09 / 10

shivneri Mahavidhyalaya shirur
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व्यक्तीमत्त्वाचा अर्थ सांगुन व्यक्तिमत्वाची वैशिष्ट्ये स्पष्ट करा?

'व्यक्तिमत्व' हा एक विशेष परिचित शब्द आहे व्यवहारात आणि विज्ञानात या शब्दाचा बऱ्याच वेळेला उपयोग केला जातो. व्यक्तिमत्व या शब्दाचा व्यवहारीक अर्थ व्यक्तीच्या बाह्य स्वरूपाशी निगडित असतो. एखादी व्यक्ती अधिक सुंदर, आकर्षक व प्रभावी दिसत असेल तर तिचे व्यक्तिमत्व चांगले आहे असे सामान्यत: सांगितले जाते. याचा अर्थ दैनदिन व्यवहारामध्ये व्यक्तिच्या शारीरिक रचनेवरुन 'व्यक्तिमत्व' हा शब्द उपयोगात आणला जातो. समाजशास्त्रीय दृष्ट्या व्यक्तिमत्व या शब्दाचा मर्यादित व संकुचित अर्थ आहे. प्रत्येक व्यक्तीनुसार व्यक्तित्वामध्ये भिन्नता दिसु शकते. समाजातल्या अनेक सामाजिक घटकांचा संपर्क, सहवास व संस्कारामुळे व्यक्तीचे व्यक्तिमत्व विकसित आहे व्यक्तिमत्त्वाचा समग्र विकास अभ्यासताना व्यक्तिमत्व ही संकल्पना विचारात घ्यावी लागते.

व्यक्तिमत्वाची वैशिष्ट्ये :—

① व्यक्तिमत्वाचा शरीर संरचनेशी संबंध नसतो :—

व्यक्तिमत्वाचा शरीर संरचनेशी कोणताही संबंध नसतो कारण प्रत्येक प्रत्येक व्यक्तिच्या शरीराची ठेवण ही वेगवेगळी असते. व्यक्तिची शरीरकाठी ही ठेंगणी (बुटकी), उंच, सडपातळ ~~ल~~ लठ्ठ असू शकते त्याचप्रमाणे शरीराचा रंग चेहऱ्याची ठेवण ही सुद्धा वेगवेगळी असते.

② व्यक्तिमत्व हे पूर्णपणे संस्कृतीप्रमाणे घडत असते :—

प्रत्येक व्यक्ती हा एक विशिष्ट संस्कृतीमध्ये जन्माला येतो कुटुंबावर ज्या संस्कृतीचा प्रभाव असेल ती संस्कृती बालकाला प्राप्त होते त्याचप्रमाणे तो संस्कृतीतील मुल्य, प्रमाणके, रूढी, प्रथा, रितीरिवाज आत्मसात करीत असतो. इतकेच नाही तर मानसिक विचलित व्यक्तीमध्ये सुद्धा ही तत्वे कार्यरत असते.

तो ज्या समुदायात जन्माला येतो त्याचा प्रभाव त्या व्यक्तीवर पडत असतो उदा. आदिवासी, भटके, ग्रामीण, शहरी, मेट्रोपोलेटियन रॉजर या मानसशास्त्राज्ञाने जी संस्कृती व्यक्ती आत्मसात करतो त्यातुन निर्माण झालेल्या अनुभवांना प्रतिकात्मक रुप देतो.

व्यक्तिमत्वाच्या व्याख्या :—

नॉर्मलमन :—

" व्यक्तिमत्व म्हणजे व्यक्तिची-शारीरिक रचना, वर्तनविशेष, अभिरुची, अभिवृत्ती तसेच क्षमता आणि योग्यता या सर्वांचे वैशिष्ट्य-पुर्ण एकीकरण होय. "

किंबाल यंग :—

" व्यक्तिमत्वाला दोन पैलू असतात ज्यात बाह्य व अंतर्गत बाह्य पैलूमध्ये व्यक्तिची भूमिका व स्थान व्यक्तिच्या सवयी वर्तन व्यवहार दुसऱ्या व्यक्तिशी होत असलेले आदान प्रदान यांचा समावेश होतो तर अंतर्गत पैलूमध्ये व्यक्तीच्या अभिवृत्ती प्रेरणा व दृष्टीकोण इत्यादींचा समावेश होतो. "

Vedha
Zero to Zenith...

Date :
Topic : Page :

व्यक्तिमत्त्वाचा अर्थ :—

व्यक्तिमत्व या शब्दासाठी इंग्रजीमध्ये 'personality' असा शब्द वापरला जातो 'personality' हा शब्द लॅटिन भाषेतील 'persona' या शब्दापासुन बनला आहे याचा अर्थ 'मुखवटा' होय या वरुन नाटकातील विविध पत्रांचा स्वभाव लक्षात येतो. नंतरच्या काळात हा शब्द मानवी स्वभावासाठी उपयोगिला जावू लागला.

व्यक्तीने आपल्या अस्तित्वाचे निर्माण केलेले आणि टिकवुन ठेवलेले वेगळेपण म्हणजे व्यक्तिमत्व होय समाजशास्त्राच्या दृष्टीने व्यक्तिमत्व ही एक व्यापक संकल्पना आहे व्यक्तीचे शारीरिक सौंदर्य, शारीरिक ठेवण, स्वभाव वैशिष्ट्ये, सवयी प्रेरणा, क्षमता, धारणा, अभिवृत्ती, अभिरुची दृष्टीकोन, विचारसरणी, सामाजिक वर्तनशैली इत्यादी अनेक गोष्टींचा 'व्यक्तिमत्व' संकल्पनेत समावेश होतो.

काळामध्ये, कोणती परिस्थिती उद्भवते त्यावर त्याचे वर्तन हे ठरत असते त्यामुळे ते, वर्तन चुकीचे ठरू शकते, किंवा बरोबर ही असू शकते पण ते नेहमीसाठी ते चुकिचे ठरू शकत नाही.

उदा. प्रामाणिक खरे बोलणाऱ्या माणसाच्या घरी चोर आले आणि त्यांनी पैशाची मागणी केली तर हा व्यक्ती खोटे बोलणार पण ते चुकिचे वर्तन नाही.

⑧ काही व्यक्ती संस्कृतीतील घटकांना स्विकारत नाहीत :—

काही व्यक्ती संस्कृती प्रमाणेच वर्तन करत असे नाही कारण ती व्यक्ती संस्कृतीतील चांगल्या किंवा वाईट यावर चिंतन करेल आणि ते बरोबर आहे किंवा नाही हे बघेल आणि त्याप्रमाणे आपला दृष्टीकोन बनवेल अशा व्यक्तीवर संस्कृतीचा कोणताच प्रभाव होत नाही.

⑤ प्रत्येक व्यक्तीचे व्यक्तिमत्व अद्वितीय असते :—

प्रत्येक व्यक्तीचे व्यक्तिमत्व हे अद्वितीय असते त्याची तुलना दुसऱ्याच्या व्यक्तिमत्वाशी करता येत नाही कारण त्याचे व्यक्तिमत्व हे त्या त्या संस्कृतीप्रमाणे घडलेले असते बोलण्याची पद्धती, विचार करण्याची पद्धती, वागण्याची पद्धती वेगवेगळी असते.

⑥ प्रत्येक व्यक्तीचे व्यक्तिमत्व हे अविभाज्य असते :—

संस्कृतीच्या माध्यमातून व्यक्तीचे व्यक्तिमत्व तयार होत असते त्या व्यक्तिमत्वाला बदलवता येत नाही म्हणजेच त्याचे व्यक्तिमत्व कमी किंवा जास्त करता येत नाही कारण त्याने ज्या ज्या गोष्टी प्राप्त केलेल्या आहेत त्या त्याच्या व्यक्तीमत्वाच्या अविभाज्य घटक बनतात ते बदलवता येत नाही

उदा :— एखादा व्यक्ती जर प्रामाणिक असेल तर तो कशीही चोरी करणार नाही. चिड-खोर, संवेदनशिल, दृढविश्वास इ.

⑦ व्यक्तिमत्व चांगले किंवा वाईट नसते :—

व्यक्तीचे वर्तन हे परिस्थिती सापेक्ष असते कारण त्या व्यक्तीवर त्या

③ प्रत्येक व्यक्तीमध्ये काही विशेष गुण असतात :—

प्रत्येक व्यक्तीमध्ये काही विशेष गुण असतात जे दुसऱ्यामध्ये नसते उदा. साहस चिकाटी, कार्यदक्षता, कर्तव्यनिष्ठा, उत्साह, आत्म-विश्वास, चपळपणा, दृढविश्वास, विनयशिलता प्रेमळपणा, करूणा, निस्वार्थवृत्ती, विशिष्ट कला गुण, उद्योगी, सारासार विचार करून निर्णय घेणारा कल्पक, शीघ्रकोपी इ.

④ व्यक्ती संस्कृतीप्रमाणेच व्यवहार करतो :—

संस्कृती हा प्रत्येक समाजाचा अविभाज्य भाग आहे संस्कृतीमध्ये घटक तत्वे व्यक्ती आत्मसात करत असतो ही तत्वे म्हणजेच प्रथा, परंपरा, रिती रिवाज, संकेत, खाणपाण राहणीमान इ. त्याचप्रमाणे तो समाजामध्ये व्यवहार करत असतो. आगबर्न या समाज-शास्त्राने आपल्या संशोधनातून असे सिद्ध केले की काही व्यक्तींना वेळेचे महत्व असते काहींना मात्र त्याचे महत्व वाटत नाही हे सर्व संस्कृतीमधून निर्माण होते.

उदा :— भारतीय माणसाला वेळेचे ~~म्ह~~ महत्त्व वाटत नाही.

Zero to Zenith...

Date : Page :

Topic :

⑨ व्यक्तिमत्वावर, सामाजिक आंतरक्रियेचा मोठा प्रभाव असतो :-

व्यक्ती समाजात जीवन जगत असताना, एकमेकांशी आंतरक्रिया करत असतो या आंतरक्रियेचे रूपांतर प्रक्रियेमध्ये होते त्यातुन, व्यक्ती एकमेकांच्या मनामध्ये प्रवेश करतो या आंतरक्रियेचा प्रभाव व्यक्तीच्या व्यक्तीमत्वावर पडत असतो चांगले, वाईट, चूक, बरोबर, दुर्गुण सद्गुण तसेच विविध। व्यक्तिची खरी ओळख आंतरक्रियेतुन होत असते म्हणुन आंतरक्रियेचा व्यक्तिमत्वावर मोठा प्रभाव पडतो.

09 गुण

2019-20

09/10

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Q.1] What is width and intensity of spectral lines explain factor affecting on it!

width of spectral lines:-

- Real Spectral lines are broadened because:
  - Energy levels are not infinitely sharp.
  - Atoms are moving relative to observer
- 3 mechanisms determine profile φ(v)
  - Quantum mechanical uncertanity in the energy E of levels with finite lifetimes → the natural width of a line (generally very small).
  - collisional broadening collisions reduce the effective lifetime of a state leading to broad-er lines. High pressure → more collisions (eg. stars)
  - Doppler or thermal broadening, due to the thermal (or large-scale turbulent) motion of individual atoms in the gas relative to the observer.

Intensity of spectral line: A spectral line is a dark or bright line in an other-wise uniform and continuous spectrum, resulting from a deficiency or excess of photons in a narrow frequency rang compared with the nearby frequencies. Spectra lines have a position and a height

The position of lines has been desc as the separation of energy levels. height of spectral line is describe by intensity of spectral lines.

Factors affecting on width and inten of spectral lines:

- The higher the temperature of the the wider the distribution of velociti in the gas. Since the spectral lines a combination of all of the emitted radiation, the higher the temperatu of the gas, the broader the spectr line emitted from the gas.
- While discussing spectral intensities t are three main factors to be considere

1] Transition probability: System in a one state changing to another state

2] Population the number of atoms or molecules initially in the state from which the transition occurs.

3] The concentration or path length of sample. The amount of material givi rise to spectrum.

Q.2] Explain the isotopic effect on the spectra of diatomic rigid rotator.

A diatomic molecule rotating about an axis passing through the centre of gravity is an example of rigid rotator as shown in the figure.

Two atoms A and B of masses m_1 and m_2 are joined by a rigi of length r_0.

where, K is force constant and μ is the reduced mass of the system. The equation ① in terms of cm^{-1} may be written as,

$$\bar{\omega} = \frac{1}{2\pi c}\sqrt{K/\mu}\ cm^{-1} \longrightarrow ②$$

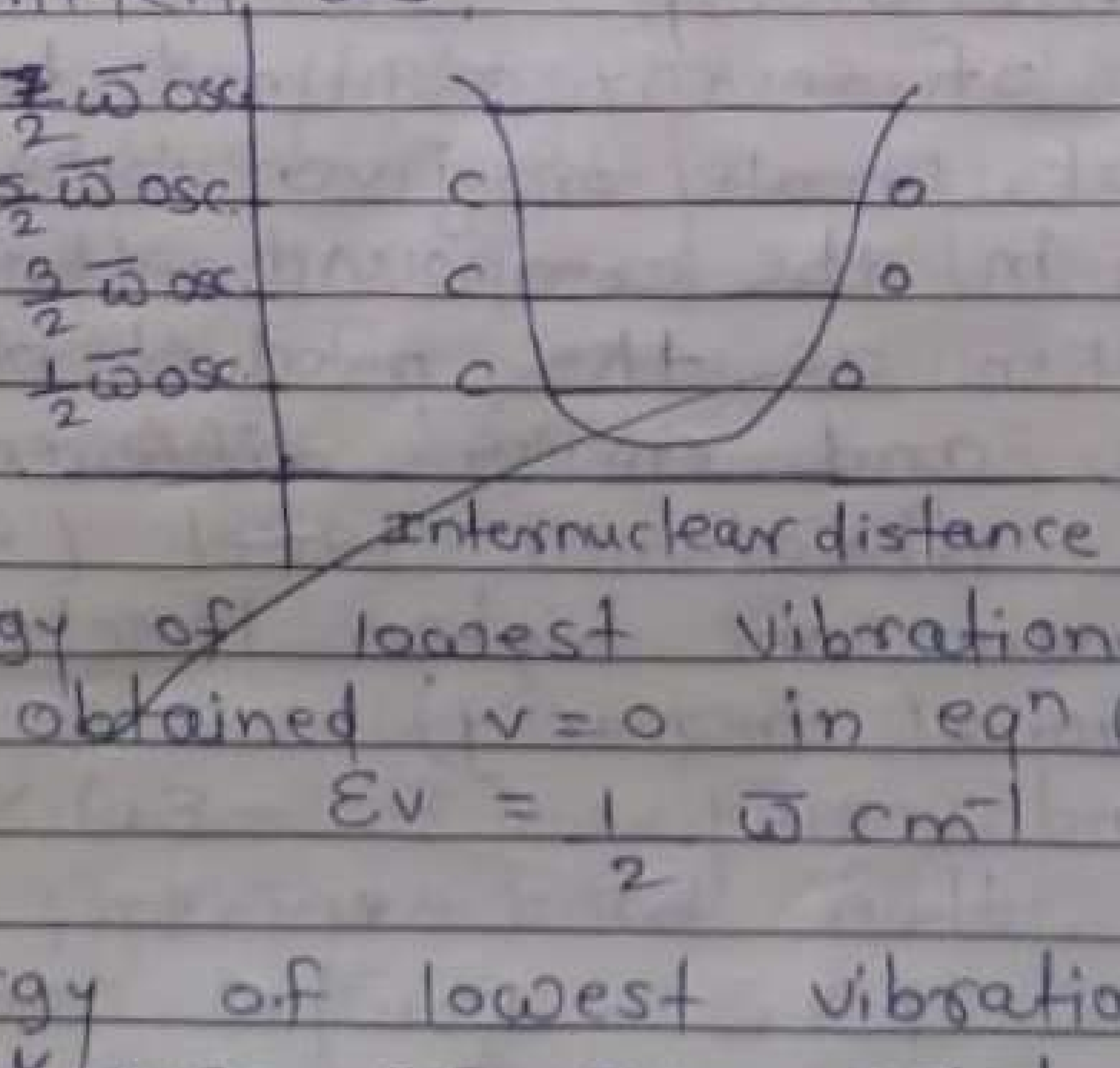
on solving the schrodinger's wave equation for simple harmonic oscillator, the various quantised vibrational energy levels are given by the expression,

