yadav.

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Signature of Supervisor	

Suppliment No. : 2
Roll No. : 1313
Class : M.Sc I

Subject : Quantum Mechanics
Test / Tutorial No. : Internal Examination.
Div. :

2) Hermitian operator :

Hermitian operator operates the the two functions i.e. $F(x)$ and $G(x)$ along Z-direction. So the equations along X and Y direction are,

Along X- direction,

$E = E_0 \cancel{\cos}\ \hat{x} \cos(kz - \omega t)$ —— (1)

Similarly along Y- direction

$E = E_0 \hat{y} \cos(kz - \omega t)$ —— (2)

Let us operate Hermitian operator 'A' on the functions $F(x)$ and $G(x)$.

$A \cdot F(x) \cdot A\, G(x) = [A F(x) \cdot G(x)] = [G(x) \cdot A \cdot F(x)]$

On integrating above equation by the intervals a to b then

$\int_a^b F(x)\, A\, G(x)\, dx = \int_a^b A\, F(x^*) \cdot G x\, dx = 0$

$\Rightarrow \int_a^b G(x)\, A\, F(x^*)\, dx$

In bracket notation,

$[F(x) \cdot A\, G(x)] = [A F(x) \cdot G(x)] = [G(x) \cdot A F(x)]$

Let am and an bet the functions of $F(x)$ and $G(x)$ then.

$E_0 \hat{x} \cos(kz - \omega t) = a_m \left[\frac{1}{\sqrt{2}} \cos(kz - \omega t) + \frac{1}{\sqrt{2}} \cos(kz - \omega t)\right]$ —— (1)

$$E_0 \hat{y} \cos(kz - \omega t) = a_n \left(-\frac{1}{\sqrt{2}} \cos(kz - \omega t) + \frac{1}{\sqrt{2}} \cos(kz - \omega t) \right) \quad -(2)$$

On comparing eq^n (1) and (2),

$$a_m = a_n$$

$$\therefore a_m - a_n = 0$$

05

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Department of Physics

Internal Examination-M.Sc-I-2023-24-SEM-II

Paper: Quantum Mechanics

Day & Date: Tuesday, 12 /03/ 2024

Attendance Sheet

Sr. No.	Name of the students	Roll. No.	Sign	Marks
1)	Dhiraj . P. Bhingardeve	1302		17
2)	Suyash S. Dongare	1305		13
3)	Anjali B. Kamble.	1308		16
4)	Devkule Nishigandha . H.	1304		11
5)	Vedaja Ajay Yadav	1313		15
6)	Mahek S. Jamadar	1306		18
7)	Akash B. Kavathek	1309		17

18.03.24

Teacher In Charge

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Vivekanand College, Kolhapur (Empowered Autonomous)

M.Sc. Part- I (Sem-II) Internal Examination: 2024

Course Code: DSE12PHY22

Condensed Matter Physics

Day: Wednesday
Date: 13-03-2024

Time: 12.00 PM – 01.00 PM
Marks: 20

Instructions:

1) All the questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.
4) Use of log table/calculator is allowed.

Q. 1) Select the correct alternative **(02 marks)**

1. The actual arrangement of the atom is described by the_____ .

a. Crystal structure b. Solid structure

c. Shell structure d. composite structure

2. All the atoms in perfect crystal are at specific.....

a. Atomic site b. Ionic site

c. Crystal site d. vacant -atomic site

Q. 2) Short answer question (any One out of two) **(12 marks)**

1. Define Brillouin zone for a lattice by considering simple cubic structure. How would you construct the first Brillouin zone for a fcc and bcc lattice.

2. Derive Bragg's law and explain its importance in X-ray diffraction. And , compare the X-ray, electron, and neutron diffraction methods.

Q. 3) Short answer question (any One out of two) **(6 marks)**

1. Explain the concept of reciprocal lattice.

2. Show that the atomic packing factor for fcc and hcp metals are the same.

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Centre	VCK.

16/20

प्र. क्र.
Q. No.

Q. 1.

1. The actual arrangement of the atom is described by the Crystal Structure

2. All the atomic imperfect crystal at Specific Ionic Site.

1

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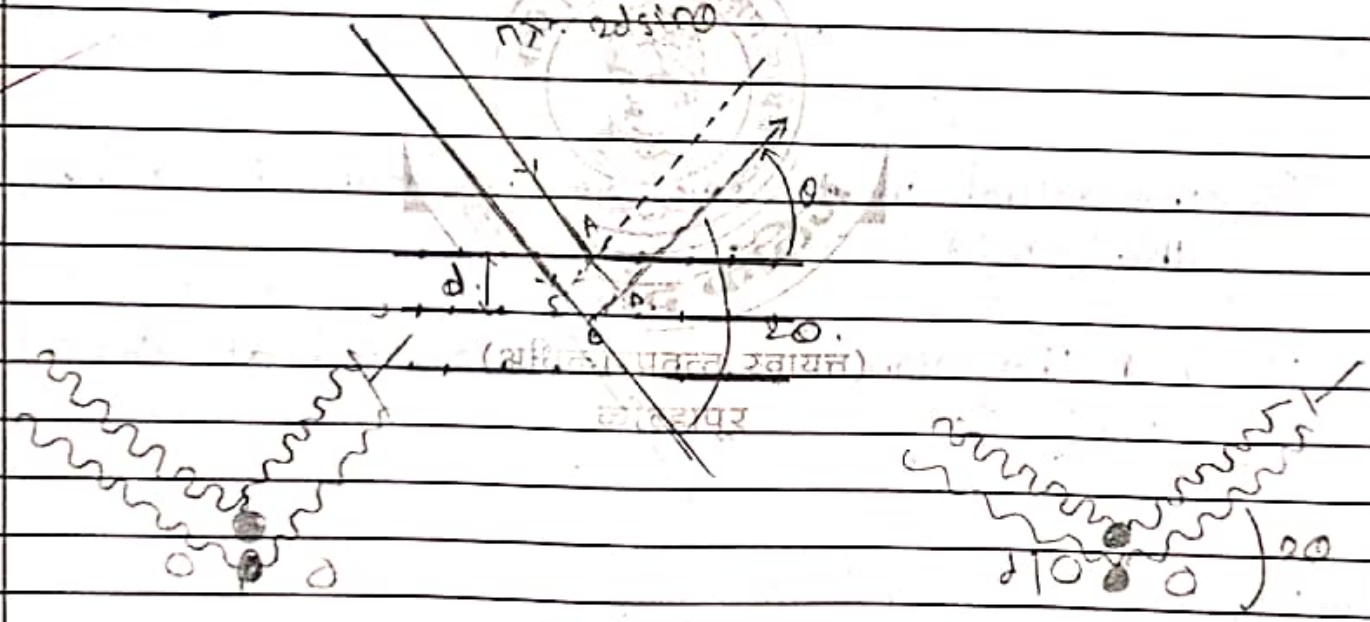
02 Section | Q. No. 02 | Marks 10

प्र. क्र.
Q. No.

Q 2.

2. Bragg's law :-

Consider a set of parallel planes called Bragg's plane. Then the intensity of reflected beam ~~will be~~ at a certain angle will be maximum. ~~When the light reflected light wave.~~ When the path difference between



Let
'd' be the path difference betn reflected planes
'λ' be the wavelength
'θ' be the glacing angle.

The path difference

$= CB + BD.$

$= d\sin\theta + d\sin\theta = 2d\sin\theta.$

'n' is the ~~number~~ order of scattering. This called Bragg's law.

~~Comparision of x~~

Comparision of X-ray, electron and neutron diffraction

Sr. no.	features	X-ray diffraction (XRD)	Electron diffraction (ED)	neutron diffraction (ND).
1.	Rayes used	X-ray	Electrons	Neutrons.
2.	Interaction mechanism.	Scattering by electron cloud	scattering by electrostatic Potential	Scattering by atomic nuclei and magnetic moments.
3.	Penetration depth	Moderate	low (Surface sensitive)	~~Moderate~~ High
4.	Sample thickness	few microns to millimeter	Nanometer	mitimeter to centimeter.