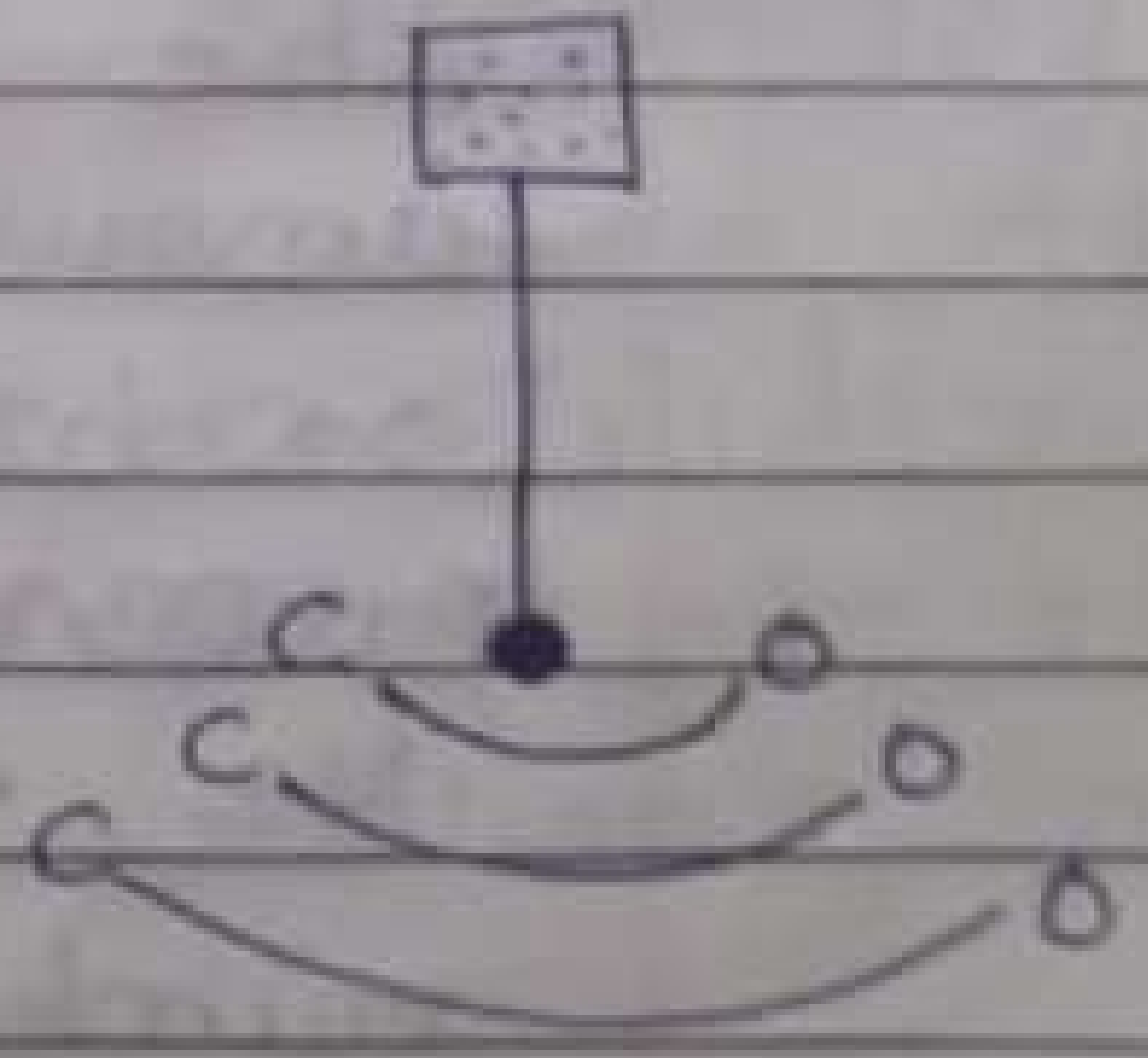
$$E_v = \left[v + \frac{1}{2}\right] h\omega \text{ Joules} \longrightarrow ③$$

where, v = 0, 1, 2, ------ is called the vibrational quantum number. Equation ③ in terms of cm^{-1} may be written as,

$$\varepsilon_v = \frac{E_v}{hc} = \left[v + \frac{1}{2}\right] \bar{\omega}\ cm^{-1} \longrightarrow ④$$

Allowed energy level from eqⁿ ④ may be written as,

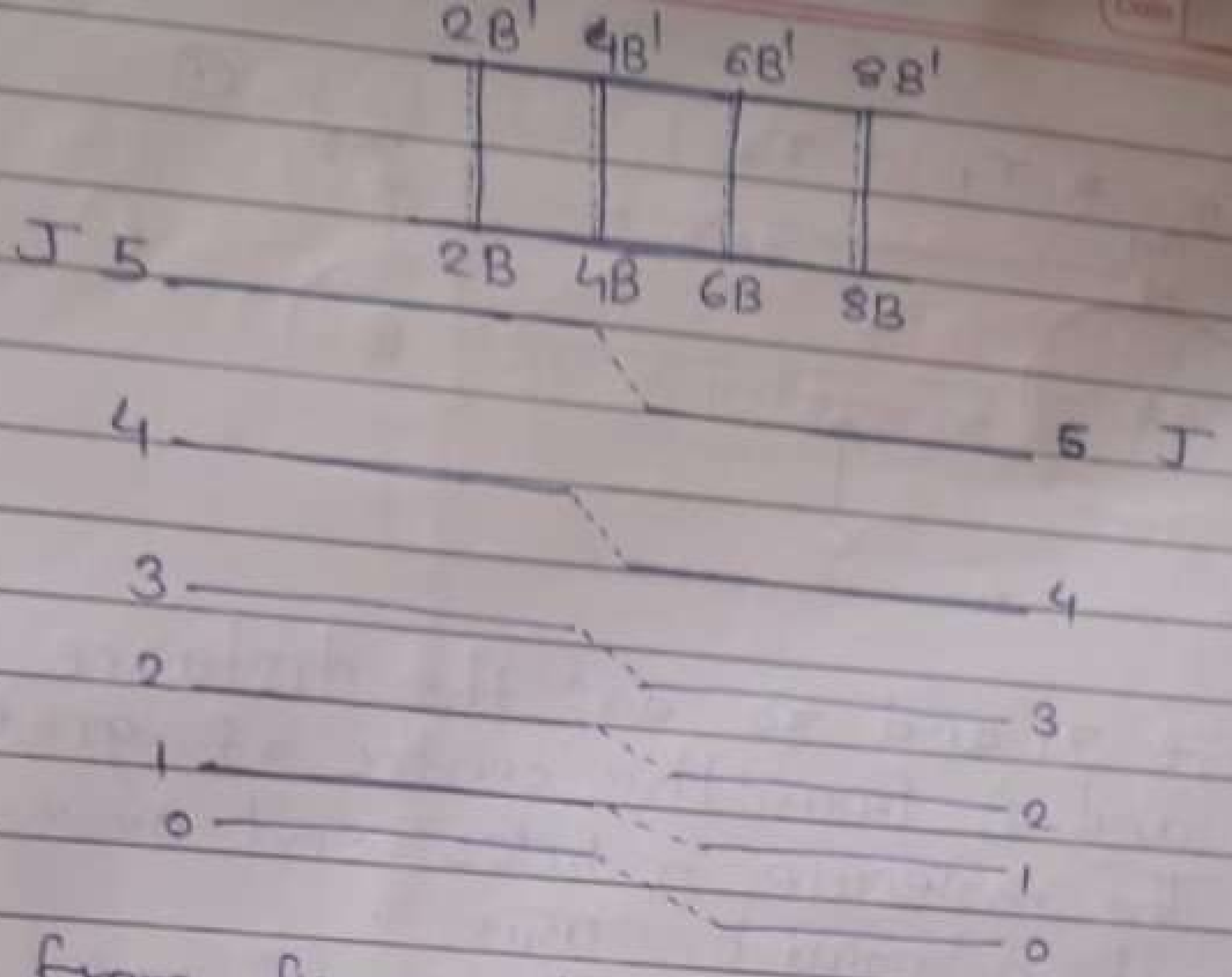




Energy of lowest vibrational energy may be obtained v = 0 in eqⁿ ④.

$$\varepsilon_v = \frac{1}{2}\bar{\omega}\ cm^{-1}$$

Energy of lowest vibrational energy ε_0 is known as zero point energy. The significant of zero point energy is that diatomic molecule can never have zer vibrational energy i.e. atom never be



from figure, it is evident that there is relative lowering of energy levels with isotopic substitution and the spectrum of heavier species c13 shows smaller seperation between the lines 2B' than that of lighter line 2B.

From the decreased seperation the atomic weight of an isotope can be determined presizely.

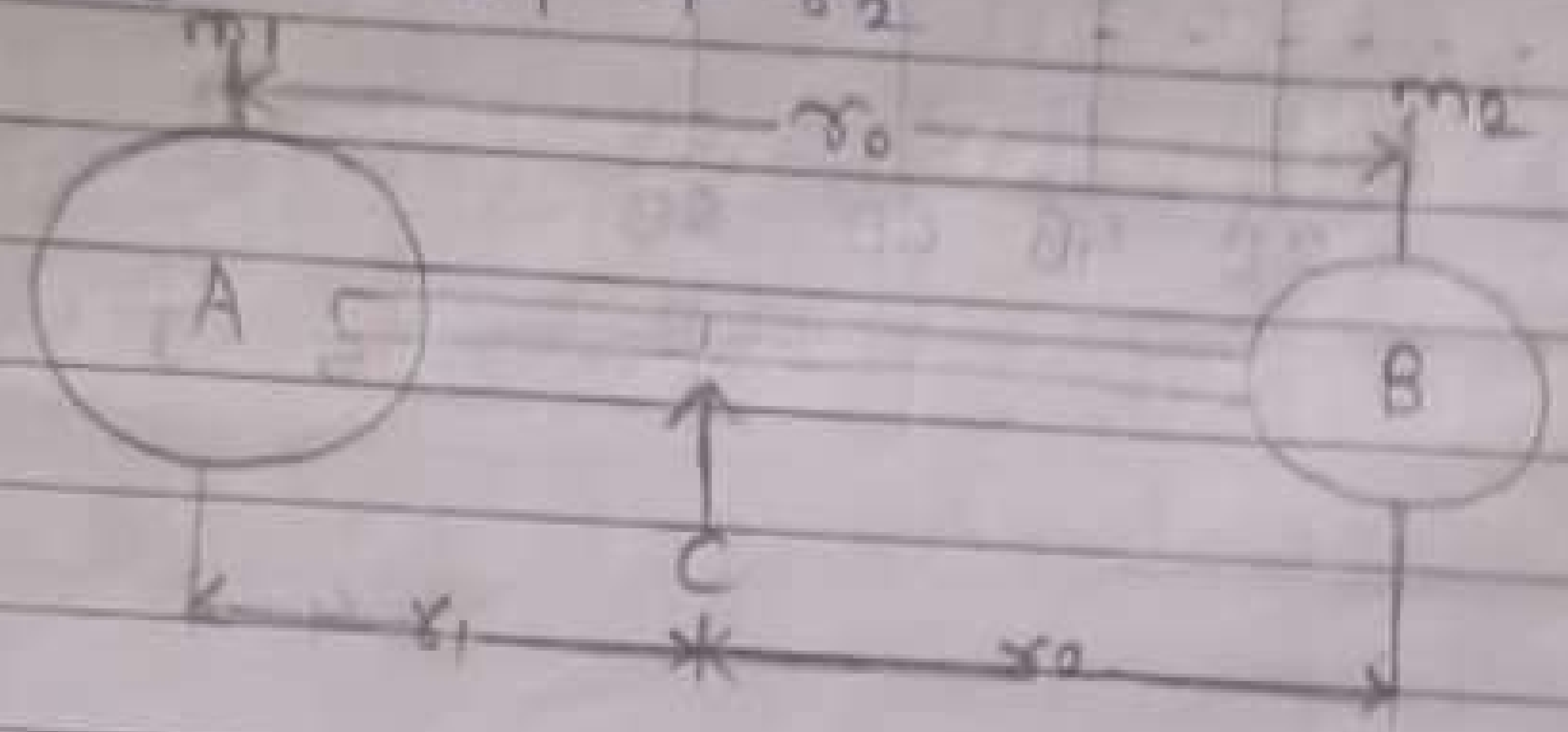
Q.3] Explain in brief simple harmonic oscillator give selection rule and explain qualitative relation between force constant (K) and bond energies?

Simple harmonic oscillator :-

A diatomic molecule with atomic masses m_1 and m_2 joined by a chemical bond vibrates as a simple harmonic oscillator. An elastic chemical bond like a spring has a certain vibration frequency depending upon the mass of the system and the force constant. It is given as,

$$\omega = \frac{1}{2\pi}\sqrt{K/\mu}\ Hz \longrightarrow ①$$

$r_0 = r_1 + r_2$ ①



where r_1 and r_2 are the distance of atom A and B from the centre of gravity. The molecule rotates end-over-end about a point C. Thus,

$$m_1 r_1 = m_2 r_2$$

Effect of isotopic substitution on rotational spectra :-

The isotope is the atoms of same elements with different mass number. When particular atom in a molecule is replace by isotope then there is no appreciable change in bond length. However total mass of molecule hence it's moment of inertia and rotational constant changes

e.g - on going from c^{12} to c^{13} there is increase in mass, therefore moment of inertia increases and hense rotational constant decreases.

i.e. - $B > B'$

where B' is rotational constant for $c^{13}o$. This change will be reflected in the rotational energy level and spectral lines of carbon monoxide ($c^{12}o$ and $c^{13}o$) As shown in following figure completely at rest relative to each ot

selection rule : The selection rule the allowed transitions between diffe energy levels. for simple harmonic llator, the energy levels are equaidis Thus, the energy for transition from first to second level or from seco to third level is same and is identic to that of transitions ~~that~~ from ene level zero to first. Therefore the o transitions that can takes place are those in which vibrational quantum nu changes by unity. i.e.- the selection r for simple harmonic oscillator is,

$$\Delta v = \pm 1 \longrightarrow ⑥$$

⇒ **Qualitative relation between force constant and bond energy.**

The bond energy is defined as the avera amount of energy required to dissociat or break 1mole of given type of bond present in the compound, thus it may be taken as the product of avagadro numbez and energy difference betn lowest vibrational level ($v = 0$) and maximum or higher level (i.e- vibrational frequency)

∴ Bond energy $= (\varepsilon_v - \varepsilon_0) \times N$.

if $v = 1$, then bond energy,

$$B.E = \left(\frac{3}{2}\bar{\omega} - \frac{1}{2}\bar{\omega}\right)N$$

$$B.E = \bar{\omega} N$$

But we know that

$$\bar{\omega} = \frac{1}{2\pi c}\sqrt{\frac{K}{\mu}}$$

$$B.E. = \frac{1}{2\pi c}\sqrt{\frac{K}{\mu}} \times N.$$

In above equation, 'c' - velocity of light
μ - reduced mass, N - avagadrog's no.
R - constant.

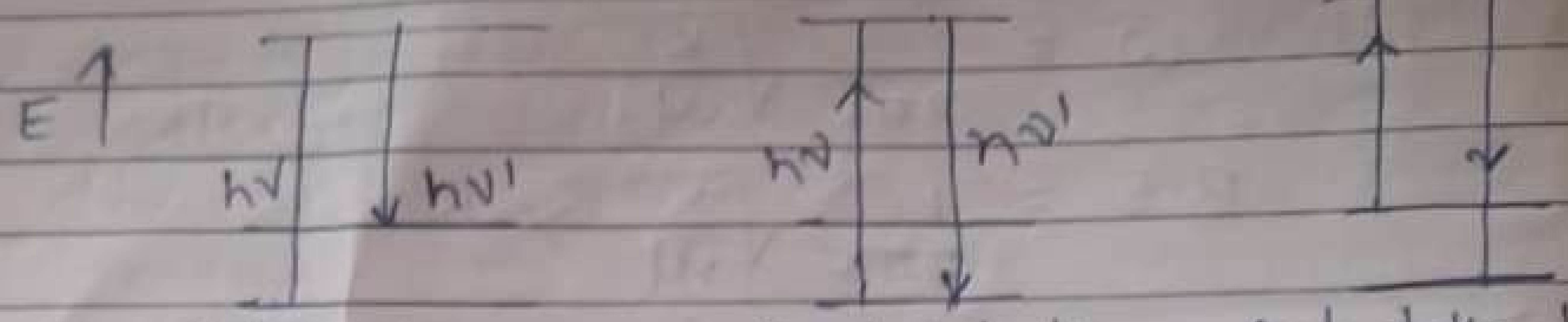
$$\therefore B.E. \propto \sqrt{K}$$

Thus bond energy is directly proportional to square root of force constant.

Q.4] What is **Raman** effect **and** explain, classi-cal and quantum theory of Raman effect?

The Raman spectroscopy is the scattering type of spectroscopy. In 1928 Sir C.V. Raman discovered that when a beam of monochromatic light is allocoeded to pass through a substance then the scattered light contain some additional frequencies over and above that of incident frequency. This is known as Raman's effect.

The lines whose wavelength have been modified in Raman effect are called as Raman line. The lines having longer wavelength (lower frequency) than that of the incident light are called as stock light and those having shorter wavelength (higher frequency) are called anti-stock line



stoke lines	Rayleigh lines	Antistoke-line
$\nu > \nu'$	$\nu = \nu'$	$\nu < \nu'$
$\Delta\nu > 0$	$\Delta = 0$	$\Delta\nu < 0$
$\Delta\nu = +ve$		$\Delta\nu = -ve$
Decrease in frequency Increase in wavelength	No change in ν and λ	Increase in frequency decrease in wave length

If 'ν_i' is the frequency of incident light and 'ν_s' is frequency of scattered light then raman shift $\Delta\nu$. "$\Delta\nu = \nu_i - \nu_s$" is known as raman shift. For stock light raman shift is +ve and for anti-stock light raman shift is -ve. The Raman shift does not depend upon the frequency of incident light but it is a characteristics of substance - causing effect.

concept of polarizibility classical theory of Raman effect:

The classical theory of Raman effect was developed by Scientiest G. placzek in 1934. It is known from electrostatic that molecule is distarted in applied electric field i.e. - the electrons are attracted to the +ve pole while nuclei to the -ve whole. Induced dipole moment is thus produced in the molecule due to the displacement of el⁻s & nuclei this is analogous to Rayleigh line.

(ii) If $E_p > E_q$, $\Delta \nu$ is +ve and $\nu' > \nu$. This refer to antistock light.

(iii) If $E_p < E_q$ then $\Delta \nu$ is -ve and $\nu' < \nu$ this correspond to stock lines.