Section	Q. No.												
	Marks												

Sr. no.	features	X-ray diffraction (XRD)	electron diffraction (ED)	neutron diffraction (ND).
5)	Resolution	Moderate	High	Moderate.
6)	sensitivity for light detection	low (poor for light H, Be, Li)	High.	High (good for H, B, Li)
7)	environmental conditions.	required vacuum or controlled atmosphere	usually in vacuum, sensitive to contamination	worked in very extreme condition.
8)	structure	Atomic structure		Atomic position & magnetic
9)	Magnetic structure analysis	No	NO	yes.
10)	Application	Crystallography phase material, material characterisation	Nanomaterials thin film surface studies	Isotopes studies, magnetism studies & Hydrogen bonding

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प्र. क्र.
Q. No.

Importance of Bragg's law in xray diffraction.

Bragg's law is crucial for x-ray diffraction because it explains the construction conditions for interference of x-ray.

Material characterization. Bragg's law is used.

Bragg's law is used x-ray diffraction. fo

10

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Section | Q. No. 03 | Marks 05

प्र. क्र.
Q. No.

Q. 1. Concept of reciprocal lattice. :-

The reciprocal lattice is fundamental concept in crystallograpy and solid state physics that represent the periodicity of crystal in momentum space (Fourier space) rather than real space. It is mathematically derive from ~~real space~~ the direct lattice of a crystal and is crystal for direction pattern electron, bond structure and phonon dispersion diffusion.

Given a crystal lattice and within real space lattice vector a_1, a_2, a_3 the reciprocal lattice vectors b_1, b_2, b_3 are such that

$$a_j \cdot b_i = 2\pi \delta_{ij}$$

where δ_{ij} is the kronecker delta.
This condition. ensure that the reciprocal lattice is properly aligned with symmetry of the direct lattice.

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Construction of the reciprocal lattice,

The principle lattice basis vectors are given by

$$b_1 = \frac{2\pi (a_2 \times a_3)}{a_1 (a_2 \times a_3}$$

$$b_2 = \frac{2\pi (a_3 \times a_1)}{a_1 (a_2 \times a)}$$

$$b_3 = \frac{2\pi (a_1 \times a_2)}{a_1 (a_2 \times a_3)}$$

These equations ensure that the reciprocal lattice captures the periodicity of the wave vector in fourier space.

05

ESTD 1994

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16/20

प्र. क्र.
Q. No.

Q.1)

1) crystal structure.

2) Ionic site

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02 Section | Q. No. 02 | Marks 10

प्र. क्र.
Q. No.

Q.2)

Bragg's law:

Bragg's law is defined as diffraction of X-ray waves in a crystal structure in all direction in it's atomic planes.

$$n\lambda = 2d\sin\theta$$

Where n is a integer.
(n=1)

λ is a wavelength of crystal plane

d is a distance between wavelength of crystal planes w.r.t eachother

θ is a angle made to the incidence wave on a crystal plane.

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~~Explanation~~ Significance

In Bragg's law x-ray refraction of a crystal is measured. when a incident waves is applied to an crystal material the crystal get scattered and we get refraction waves of a crystal material. In this we measure the density of a material or thickness and atomic structure of an crystal material that's why Bragg's law is used to identify the crystal structure of an crystal material.

Crystal structure and atomic planes:

A crystal is ~~madeup~~ madeup of atoms which are situated at a parralel distance in interplanar system. the crystal is formed with this atoms & atomic planes.

X-ray diffraction:

when a x-ray is incident on a crystal material the incident beam of x-ray is scattered within a crystal material. the ~~inplan~~ interplanar planes and atomic planes. the diffracted rays get bomberded with a atoms and we get diffraction of a crystal material.

Section	Q. No.												
	Marks												

प्र. क्र.
Q. No.

Constructive interference

~~The~~ ~~d~~ in constructive interference the angle made up with a θ is need to interplanar with it's sides of a crystal material. it has need to be plane and integer to the atomic planes of crystal. integer angle made up with a planes are respetively

$$\Delta = n\lambda \quad \text{—} (1)$$

So using Bragg's law in this equation the equation will be

$$n\lambda = 2d\sin\theta$$

Using Bragg's law in X-ray diffraction it is easy to measure interplanar distance between the atomic planes. also it is easy to measure the wave length of a diffraction wave which is incident on a crystal material.

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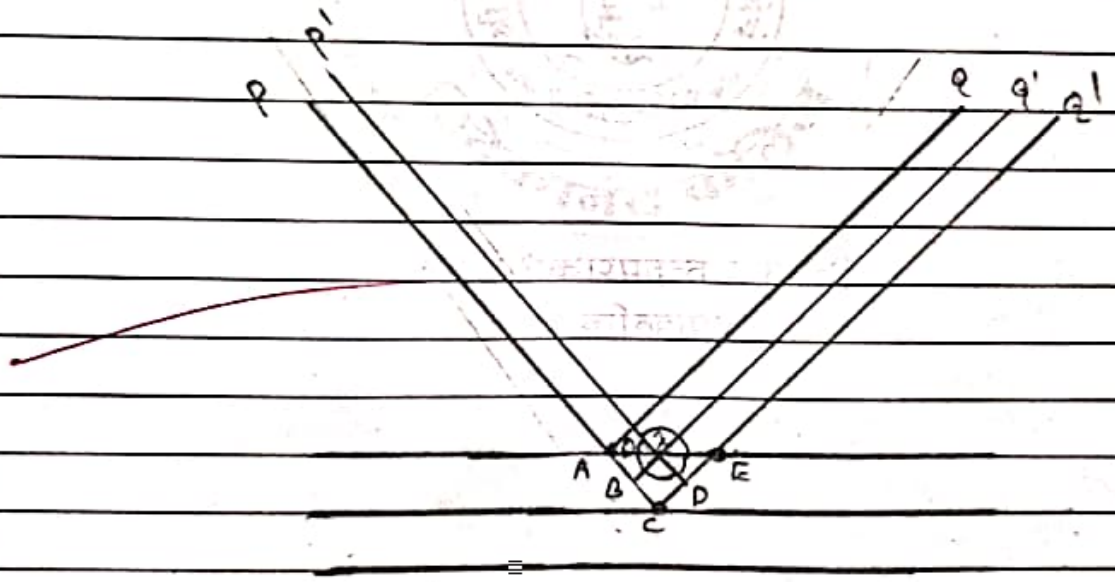

~~Fig:~~ X-ray diffraction

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Q. No.

Section | Q. No. | Marks

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Q. No.

Physical significance

in x-ray diffraction ~~of~~ the angle θ is made with a incident wave and λ is a wave length of a crystal plane.

mathematical analyis

using Bragg's law we can calculate the wave length of crystal material. so the wavelength of the ~~ex~~ crystal in x-ray diffraction is

x-ray wave ~~a~~length = ~~0.1~~ 0.1nm

λ · wave length = 0.2 nm

$\therefore \quad n\lambda = 2d\sin\theta$

For $n = 1$

ESTD JUNE 1984

Section	Q. No.													03
	Marks													

प्र. क्र.
Q. No.