As the change in energy of molecule is governed by quantum rules then we can write, $E_p - E_q = \pm nh\nu_c$ where $n = 1, 2, 3$ etc and ν_c - is a characteristic frequency of molecule. If $n = 1$ then above equation reduces to, ~~±~~ $\nu' = \nu \pm \nu_c$

From this equation it follows that the frequency difference $\nu - \nu'$ correspondance to the characteristic freq of the molecule. The raman lines are equidistant from the rayleigh line ~~from~~ either side and reffer to the infrared absorbtion lines of scaterer

Q. 5] Explain in details stoke lines, Anti-Stock lines and Rayleigh line?

The formation of stokes lines is an importaut part of the Raman spectrograph. We know that Raman spectra incorporate many important aspects regarding the scattering of light. According to Raman scattering, when a light ray is allowed to pass through a transparent medium, the particles of the molecules will scatter a part of light in all possible directions. Raman scattering is based on inelastic scattering of the monochromatic light, quantum theory is needed to predict selection rule and intensities correct

According to this theory the Raman effect may be regarded as the outcome of the collision between the light photons and molecules of the substance.

suppose a molecule of mass 'm' in the energy state Ep is moving with velocity 'v' and is colliding with a ligh photon hν. suppose this molecule undergoes a change in it's energy state as well as it's velocity. Let the new energy state Eq and velocity 'v'' after suffering a collision. If we apply the principle of conservation of energy then E,

$$E_p + \frac{1}{2}mv^2 = E_q + \frac{1}{2}mv^2 \longrightarrow ①$$

It can be readily proove that the chang in velocity of this molecule is practically neglegible. Thus eq^n 1st become

$$E_p + h\nu = E_q + h\nu'$$

$$h\nu' = h\nu + E_p - E_q$$

divided by 'h' to the both side of eq^n

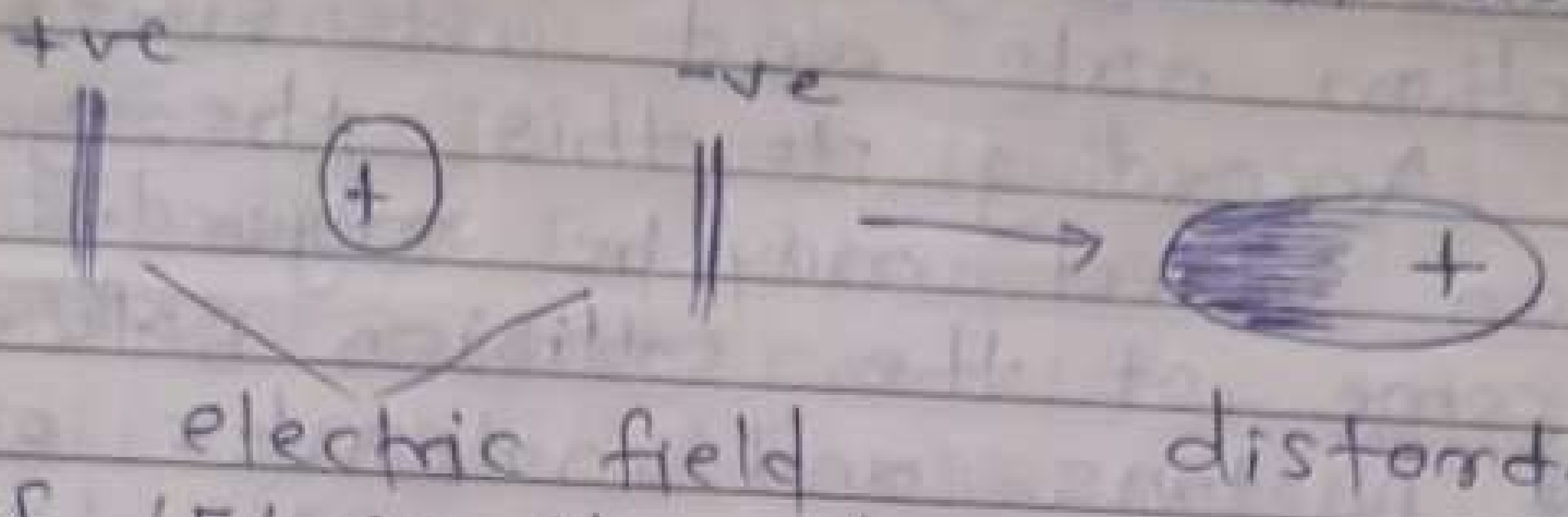
$$\nu' = \nu + \frac{E_p - E_q}{h}$$

$$\nu' = \nu + \Delta\nu \longrightarrow ②$$

from eq^n ② the three cases.

① If $E_p = E_q$ the frequency difference Raman shift $\Delta\nu$ is zero ($\Delta\nu = 0$) and $\nu' = \nu$ and molecule simply deflect the photon. Thus collision is elastic and

and molecules is known as polarized.



If 'E' is the strength of electric field associated with the electromagnetic the magnitude of induced dipole moment (μ) is the molecule is given by relation.

$$\therefore \mu = \alpha E \longrightarrow ①$$

where α is polarizibility of molecule.

The strength of 'E' electric field of an electromagnetic radiation of a frequency 'v' is given by equation.

$$E = \epsilon_0 \sin 2\pi v t \longrightarrow ②$$

where E_0 is amplitude of vibrating electri field vector from eq^n ① & ② the induce dipole moment.

$$\mu = \alpha E_0 \sin 2\pi v t \longrightarrow ③$$

From eq^n ③ it follocos that the interaction of electromagnetic field of a frequency 'v' induced a dipole in the ato or molecule which ossilate with the same frequency. According to the classical theory this osscilating dipole would emit radiation of a same frequency that of incident light giving release catoling beam.

Quantum theory of Raman Spectra:-

The classical theory is able to explain the existance of raman effect, but usually a LASER light in the UV region, near the infrared region, and near the UV range.

A few parts of the scattere light have lower frequencies (higher wavelengths) than incident light, giv rise to the origin of the stokes lines in a Raman spectrum. This occurs when a photon transfers part of its total energy to the molecule and since it encounters a loss of energy, its frequency w be shifted towards lower frequenci The molecule absorbs energy to under the transition to higher vibrational states. Thus, the stroke lines are th lines whose wavelengths are longer than that of the incident light. In this article, we will look into th concept of stokes line with comparis to anti-stokes lines, detailed explainat for stokes & anti stokes lines, and Raman frequency. So, without any further ado, let us understand th stokes & anti-stokes lines.

Stocks and Antistockes lines:

A typical Raman spectrum is centered at the frequency of incident light (normal a laser light in the visible part of th electromagnetic spectrum), with very high intensity owing to Rayleigh scattering. stokes lines can be observed towards the lower frequencies and anti-stokes can be seen towards the higher frequencies, later they are mirrored at the center of the Raman spectrum. Nevertheless, Stokes lines are more intense in comparison with the antistokes counterparts because the vibrational ground state is more populated than excited state.

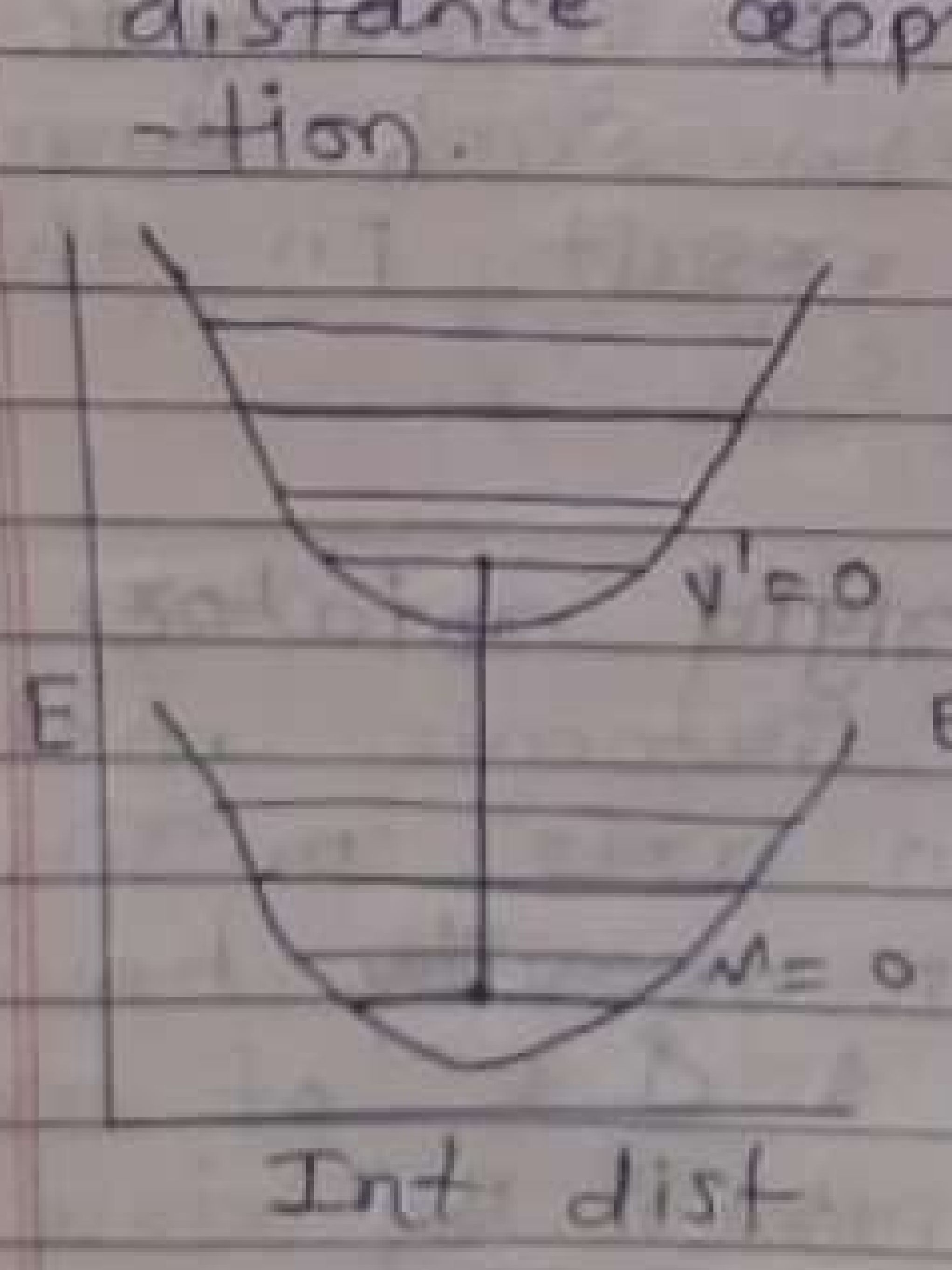
Rayleigh line :-

Mechanics - A straight line connecting points corresponding to the initial and final states on a graph of pressure versus specific volume for a substance subjected to a shock wave.

spectroscopy - spectrum line in scattered radiation which has the same frequency as the corresponding incident radiation.

Q.6] State and explain frank - condon principle &

An electronic transition takes place so rapidly that the vibrating molecule does not change it's internuclear distance appretiably during the transition.



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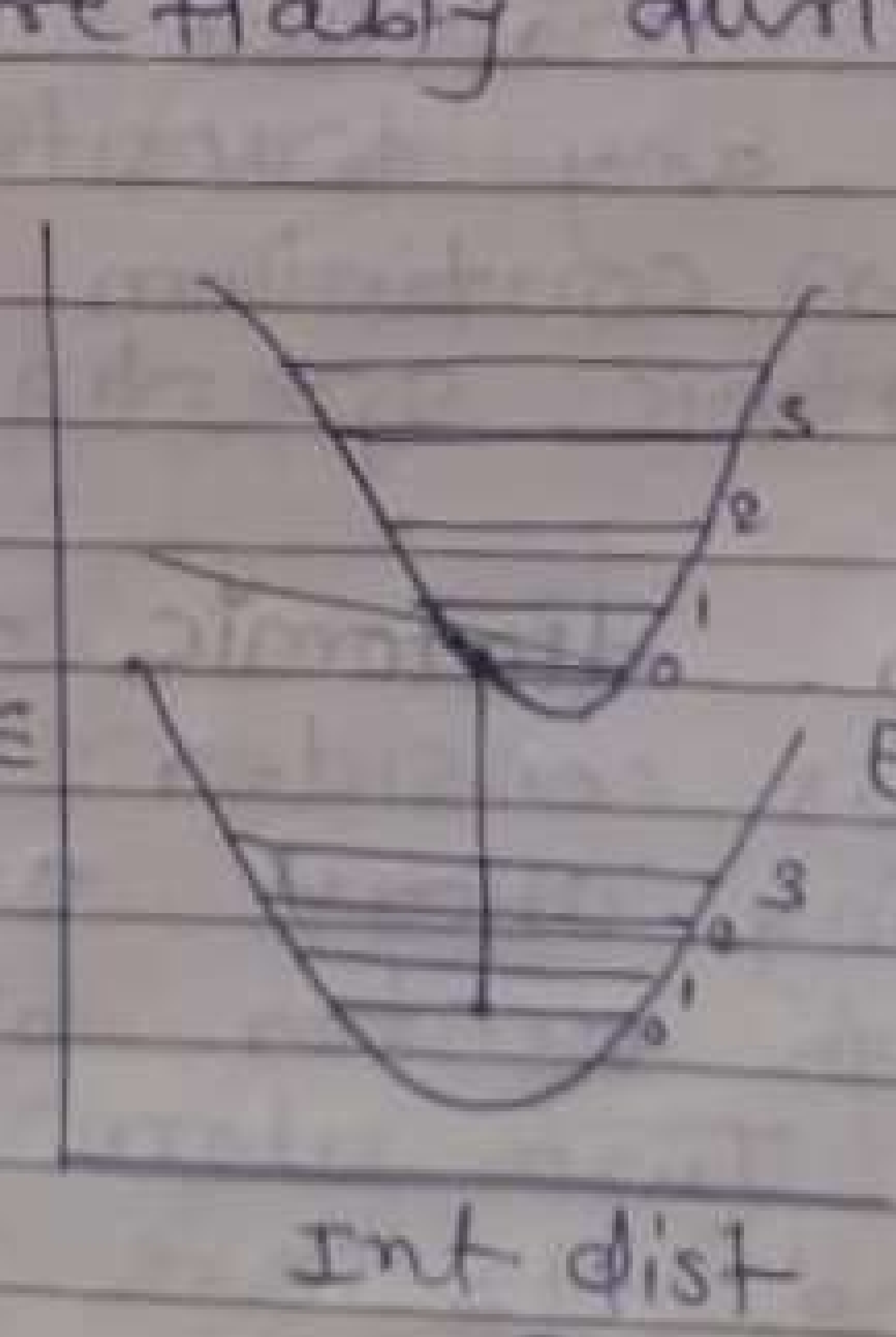

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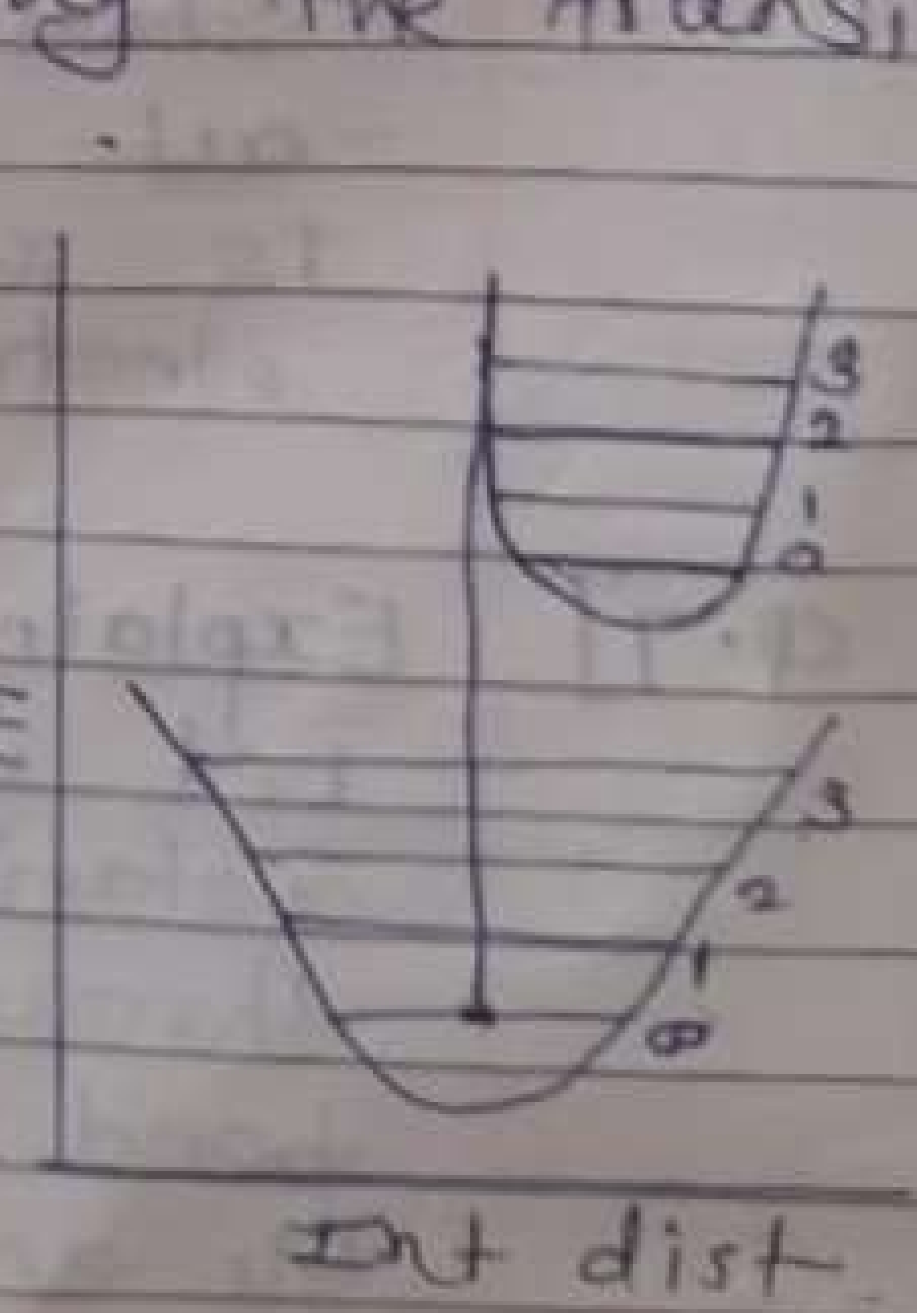

(c)

Figure ⓐ shows the upper exited state electronic state have same equilibrium internuclear distant as the lower or ground state electronic state. Therefore the most probable transition in this case is (0,0) transition and shown by vertical line. and this type of transition obey frank condon principle.