$0.1 = 2 \times 0.2 \times \sin\theta$

$\sin\theta = \frac{0.1}{0.4} = 0.24\,nm$

$\theta = \sin^{-1} \approx \cancel{14.68}\ 14.50$

10

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कोल्हापूर

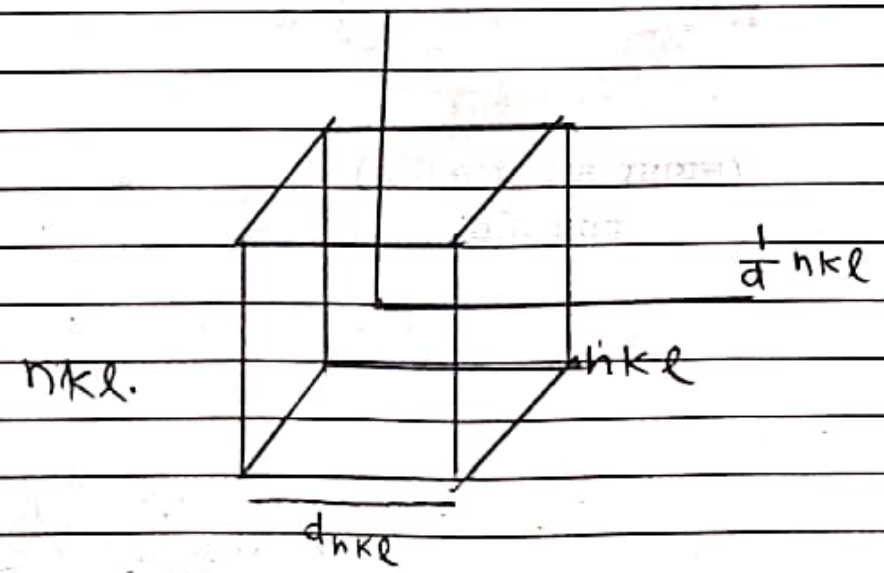
ESTD JUNE 1964

04	Section	Q. No.	03
		Marks	05

प्र. क्र.
Q. No.

Reciprocal lattice:

Reciprocal lattice is a Fundamental concept in crystallography Reciprocal lattice is a imaginary crystal lattice is used to measure diffraction of a crystal material or find out the thickness, material density, and atomic structure of an crystal structure.



in this the interplanar distance of a crystal to eachother is hkl to find out the interplanar distance the d_{hkl} is needs to be half of a crystal point.

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in reciprocal lattice to find out the structure of a crystal lattice is difficult because of their ~~dist~~ interplanar distane in space. to this problem the reciprocal lattice is used which is a imaginary lattice. using this method we can find out the thickness of a material and desity of a material plus the type of material which was used in it. In simple lattice to find the atomic planes of a crystal is diffi cult because of it's 2 dimesional nature. using reciprocal lattice ~~we in~~ we can find out the structure of a crystal material.

05

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Shri Swami Vivekanand Shikshan Sanstha's

Vivekanand College, Kolhapur (Empowered Autonomous)

Department of Physics

Internal Examination-M. Sc-I-2023-24-SEM-II

Paper: Condensed Matter Physics

Day & Date: Wednesday, 13 /03/ 2024

Attendance Sheet

Sr. No.	Name of the students	Roll. No.	Sign	
1)	Dhiraj . P. Bhingardeve	1302		12
2)	Suyash S. Dongare	1305		10
3)	Anjali B. Kamble	1308		14
4)	Vedaja A. Yadav	1313		20
5)	Mahek . S. Jamadar	13047		16
6)	Gouri B. Garade	1306		18
7)	Kavathekar Akash B.	1309		18

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Vivekanand College, Kolhapur (Empowered Autonomous)

M.Sc. Part- I (Sem-II) Internal Examination: 2024

Course Code: DSE12PHY21

SOLID STATE PHYSICS II

(Semiconductor Physics)

Day: Thursday | Time: 12-1 pm

Date: 14/03/2024 | Marks: 20

Instructions:

1) All the questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagrams wherever necessary.
4) Use of log table/calculator is allowed.