Figure ⓑ shows the excited electronic state has a slightly greater internuclear distance than the ground state and this type of transition is less probable. Thus transition is max intensity during the transition and it diminish for (2,0) transition on lower and higher state.

Figure ⓒ the upper state seperation is considerably greater than in the lower state and the vibrational level to which transition takes place has very high frequency. From such state molecule will dissociate without any transition such transition is an continium result in the electronic spectra.

Q.7] Explain diatomic rigid rotator molecule

Let us consider diatomic molecule rotating about an axis passing through center of gravity having rigid bond. Two atom A & B of masses M_1 and M_2 are joined by rigid bar length r_0 thus $r_0 = r_1 + r_2 \longrightarrow (1)$

2019-20 09
10

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Sub :- physical chemistry

Q.1. Explain in details law of crystalography.

→ crystalography is the branch of Science which deals with geometry, properties and structure of crystal & crystalline Substances.

Geometrical crystallography is concerned with the outer Spatial arrangement of crystal planes and geometrical shape of crystals. Thus crystallography depends upon the three fundamental laws.

1) Law of constancy of interfacial angles
2) Law of Rationality of indices.
3) Law of symmetry.

1) Law of constancy of interfacial angles

The plane Surfaces of the crystal are called faces. The angles between the faces is called the interfacial angles. The law of contancy of interfacial angles States that the size and Shape of the faces of the crystals of one & the same substance

where μ is reduce mass of molecule
r_0 - Bond length.

we know that, kinetic energy $\frac{1}{2}mv^2$
Thus the kinetic energy of rotation of rigid rotator is given by equation,

$$E_{rot} = \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2$$

where v_1 and v_2 are linier velocities of masses m_1 and m_2.

The angular velocity of rigid rotator,

$$W = \frac{v}{r}, \quad V = \omega r$$

$$\therefore E_{rot} = \frac{1}{2} m_1 (\omega r_1)^2 + \frac{1}{2} m_2 (\omega r_2)^2$$

$$E_{rot} = \omega^2 (m_1 r_1^2 + m_2 r_2^2)$$

$$E_{rot} = \frac{1}{2} I \omega^2 \left[\because I = m_1 r_1^2 + m_2 r_2^2\right]$$

Since molecule is rigid rotator and potential energy is zero.

where r_1 and r_2 are the distance of atom A & B from a center of gravity. The molecule rotated end over end about point c. Thus $m_1 r_1 = m_2 r_2 \rightarrow$ ②

The moment of inertia about c is defined as,

$$I = m_1 r_1^2 + m_2 r_2^2$$

$$= m_1 r_1 r_1 + m_2 r_2 r_2$$

but we know that $m_1 r_1 = m_2 r_2$

$$\therefore I = r_1 r_2 (m_1 + m_2) \rightarrow ③$$

from eqⁿ ① and ② we can write,

$$m_1 r_1 = m_2 r_2$$

$$m_1 r_1 = m_2 (r_0 - r_1)$$

$$m_1 r_1 = m_2 r_0 - m_2 r_1$$

$$r_1 = \frac{m_2 r_0}{(m_1 + m_2)} \rightarrow ④$$

Similarly

$$r_2 = \frac{m_1 r_0}{(m_1 + m_2)} \rightarrow ⑤$$

on substituting eqⁿ ④ and ⑤ in eqⁿ ③

$$I = \left(\frac{m_2 r_0}{m_1 + m_2}\right)\left(\frac{m_1 r_0}{m_1 + m_2}\right)(m_1 + m_2)$$

$$I = \left(\frac{m_1 m_2 r_0^2}{(m_1 + m_2)^2}\right)(m_1 + m_2)$$

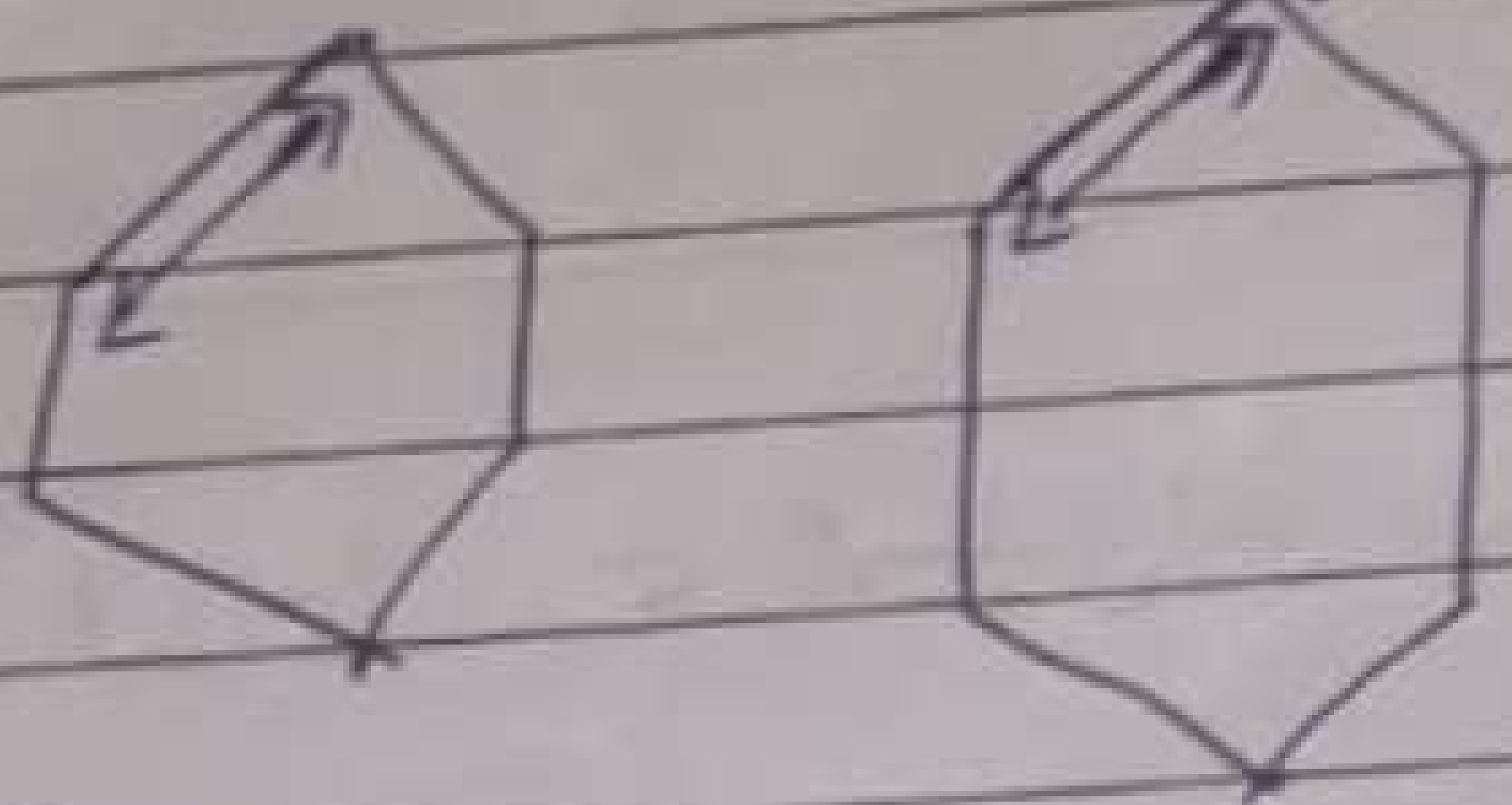
$$I = \frac{m_1 m_2 r_0^2}{m_1 + m_2} \quad r_0^2$$

but we know that

$$\mu = \frac{m_1 m_2}{m_1 + m_2}$$

$$\therefore I = \mu r_0^2 \rightarrow ⑥$$

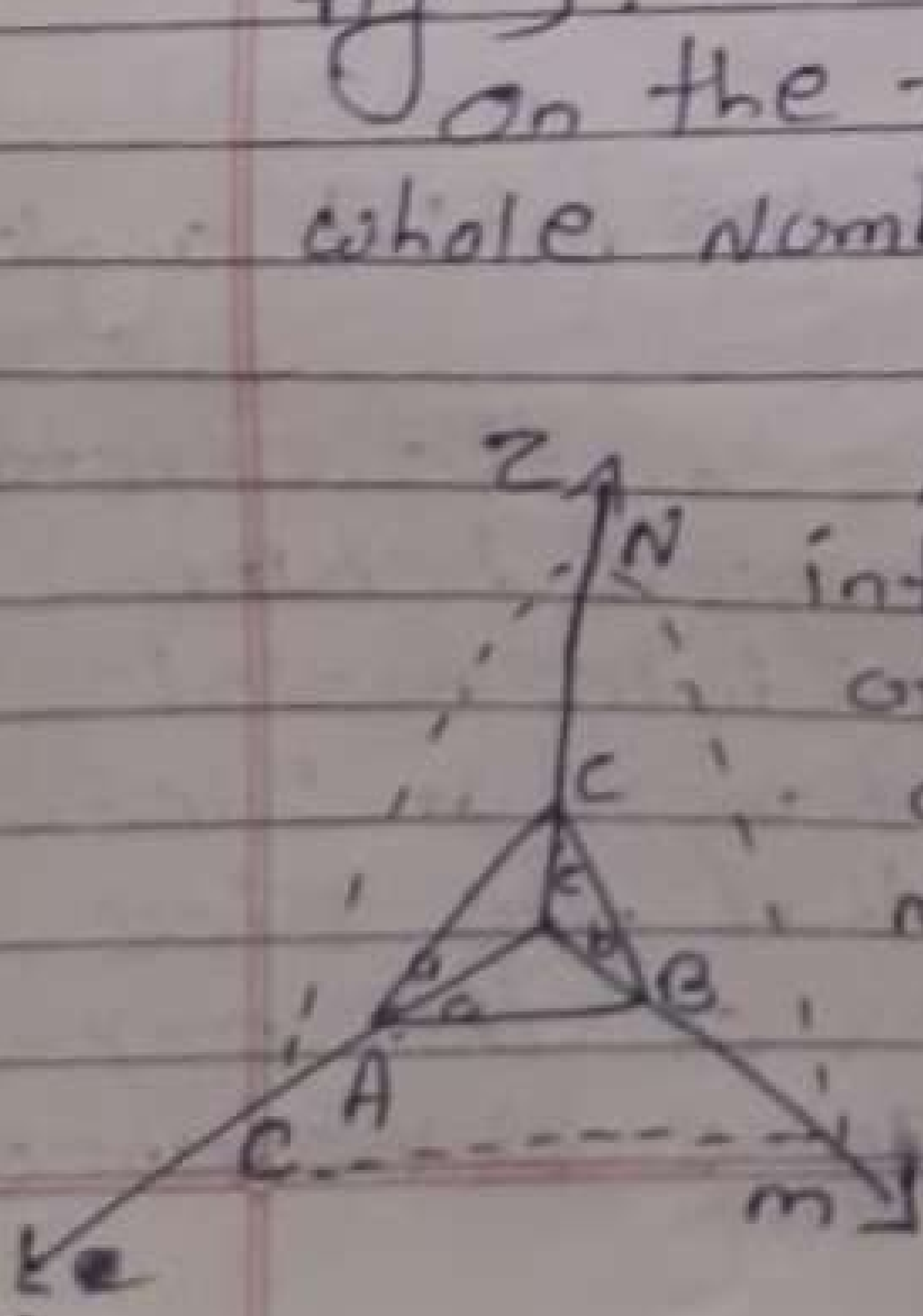
may differ depending may on Conditio- as of formation but the interfacial angles between any two corresponding faces.



2) Law of Rationality of Indices.

The law of rationality of Indices States that the intercepts of any face of a crystal along the crystallographic axes are either equal to the unit intercepts (a, b, c) or some simple whole number multiples of them i.e. the ratio between intercepts can always be expressed by rational number.

E.X:- consider ABC be a unit place the unit intercepts will then be a, b & c according to this law the intercepts of any face such as LMN (as shown in fig). On the three axes will be simple whole number a, b & c respectively.



As can be seen fig. these intercepts are in the ratio: of 2a : 2b : 3c where 2, 2, 3 are simple integral whole number. The co-efficients of unit intercepts are known as weiss indices.

(2,2 & 3) in this case. weiss indices are not alldays simple integral whole numbers. They may have fractional values & as well as infinity. Therefore weiss indices are incomvernient in use & consequently have been replaced by miller indices.

The miller indices of a plane are a set of integrals (h,k,J) used to describe a given plane. The miller indices of plane are obtained by ~~taking the reciprocals of weiss indices and~~ obtained by taking the reciprocals of weiss indices and multiplying throughout by the smallest number in order to make all integrals as integers.

Ex:- The intercepts of plane lmn are 2a, 2b & 3c. The weiss indices are 2:2:3
2:2:3 weiss - Indices are 2:2:3
Co-efficient Reciprocals $\frac{1}{2} : \frac{1}{2} : \frac{1}{3}$

miller indices 3:3:2
Thus plane lmn is designated as (3,3,2) the distance between the parallel plane in a crystal are designated as dhkl. for cubic lattices these distances are given by the general formula.

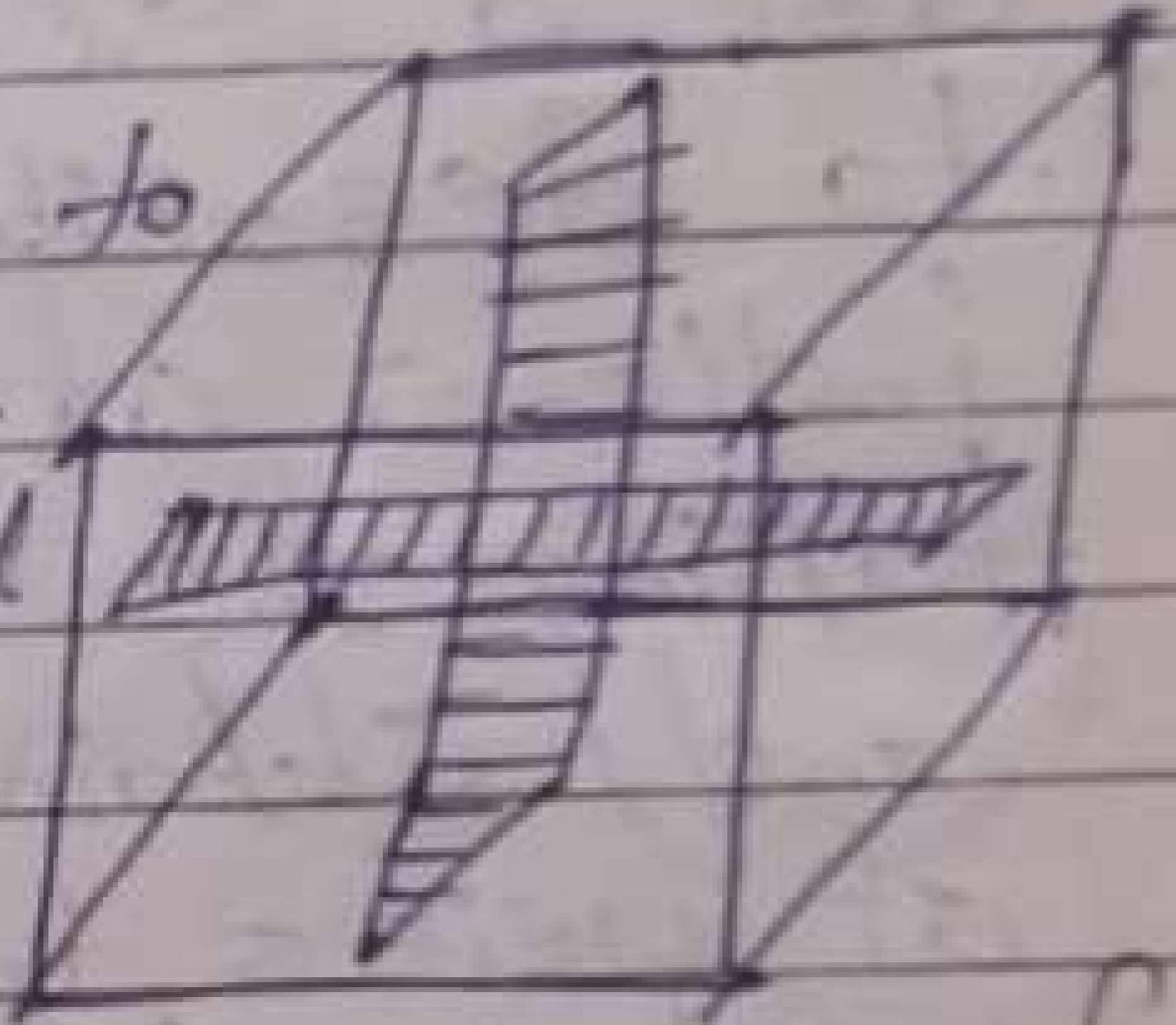
$$d_{hkl} = \frac{a}{\sqrt{h^2+k^2+l^2}}$$

where, a = length of the cube

3) Law of Symmetry

This law states that all crystals of the same substance possess the same elements of symmetry. There are three types of symmetry associated with a crystal.

i) Plane of Symmetry



A crystal is said to have a plane of symmetry if it can be devided by an imaginary plane into two plane of symmetry. parts such that each of the other. crystal may have one or more planes of symmetry.

ii) Axis of symmetry.

An axis of symmetry is an imaginary line passing through crystal about which if the crystal is rotated, it presents the same appearance more than once during one complete rotation i.e. rotation through 360°.

If same appearance is obtained twice it is called an axis of symmetry or diad axis. If it appears three times it is axis of three fold symmetry or triad axis and so on.

Thus therefore corrected volume
$V_i = (V - b)$
$V - Nb$

- Pressure Corrections:

The pressure of a gas impact of gas molecule on the vander wall of container i.e. Collision between gas molecule and Container.

A molecular Some wear the made of at a Point a equaly. attracted by all direction this forcesses naturals or minimums the rate of Colision Hence, decreases Pressure

∴ If pi is ideal decreases Pressure Pis a adsorb pressure then ideal pressure is pi is abserve Pressure P + pressure correction
i.e $p_i = P + P'$ ——— (2)
p' = corrected Pressure.