Q. 1) Select the correct alternative. **(02 marks)**

1. Solar cell works on the principle of _____.

   a. Thomson effect b. Photovoltaic effect

   c. Seebeck effect d. None of the above

2. In photoconductor when light absorb by semiconductor the number of free electron and holes _____, then electrical conductivity is _____.

   a. Decreases, Increases b. Increases, Decreases

   c. Increases, Increases d. None of the above

Q. 2) Short answer question (any one out of two). **(12 marks)**

1. What is meant by LED? Explain their types.
2. Discuss the principle, construction, and working of a photodetector.

Q. 3) Short answer question (any one out of two). **(6 marks)**

3. Explain the principle, construction, and working of a solar cell.
4. Write a note on Photonic devices.

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॥ ज्ञान, विज्ञान आणि सुंसस्कार यासाठी शिक्षण प्रसार ॥

- शिक्षणमहर्षी डॉ. बापूजी साळुंखे

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1. Solar Cell works on the principle of photovoltaic effect.

2. In photoconductor when light abort by Semiconductor the Number of free electron & holes Increases then eletrical Conductivity is Increases.

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2 Section | Q. No. 02 | Marks 09

प्र. क्र.
Q. No.

Q. 2

1. What is meant by LED? Explain their types.

→ LED Stand by Light emitted Diod. It is a Semiconductor Device when that emits light when an eletric Current passes through It LED are Widely used in lighting, Display Screen and electronic Devices Due to their energy efficiency, long lifespan & low power Consumption.

There are Some Type's of LED.

1. Through - Hole LED :-
These have two long leads & mounted on Circuit board by inserting the lead into the Holes.
These available in different Shape like Sq Circular, Rectangal. & Standed is 5mm & 3mm.

2. Surface - Mounted LED (SMD) -
Small & Compact Mounted Directly on the Surface on Circuit Board
Used In LED T.V, Mobile phone.

प्र. क्र.
Q. No.

3. High - power LED's
Designed to emitted a large amount of light used in
- Used in Street light & Flashlight

4. R.G.B LED
R.G.B LED Can produce Multiple Color by Combination red, green and blue light,
Used in Decorative lighting Stage lighting

5. Infrared LED (IR LED)
- Emit infrared light that is in invisible to human eye.
- Infrared LED used in remote Control & Night Vision Camera,

6. Ultraviolet LED (UV LED's)
- Emit Ultraviolet LED is Used for Sterilization & Counterfeit detection.

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Section	Q. No.												
	Marks												

प्र. क्र.
Q. No.

7) Organic LED (OLED)

Use Organic Compounds that emit light when current applied. the Organic LED Made by Organic Components. It is Used for flexibleity Display / Smartphone & television.

Organic LED Device Due to their superior Image quality flixibility & energy efficiancy

LED is Most Usefull and low power Consumption Device.

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- शिक्षणमहर्षी डॉ. बापूजी साळुंखे

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1. Explain the principle Construction and Working of a Solar Cell

→ The Working of Solar cell is Based on the photovoltais effect. when light fall on Semiconductor Device Material, it exist electron's to Creating electron hole's pairs these Charge Carriers are Separated by an internal electric field, generated. Direct Current across the terminals

Construction of Solar Cell.

A Solar Cell is typicall made of Silicon and Consists of following layer

1. Trasparant Glass Cover.

Protect the Cell environmental Damage

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04 Section

2 Section | Q. No. | Marks

प्र. क्र.
Q. No.

And Allow Sunlight to pass through with Minimal reflection

2 Anti - Reflective Coating
Reduce the loss of light Due to reflection.

3. Top Contact - ~~Collects~~
Collects and trasmitts the generated Current.

4. P-N Junction Semiconductor layer
Made of silicon, where the actual photovoltaic Conversion occures.
N type layer is placed above the p-type of layer.

5 Back Contact -
Acts as the Second electrode to Complete the Circuit.

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Section	Q. No.	03											03
	Marks	05											

प्र. क्र.
Q. No.

Work

1) absorption of Sunlight
absorp the Sunlight for Converting in Charge Carrier.

2) Generation of electron Hole pair
the falling Sunlight Creat Charge Carrier and ~~for~~ Charge Carrier Creat the electron Hole pair.

3) Charge Separation by the eletric field.
Separat the Charge and Creat the field of eletron

(अधिकारपदच्या स्वायत्त)

4) Current flow कोन्नापर flow the Current.

5) power Utilization.

05

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16/20

प्र. क्र.
Q. No.