Now the force of attraction Single molecule density of a gas therefore attraction forces on molecule.
i.e. $f \propto \frac{1}{V}$

∴ Total attractive force $\propto \frac{1}{V} \times \frac{1}{V} \propto \frac{1}{V^2}$

as the pressure correction depend upon $p' \propto \frac{1}{V^2}$ or $p' = \frac{a}{V^2}$
Where a = Constant.

Q.3 Derive an expression for vander wall equation?.

→ The Scientist vander wall in 1873 gave logical explanation of the devation of a gases from ideal behaviour. He pointed out that there are two faulty asomation of kinetic molecular they of gases.

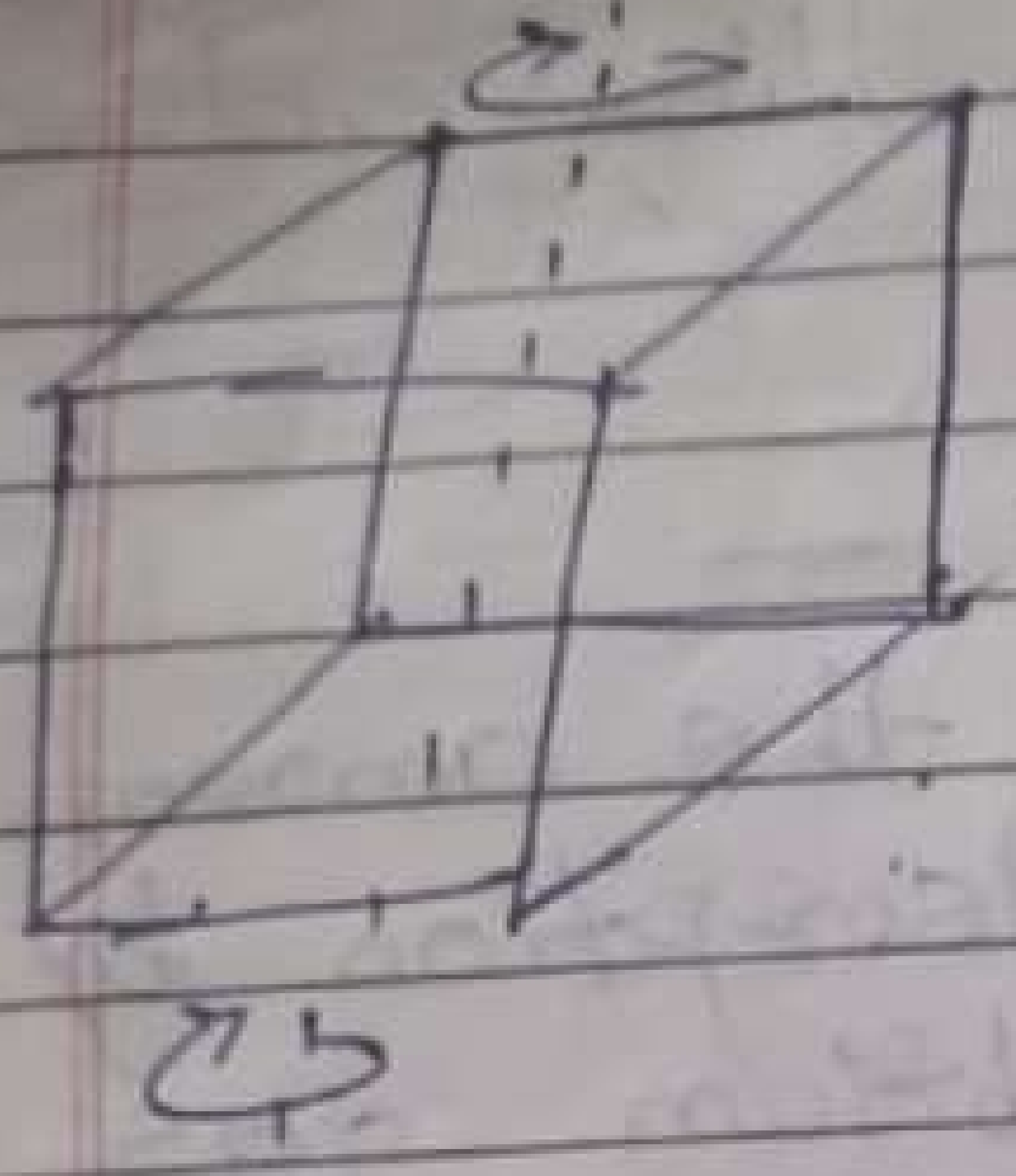
1) The molecule in a gas are point masses and passes no volume, this mins that the actual value of accupied gas niglizible of a total value of gas.

2) Their are no inter molecular attraction in a gas the vander wall however of pointed gas?. in a real gases the molecule do have a volume and excereated intermolecular attraction. Thus, he suggested correction for the factor volume correction & fectional correction.

- Volume Corrections.:

The ideal gas equation (PV=RT) is a total volume accupied by volume of a gas since the molecule have definite have they the we accupied definite value excluded value.

This will be the effective volume per mole of gas & ideal volume which is compreisible.



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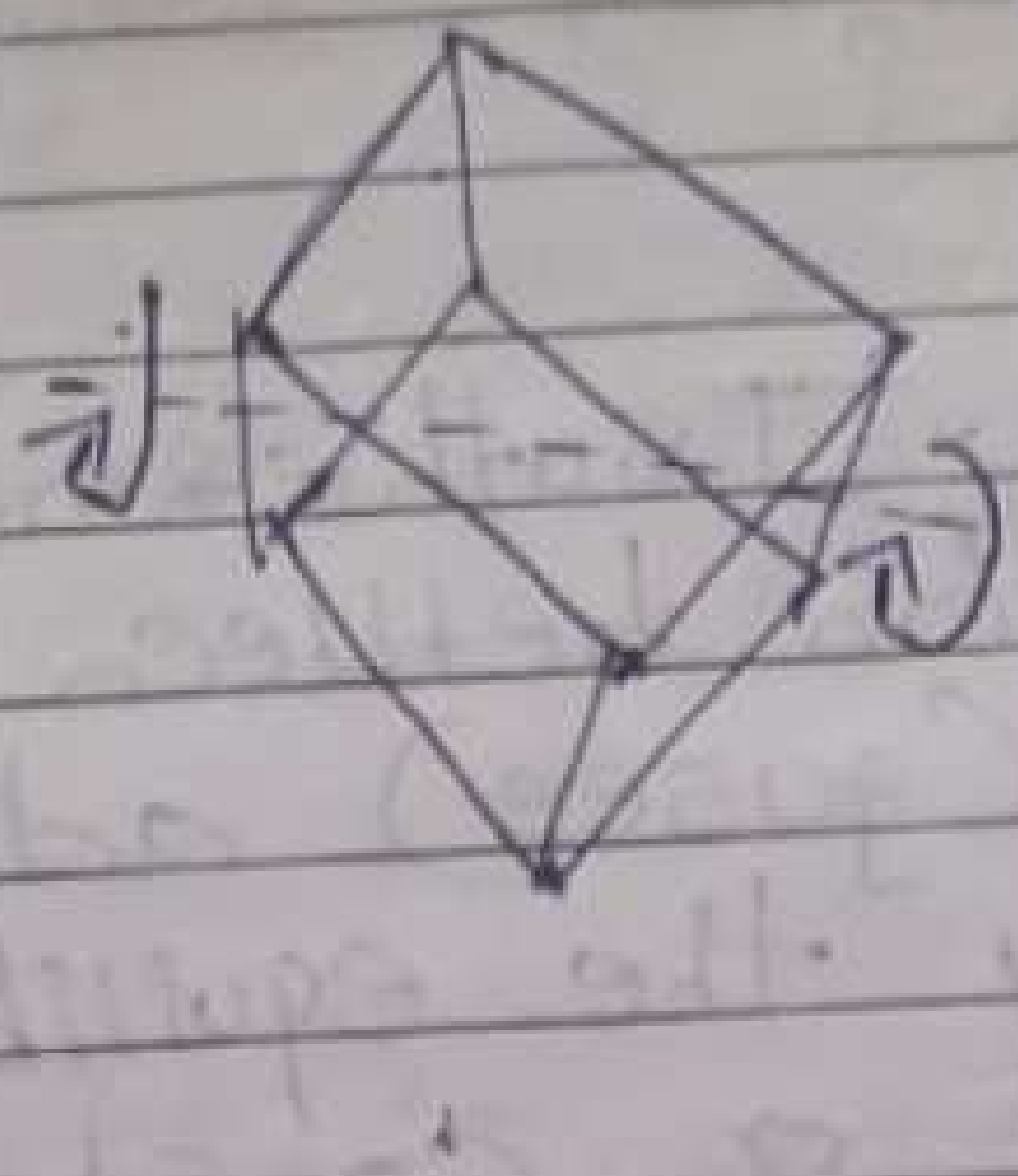

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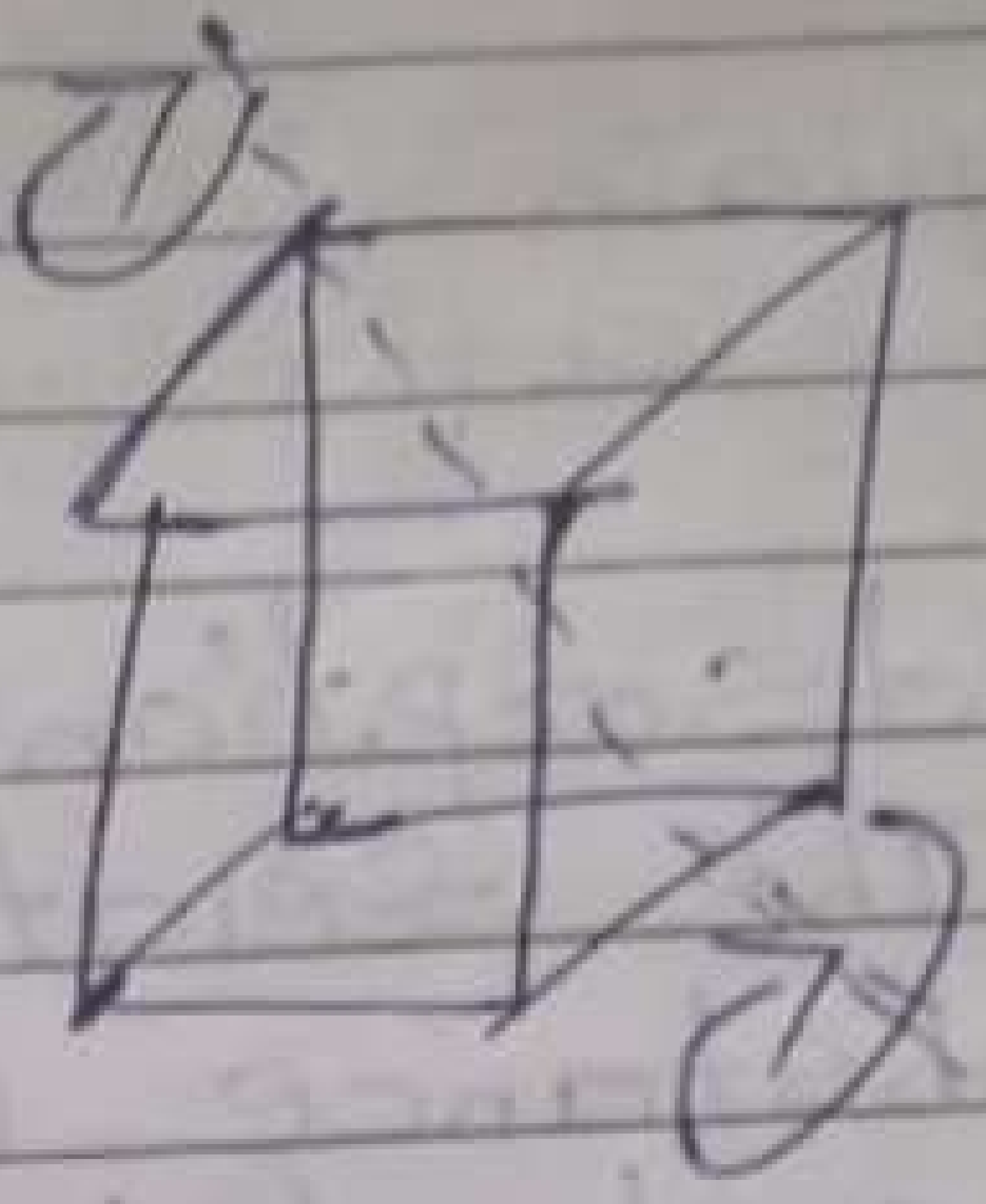

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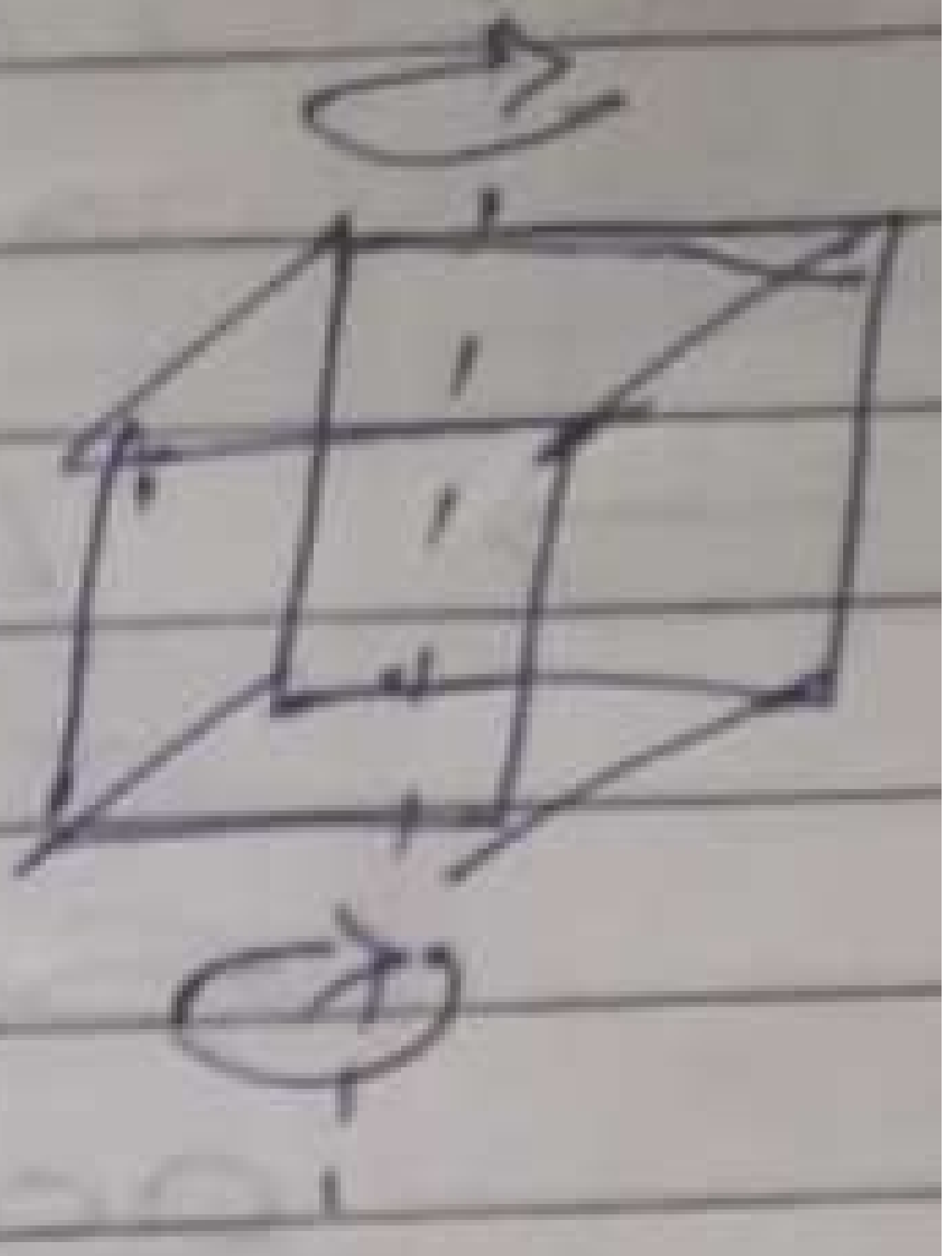


(d)

iii) Center of Symmetry.

Centre of symmetry of a crystal is an imaginary point within the crystal such that any line drawn through it intersects the surface of the crystal at equal distances in bothe directions. It may be noted that the crystal may have any number of planes or axes of symmetry but it has only one center of symmetry.

Q.4. Explain in details langmuir adsorption Isotherm ?.

→ It derived Simple adsorption isotherm based on theoretical consideration.

- Assumptions —

i) Adsorp layer is uniform all over adsorbent.