Q. 1.

1. Solar cell works on the principle of Photovoltaic effect

2. In photoconductor when light absorbs by semiconductor the number of free electrons and holes increases then electrical conductivity is increases.

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Section | Q. No. | Marks

प्र. क्र.
Q. No.

2.

1.. LED :-

LED stands for light emitting diode. It is semiconductor device it emits energy into light energy when electrical current passes through it. LED is used in various applications like traffic light, billboards.

- How its works :-

When an electric current passes through the semiconductor it emits energy into the light energy. the electrons recombines with holes & release light energy.

- LED are more efficient than the incodensent light.
- The color of the LED is depends on energy required to the electrons to cross the band gap in semiconductor.

* Applications :-

- LEDs are used in the traffic lights, bill boards & lights.

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There are Three types of LEDs.
1) Visible LEDs
2) organic LEDs
3) Infrared LED's.

Visible LED's :-

It is a semiconductor device that emits light in visible spectrum, when electric current passed through it. It has more efficiency, it produce more light in less power.

- How it works :-

When an electric current passed through the PN Junction the electrons & holes get recombined & release energy in the form of light energy.
It is a semiconductor device that have wavelength which visible to human eyes, which is known as visible spectrum.

- The color of LED is depends on the semiconductor material which is used in the semiconductor device.

Applications :-
Visible LEDs are used it lights, electronics devices, biomaterials and medical devices.

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4 Section | Q. No. | Marks

प्र. क्र.
Q. No.

2) Organic LEDs.

It is ~~device~~ a semiconductor devices in which organic compounds are used to emit lights when electric current passed through it.

How it works :-

When an electric current is passed through the semiconductor device, the eletrons & holes are ijected in organic compound. recombines & release the energy into light energy. the organic compounds are used in devices ~~Also~~ are polymer & small.

Advantages :-

Thin & flexible :-

OLED's are thin & flexible.

Varient & color contrast :-

It has varient color & color contrast to see the picture properlly.

Self emitting :-

In this LED's are selfemitting meaning each pixel acts on & off independantly.

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Centre	VCK.

प्र. क्र.
Q. No.

Q. 2.

1) Applications of OLED's.
OLED's are used in the lighting devices. lights :- Smart TV, tablets, smart phones.

3) Infrared LEDs :
It is a semiconductor device that emit lights which is invisible to human eyes.

How it works :-
When electric current passed through the semiconductor device it converts energy into the light energy.
The device long wavelength in night 850nm and other time 940 nm.

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Marks	
Q. No.	02
Marks	10

Applications :-
Infrared light emitting diodes are used in the alarm, cameras, & medical devices.

Photonic devices :-
Photonic devices when the components regenerate which is the science of optical wave. It is used in the solar cell, Laser, various applications are used in photonic devices. it manipulate the component & generate electronics of the electrons.
Photonic devices component generte current passing through light waves are created. photonic devices are used various state of devices.
Examples :-

1) Lasers :- LED, ~~light~~, Laser diode, Static diode

2) Detectors :- Photonic devices are used light in waves

3) wave guides :- wave guides are counterparts of guide.

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Section	Q. No.	03												03
	Marks	04												

प्र. क्र.
Q. No.

Modulates :-

Applications :-

1) Photonic devices are used in bulgers alarm.
2) Photonic devices are used in logic ~~ce~~ circuit.

04

(अधिकारप्राप्त स्वायत्त)
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Department of Physics

Internal Examination-M.Sc-I-2023-24-SEM-II

Paper: Solid State Physics II

Day & Date: Thursday, 14/03/ 2024

Attendance Sheet

Sr. No.	Name of the students	Roll. No.	Sign	
1	Suyash Sanjay Dongare	1305		13
2)	Dhiraj .P. Bhingardeve	1302		14
3)	Mahek S. Jamadar	1307		18
4)	Vedaja A. Yadav	1313		16
5)	Anjali B. Kamble.	1308		14
6)	Kanathekar Akash	1309		14
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