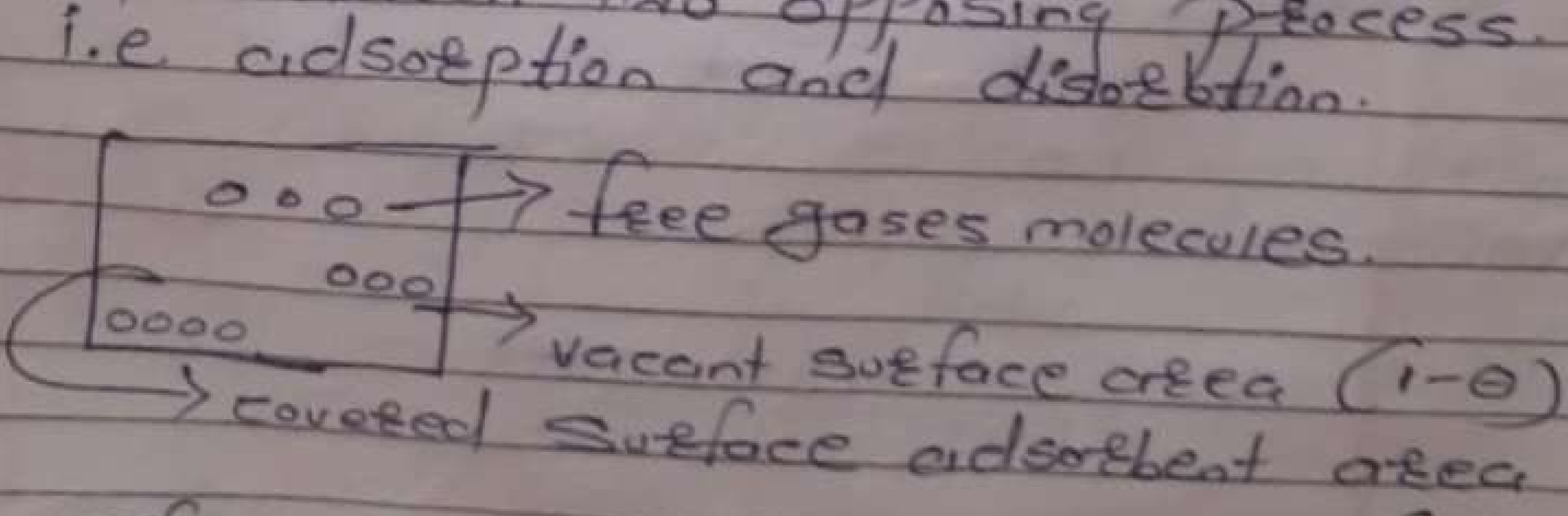
ii) The layer of gas adsorb on the solid adsorbent is one molecular thick. i.e. monolayer formation.

iii) Their is a no interaction absent adsorb molecule.

- Derivation.

Langmuir Considered than gas molecule Strike Solid Surface and are thus adsorb some of these molecule than evaporate or desorbed rapidly.

A dynamic equilibrium is estalished between two opposing process. i.e adsorption and disorbtion.



If θ is the fraction of total Surface covered by adsorbent molecule then the fraction of vacant area $(1-\theta)$.

The rate of disorption Rd is proportional to curved surface are θ $(Rd \propto \theta)$

$$\therefore Rd = kd\,\theta$$

This eqn is known as vander wall eqn or one mole of gases.

The vander wall eqn one mole of gases may be writen.

$$\left[P + \frac{an^2}{V^2}\right](V - n^{b}) = nRT.$$

Unit for vander wall eqn / constant

unit of a $= P = \frac{an^2}{V^2}$

$$a = \frac{P \times V^2}{n^2}$$

Thus, if P is expresses is volume the unit of a will be $(\text{liter})^2\,\text{mol}^{-}$

unit of b.

The b is occupied the molecule of a gas the unit of a, b.

Q.5 Give the Posulates of kinetic ~~Energy~~ theory of gases.

→ 1) The gas consist of extreamly small particals known as molecules

2) The molecules of the gas are in state of constant random motion in all possible direction with high velocity along state line path.

3) The molecule of a gas pressure of wall of container when they polite with pour another.

4) During the poligen no energy lost by the gas molecure i.e. poligen is perticully elastin.

5) Their is known molecule between the gas molecule.

6) In a molecule in the gas small like point mass & volume accupied by them is neglizibl.

7) Average K.E of gas molecule is directly properetional to the apsulate temperature.

8) A molecule of a same gases have property while the molecule of different gases and different properties.

Surface

$$\frac{2mvy^2}{l} = \frac{2m^2v_z}{l}$$

Hence, over all change of momentum per second on the all faces on both will be

$$= \frac{2mv^2x}{l} + \frac{2mvy^2}{l} + \frac{2mv_z^2}{l}$$

$$= \frac{2m}{l} vx^2 + vy^2 + v_z^2$$

$$= \frac{2mv^2}{l}$$

Now, Suppose there are n molecule in the box each and which having some velocity $V_1, V_2 ---- V_n$ etc.

The total change in momentum impact of all the molecule on the all faces of the box will be

$$= \frac{2m}{l} (v_1^2 + v_2^2 + ---- + v_n^2) \times N$$

$$= \frac{2mNu^2}{l}$$

Where, u^2 is the means Square this change is gas molecule create force on wall of Container.

Hence, pressure is created we know that —

face A with velocity (v_x) and rebond with velocity ($-v_x$).

The heat the same face again molecule most travel (L cm) to Poride with the opposite face B & then again (L cm) & face A.

∴ The time betldeen the Collision of a face Av $= \frac{2L}{v_x}$

The number of Collision per second on a face A is ∴ A $\frac{1}{} = \frac{v_x}{2L}$

Due to the Poligen change of momentum mv_x of a gas molecule is

= momentum before Collision mv_x
= momentum after Collision $-mv_x$

∴ Total change in momentum
$= mv_x - (-mv_x)$
$= 2\ mv_x$

But the no. of Collision per second the on a face A due to the molecule is $\frac{v_x}{2L}$.

∴ The total change in momentum per Second on a face A Cosed by $1\ mv_x = \frac{mv_x}{l}$

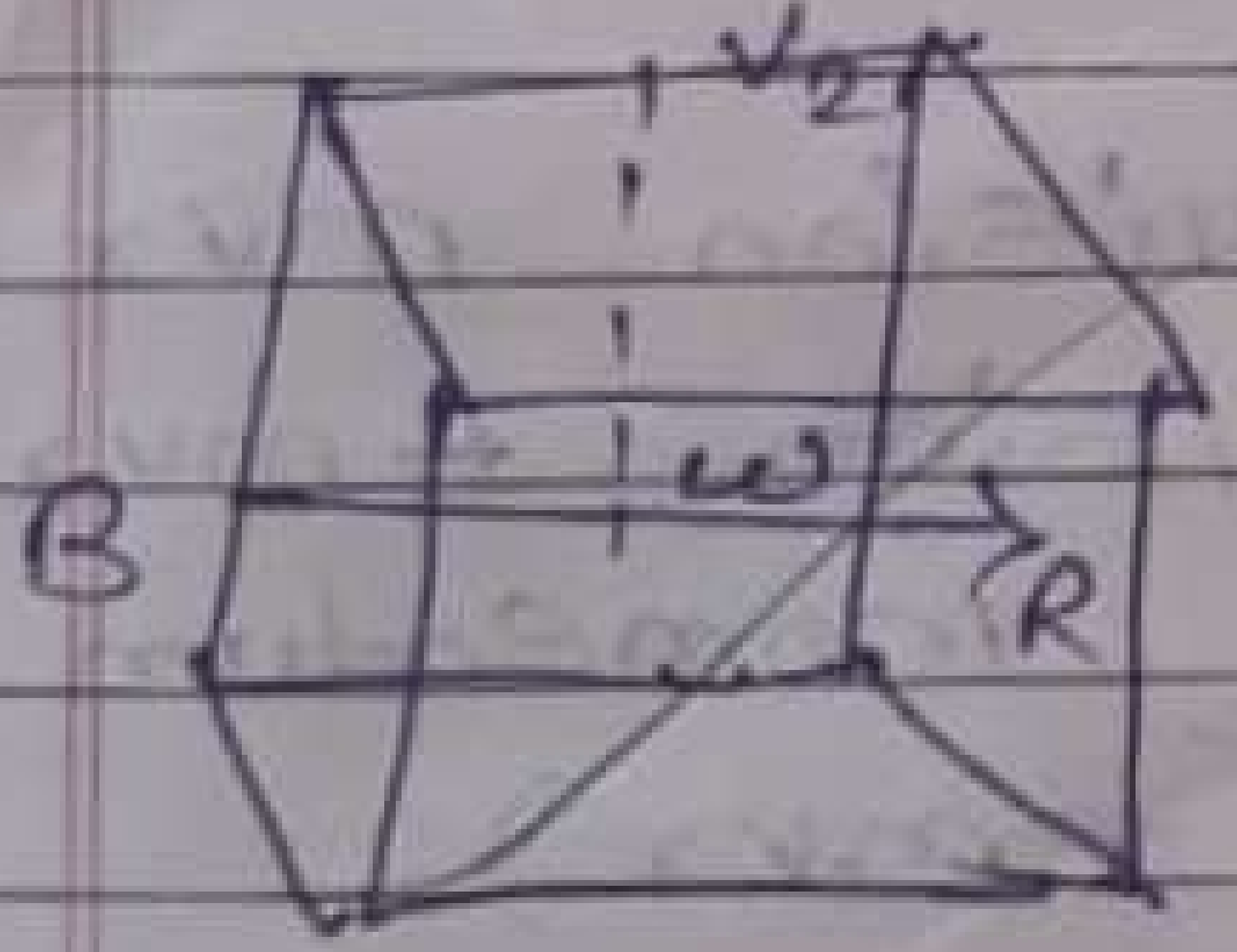
The change of momentum on a both opposite faces A & B along the x-axis would be double i.e. $2mv^2_x$.

Similarly change in momentum along the y and z axis.

Q.6. Explain in details different types of molecular velocity and give relation between them. Kinetic gas eqn.

→ According to the kinetic theory Scientist develops.
This gas equation express pressure and volume of a gas in terms of no. of molecule gas and mass.

Let us consider a certain mass of gases inclosed in quibic gas at a constant temperature.



Consider (L) be the legth of each side of a box.
(n) is the total no. of gas molecule.
(m) mass of molecule.
(v) velocity of molecule.

According to the kinetic theory of molecule, the gas moves with the velocity (v) in any direction along the axis (x, y and z) i.e. expressed as $V^2 = vx^2 + vu^2 + vz^2$ molecule of gases Polid with the wall of cube.

Consider a molecule moving in direction (ox) between opposite faces A & B. The molecule Streak a

$P = f/A$

$F = 2mu^2/l$

$P = 2mNu^2/L/6L^2$

$P = 2mNu^2/L \times 1/6L^2$

Lp = is a volume of cube

$P = f/A$

$P = 1/3 \; mnu^2/v$

$$\therefore = \frac{1}{3} mNu^2$$

Q.7. Derived $Pv = \frac{1}{3} mNv^2$

⟹ $Pv = \frac{1}{3} Nmv^2$

The man of the gas present in the volume v.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

The Kinetic theory

v is the volume in between mass and other pressure.

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Class :- B.Sc S.Y.

Subject :- Botany

Year :- 2019 - 2020

Test :- I   Sem :- IV

Paper Name :- Anatomy stem & Reproductive organ of cycus.

College Name :- Shivneri Mahavidhyalaya Shirur - Anantpal.

Q.2 Explain the T.S Stem of Pinus.

→

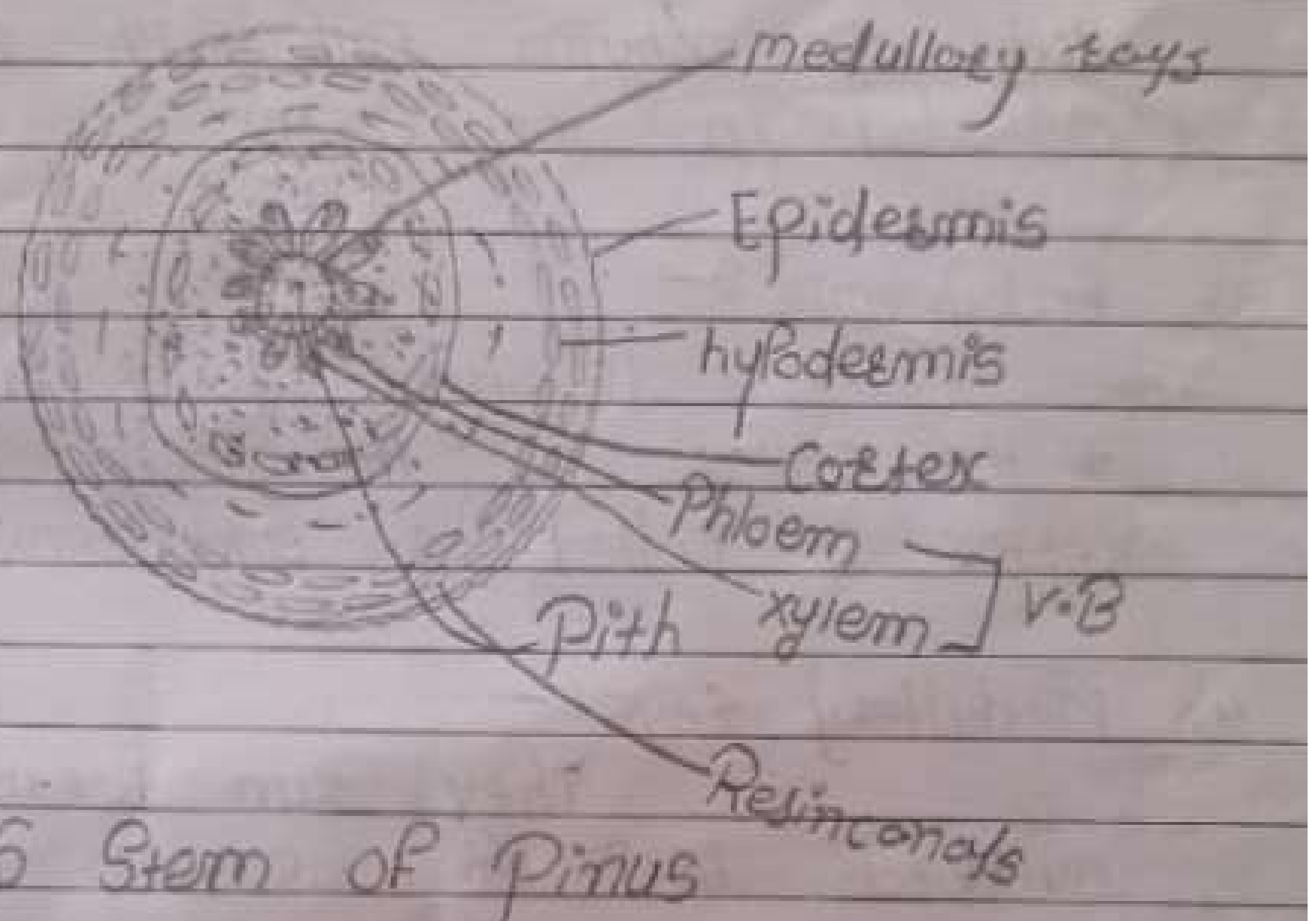

Fig :- T.S Stem of Pinus

The details of the anotomy of you Stem of pinus are differentiated into Follo wing Parts.

1) Epidermis :-

In consist of a single layer of Cells a very thick cuiticle.

— Epidermis are thick layer & occurs & ou er surface of the stem.

2) Scalen chyma :—

Some time a few Pach es of Scolem chyma occur have and their below the epidermis.

2) Cortex :—

- It is well developed ridges.

- in between the hypodemis & enododermis i
present the mesophyll tissue.

★ Mesophyll tissue:-
In betwen the hypodemis &
endodermis is present the mesephyll tissue.

- Cell of the mesophyll are polygonal &
with chloroplast. Few resinduct are pre
nt in the mesophyll cells.

- There number is varible but generally the
are two in number.

★ Endodermis :-
It is single layered with it is
a barrel shaped cells & innermost laye
it is a Casparin strips.

★ Pericycle :-
It is multilayered & consist o
Parenchymatous cells & some sclerenchyma
cells are present.

★ Vascular Bundle :-
The vascular bundle are
Conjoint. Colateral & open, endarch bundles
are present in the center.

- Xylem liks inner side to bandle Phloem
outerside of the bandle.

1 Discribe the Needle leaf of Pinus.

→

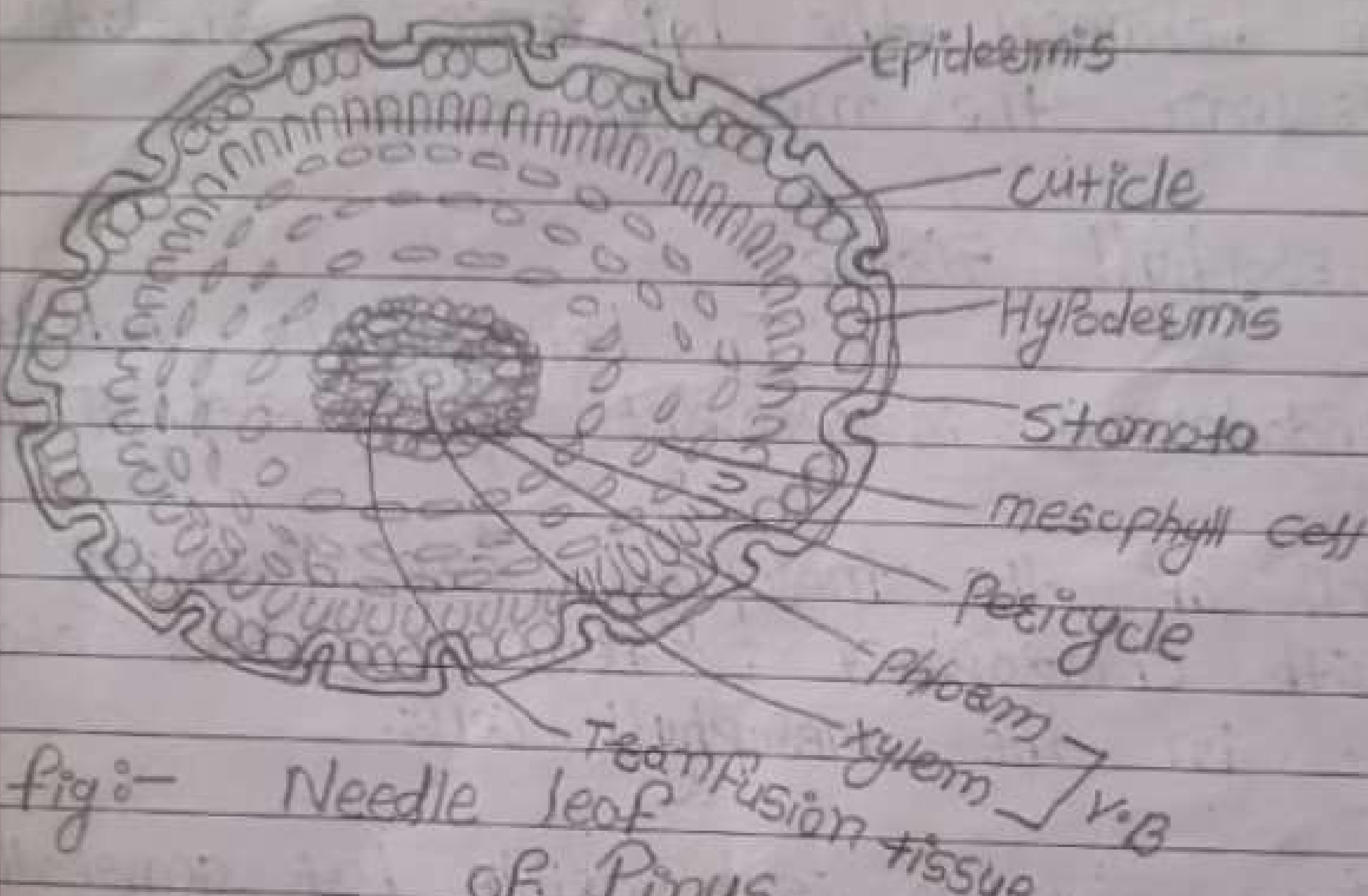

fig :- Needle leaf of Pinus.

— It is circular in outline. semicircular & tringular in sheeps.

— needle leaf of Pinus are differentiated into following parts.

★ Epidermis :-

It is the outermost layer. which Consist of thick walled cells.

— It is covered by a very strong cuticle.

— many sunken Stomata are present the epidermis.

★ Hypodermis :-

Below the epidermis are present a few layer of thick walled sclerenchymatous hypodermis.

2) Cortex :-

many layer of more or less rou ded parenchyma Cells with resin Canals ar embeded in the Cortex.

3) Endodermis :-

A single layer lying the inter to the Cortex & the innermost layer of th Cortex is called as endodermis.

4) Medullery reys :-

They run form the pith - outwards bet^n the vasaulor bandles.

5) Pith :-

There is a well defined Pith Consis g of a mass of parenchyma. Cells & a few resin ducts are also present in the Pith.

- Pith are present Centrally

6) Vasculor Bundles :-

- These are colateral & open & arranged in ring like.
- Each bundle consist of Phloem Cells, Com bium cells & xylem Cells, etc.

a) Phloem :-

- The phloem Consist of sieve tubes & Phloem Consist of Parenchyma but no Comp anion Cells.

It lies on the outer side of the bundle.

xylem :—

It consis of tracheids cells there are no true vessels cells.

— Resin duct are also present here Proto-xylem lies towards the Center and consist of a few tracheid cells & with border pith

☆ Secondary Growth :—

— Secondary Growth i'e the formation of sec. Xylem & Phloem from Cambium as found in dicot stem in Pinus.

— In addicion tube formation of Secondary-Parenchymatous Metullary ray this proses called secondary growth in Pinus Stem.

Dhamangaonkar Nikita Vishwanath
Botany - (II)
2/3/19
10/10
Assignment :- 1

Q. 1 Define & Describe the types of Lichens.

⇒ Lichens :-

Mycobiont establishes symboitic relationship with Phycobiont after association both Phycobiont and Mycobiont they known as Lichens.

There are three types of Lichens. They as are following.

i) Crustose Lichens
ii) Fruticose Lichens
iii) Foliose Lichens

i) Crustose Lichens :-

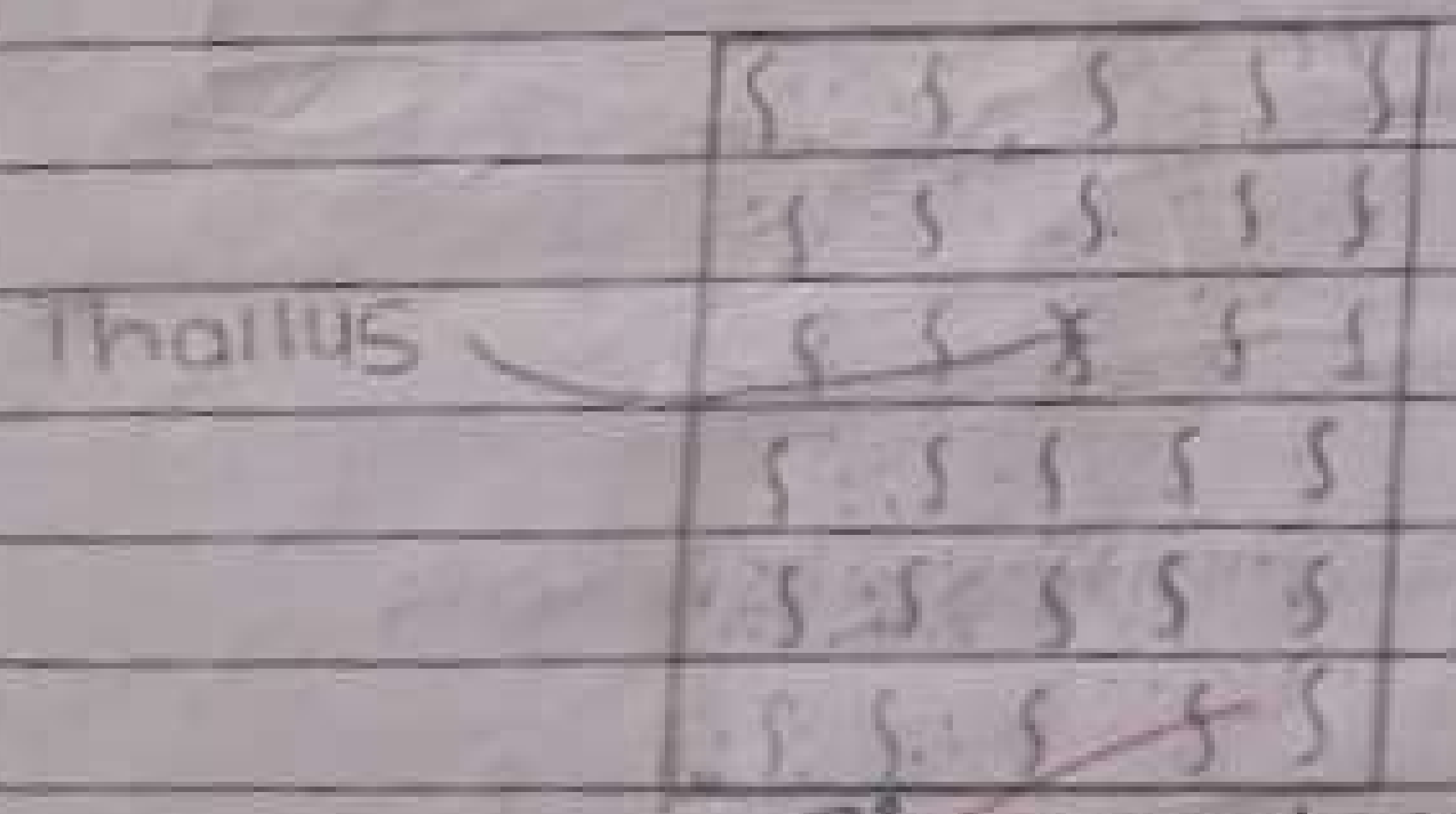

Fig. crustose Lichens

1) The thallus is in significant size.

2) It is Flate, thin usually without any distings lows.

3) It is just like a thin layer or crust closely attached by the whole of its lower surface of stone, rocks, Bark & similar harm substrata. That the crustose lichens appears to be pented on

4) Normally it is impossible to dislowdage it without breaking it.

5) It glows more or less free of the substratem but close to it.

6) It has a distinct upper and lower surface.

7) The lower surface may be white or sooty.

8) The folliose thallus is attached to ro KS and rhyzody like the appears called the Rhizinae.

9) The rhizinea aries from its lower surface.

10) The some folliose lichens the rhizir consists of a single, simple to branche highpay.

11) Rhizinea the functions of anchora and absorptive organ. The rhizinae are dark or dark brown in colour.

12) The common example of folliose lich ns are xanthoria, physcia, parmetia, centraria etc.

5) The thallus is attached only at the base by a flaterned disc. The fruticose lichens may extensive and out from the Rocks, Foliuses and branched of

6) The thallus shows no differentiation into upper and lower surfaces.

7) usnea, cladonia is the best example of fruticose lichens.

iii) Foliose Lichens :-

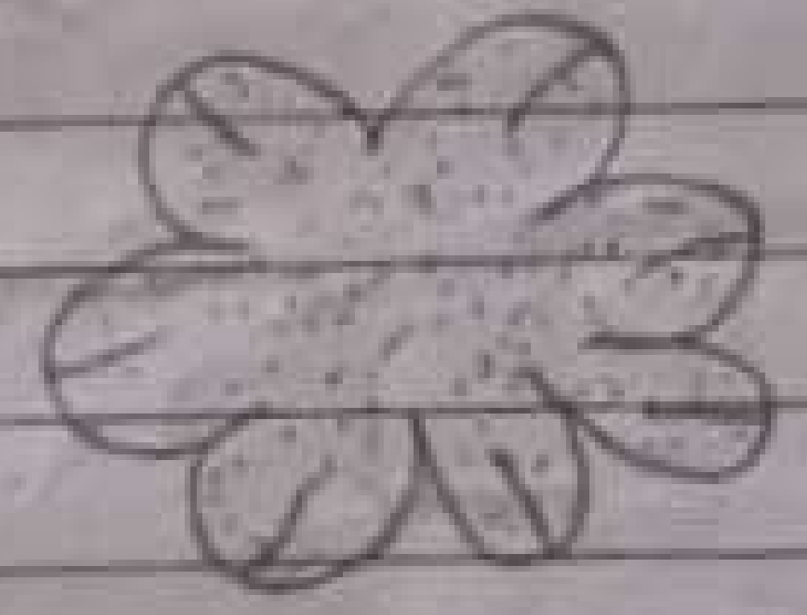

fig. Foliose Lichens

1) The foliose lichen is one of a vari ty of lichens, which are complex orga nisms that aries from the symboitic relationship between Funga and Alage.

2) Foliose lichens leave in diverse flame nts i.e from cold, dry mountains and warm valleys.

3) The folliose thylus is flat, broad, much lobed and leafy like.

4) The folliose are in the form of twis ted leaveses.

5) The surface of the thallus is usually devided into more or less Hexagonal areas for arelone in many species the thallus is fastly buried on the substratem.

6) Graphic stripts at and Hemaphona punicem are the best example of crustose lichens.

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ii) Fruticose Lichens :-

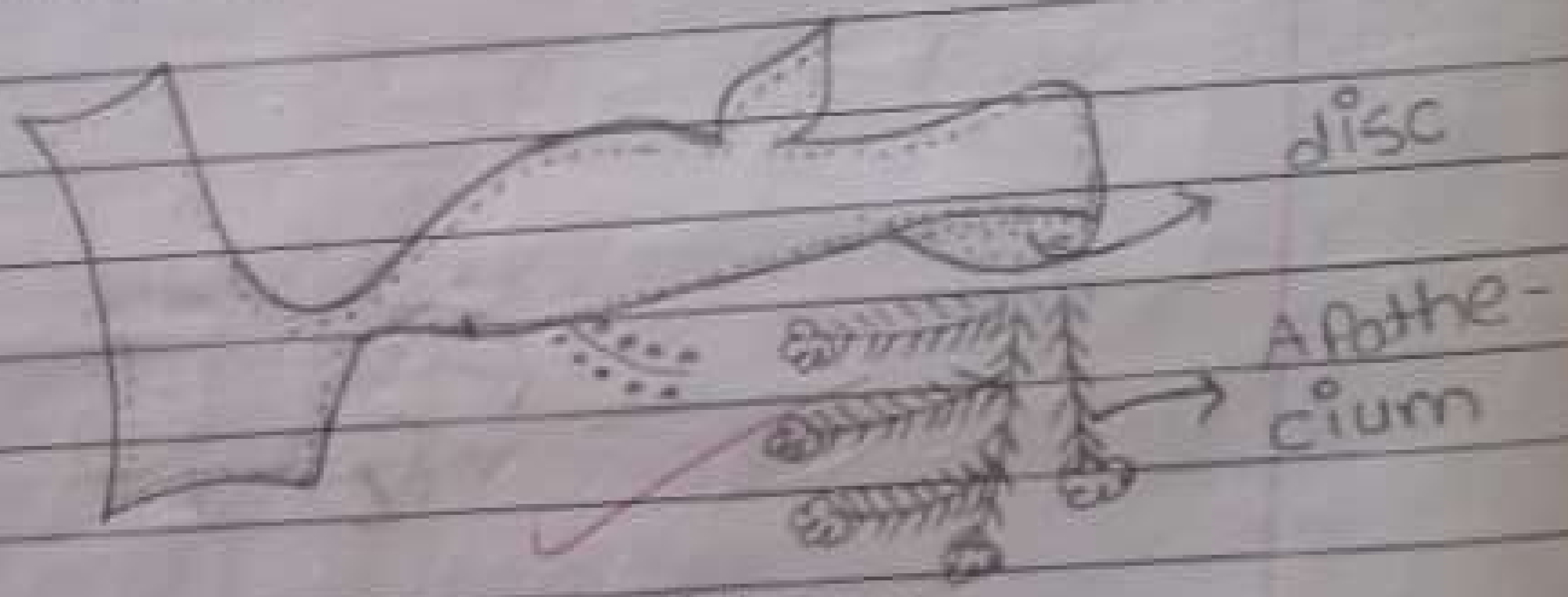

fig. Fruticose Lichens

1) They are crust & most complex thallus which is cylender and freely branched.

2) The branches may be cylendrical or riben like / flaterned and from thread like.

3) In many species are cladonia the branches stand stippy erect and tinybird.

4) There are other (usenea) in which the branches are tassael like.

Q. 2 Explain Reproduction in Bacteria.

⇒ Bacteria reproduce only by asexual method they are as following.

i) Binary fission
ii) Budding
iii) Fragmentation (filaments)

i) Binary fission :-

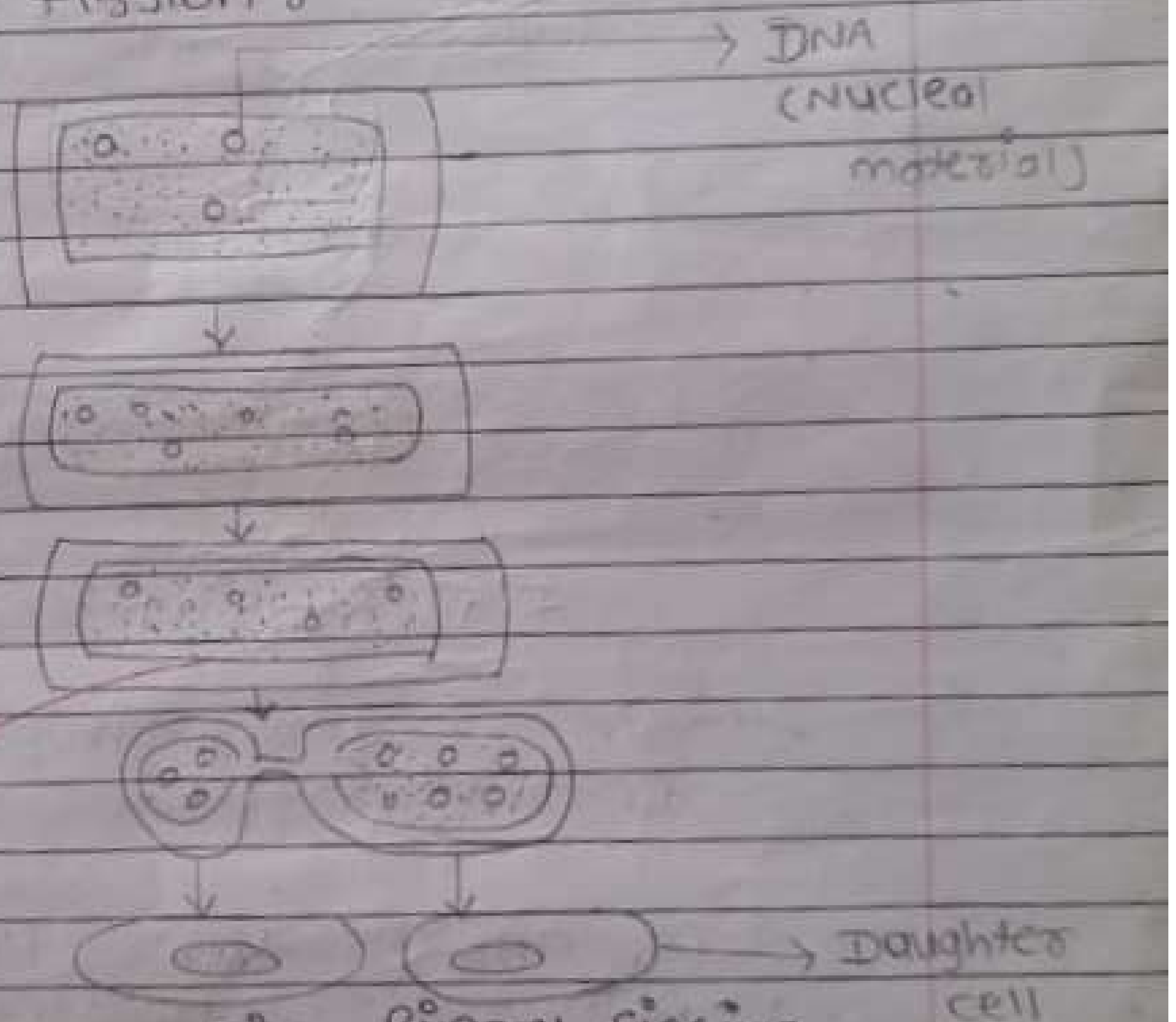

Fig. Binary fission

1) Binary fission is a asexual method.

2) Most of the bacteria reproduce by th
binary fission. A single bacterial cell
device into two cells by the transvers
binary fission.

3) Each time a cell device and forms a new generations of cell.

4) Each cell of the new generation is

capable of further division of fission.

5) Each generation has twice the number of cells as the preciding generations.

ii) Budding :-

fig Budding

1) Budding is the method of vegetative reproduction.

2) Some of the genera i.e Blasto bacter and plantomises etc generally known as budding bacteria.

3) Budding involes development of a small protugens (Bud) at the end of cell.

4) This is a largest and development in to a new cells The new cells cuts off from the fragments and grows as a new indevidal cells.

iii) **Fragmentation :-**

1) Fragmentation is a method of vegeta-tive reproduction.

2) Some bacterial genera are fillamentious in nature.

3) They usually reproduce by fragmentation of fillament.

4) In the first genera reproduction occurs by fragmentation of the fillaments

5) It occurs by the breaking off cells in the fillaments as a results fillament are formed.

6) They grow into new fillaments.

Q. 3 Explain the structure of Bacterial cell.

⇒

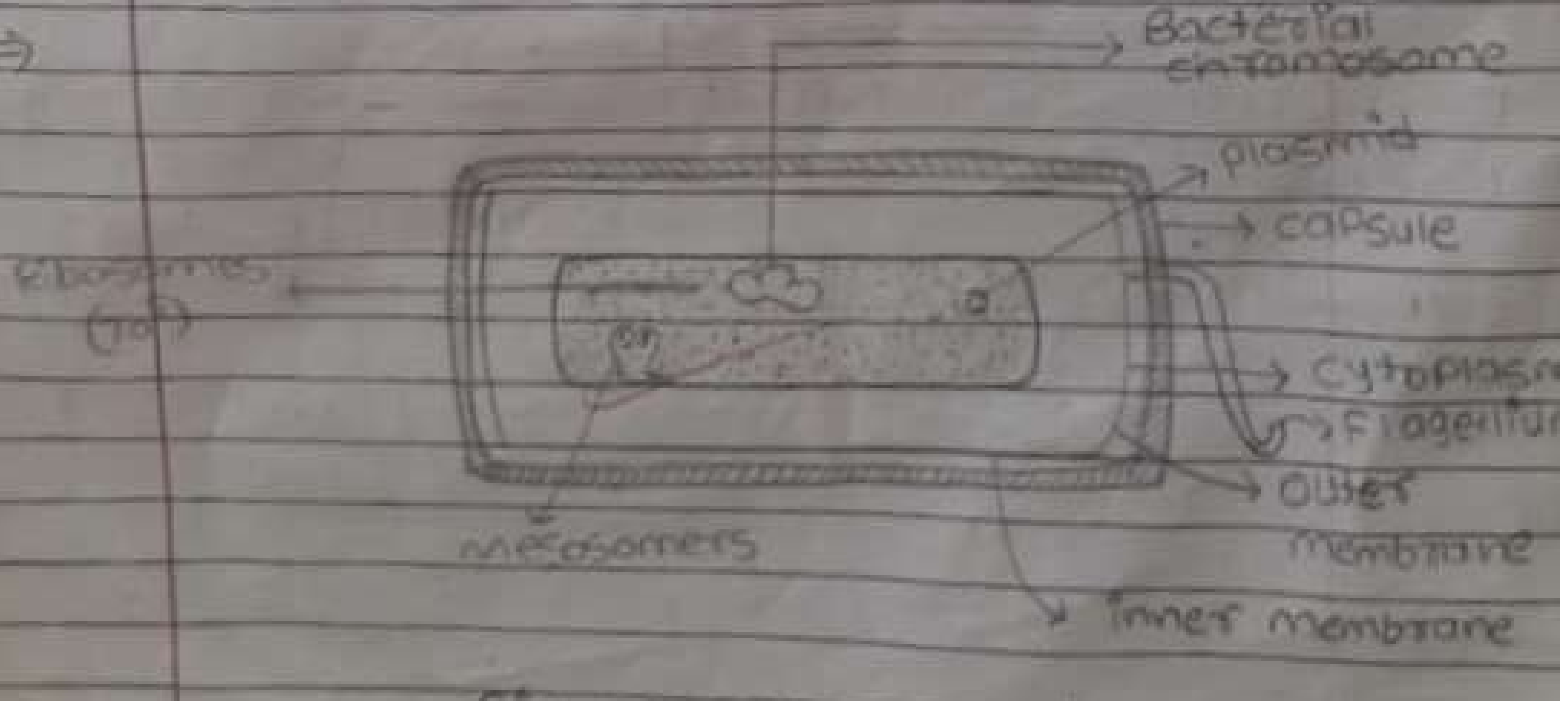

fig. structure of Bacterial cell

properties of adhesive & cohision

Cohision attraction betⁿ like same molecule is called Cohision.

Because of this property water from continuous column in xylum.

Adhesive properties of water attraction on betⁿ disimilar molecule water & wall of xylum.

- When the loss of the water takes place due to transpiration the ammount of water of mesophill cell decreses

On the other hand osmotic & diffusion pressure of this cell increased.

- The fullfill requirement of mesophill cell or the movements of water take place from adjacents cell & xylum cell of leaf.

- Now pressure is created in water in the xylum element of leaves.

- This tension is transmitted to downward to water is pulled upward in the form of contenous unbroken water column which transpiring surface upto the top of plant & similarly sirentenous by

Assignment - 01 10/10

Name :- Chatre Vishnu Ajhale
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Sub :- Botany
Class :- B. Sc. Ty Semi - V

Q.1 What is ascent of Sap & Explain in transpiration pull theory?

→ The water absorved in root hair of plant & Supply to the xylum & root to xylum stem & finally distributed to all parts of plants

- The movement of water takeplace from base of the plant to apex of the plant through xylum of stem

this upword movement of water from base of the apex of the stem is called Ascent of Sap

- Transpiration pull theory or Cohesion & Adhesive theory.

This theory firstly discoverd by Jolly & Dixon in 1894 & think theory widely excepted throught word

- According to this theory of movemen of water in plant from base to apex of plant possible be cause th

1) A Bacterial cell inclosed within the cell invelope. The cell invelope give th
Protection of bacterial cell.

2)

2) The cell envelope are made up of a capsule, plasma membrane, cell wall. In some other cells presence a outer plasma membrane in between the capsule and cell wall.

3) The bacteria covered by a capsule called capsulated bacteria.

4) The bacteria which do not contain a capsule are called non-capsulated bacteri

5) The cell envelope incloses cytoplasm. In cytoplasm it contains ribosomes and misosomes.

6) Golgi bodies, endoplasmic reteculqr
- mitocondria are absent.

7) The ribosomes are 70 S type.
The cytoplasm contains a bacterial chromosome, it is a not surrounded by nuclear membrane hence nuclear material of bacteria is called Nucleoids

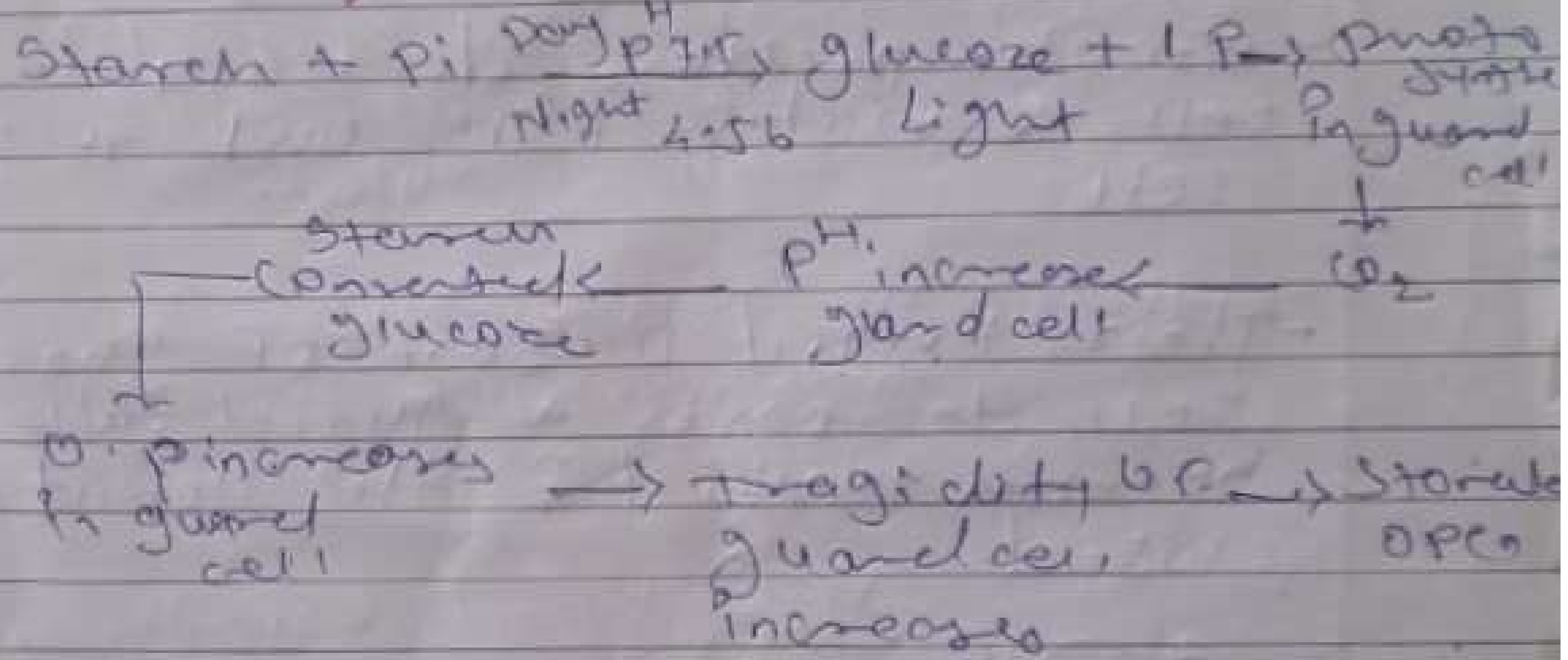
8) Some bacteria contain and extra ch romosomal circular DNA called.

9) In cytoplasm presents a pocket like structure misosomes.

the process is complited

Q.02 Explain starch Sugur inter consenat
theory & K^+ pump theory?

→ Starch Sugar inter conservation theory?



- This theory is proposed by Scarch in 1932

According to this theory intercon
of starch & sugur is because of
a change in p^H of guard cell.

- In day time photosynthesis take place in guard cell, CO_2 consenation reduced & p^H of guard cell increased

- When p^H increased the starch becomes active & hydrolysis of starch this process occurs in glucose and phosphate

- The guard cell become turgid & Stomata open.

- In night reserve process occur glucose 1 phosphate is converted into starch & it is active at low pH

- osmotic pressure decreases in guard cell & water move out of guard cell

- Their turgid pressure of guard cell decreases & guard cell becomes flaccid & the stomata are closed.

K^+ Pump theory :-

In day.

Light ⟶ Starch ⟶ malic acid

⟶ Dissociate $H^{\oplus}$ proton ⟶ K^+ entered in out guard cell ⟶ pottasium molecule are formed ⟶ pottasium molecule into guard cell ⟶ increase osmotic pressure ⟶ H_2O enterse into guard cell ⟶ Stomata open.

- This theory firstly discovered by the Levitt according to Levitt entry of side K^+ has roll in the opening & closing of Stomata,

In day time photosynthesis is take place in the guard cell it into result increase pH & starch convert into organic acid that is malic acid

This malic acid formed guard cell dissociated into malate H^{+}

- The proton are pumped out fro the guard cell into the subsidary cell & K^+ ione are pumped out the guard cell by active transpo

- ATP is required to the process now K^+ react with maltate & pottasium maltate is formed in cytoplasma of guard cell.

- It increases the osmotic pressu of guard cell & H_2O enterse into the guard cell from neighbouring cell the turgid pressed of guard cell increaser & stomata open.

- In reverse process take place at night & stomata are closed.

total loss in energy = total gain in energy

$$V\rho g(h_1 - h_2) + V(P_1 - P_2)$$

$$= \frac{1}{2} V\rho (v_2^2 - v_1^2)$$

Which gives

$$h_1 g + \frac{P_1}{\rho} + \frac{1}{2} v_1^2 = h_2 g + \frac{P_2}{\rho} + \frac{1}{2} v_2^2$$

$$\boxed{\text{i.e } hg + \frac{P}{\rho} + \frac{1}{2} v^2 = \text{constant}}$$

Q.3 poiseuille's equation for flow of liquid through a horizontal Capill-y tube.

① Steady Stremline
② pressure - constant.
③ liquid layer side of tube is Constant.
④ liquid yields to just a Small Shearing Stress
⑤ tube in horizontal So that gravity does not affect.

$$\eta 2\pi x L \frac{dv}{dx} = -Px^2\pi$$

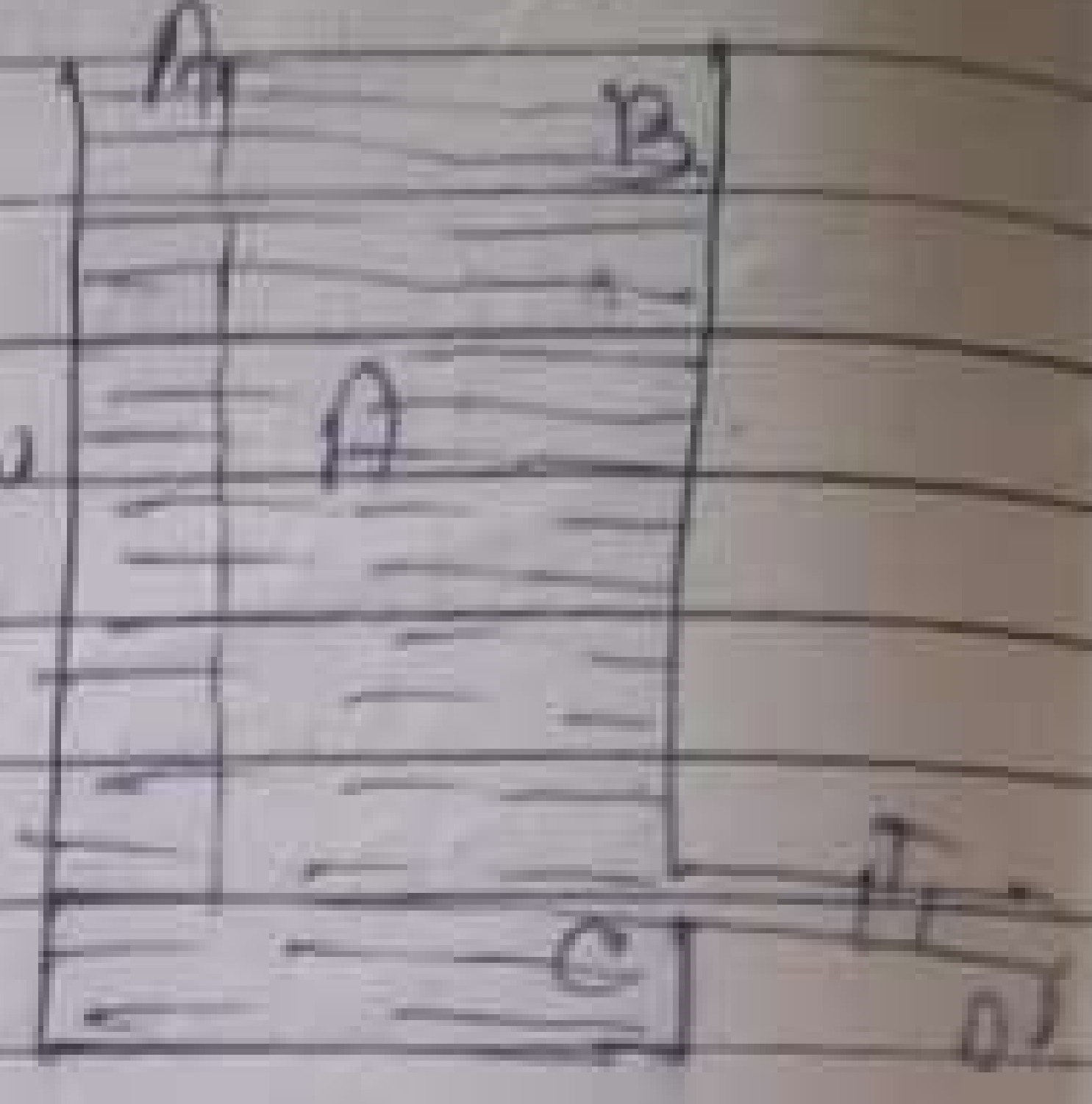
backward draging force and Inward draging force.

$$dv = \frac{-Px^2\pi}{\eta 2\pi x} \frac{dx}{L}$$

$$= \frac{-Px\,dx}{\eta 2L}$$

Q.2 State and prove bernollis therrem.

↦ $hg + \frac{P}{S} + \frac{1}{2}V^2 = \text{constant}$



a_1 a_2 - liquid is flow

P_1V_1 P_2V_2 Brod to narrow

$a_1V_1 = a_2V_2$

$V_2 > V_1$ $a_2 < a_1$

P_1 at section $AB > P_2$ At section CP

$CDC'D' = a_2\delta l_2$

$ABCD \rightarrow A'B'C'D'$

$A'B' \rightarrow \delta l_1$, $CD = C'D' \rightarrow \delta l_2$

$AB - A'B' \rightarrow \delta l_1$

loss in potentical energy liquid

$= VSgh_1 - VSgh_2$

$= VSg(h_1 - h_2)$

$P_1a_1\delta l_1 = P_1V$

$P_2a_2\delta l_2 = P_2V$

Net work $= P_1V - P_2V$

$= V(P_1 - P_2)$

$= VSg(h_1 - h_2) + V(P_1 - P_2)$

$V_2 > V_1$

$KE = \frac{1}{2}VSV_2^2 - \frac{1}{2}VSV_1^2$

$KE = \frac{1}{2}VS(V_2^2 - V_1^2)$

B.Sc.II Bolegave S.M.

$\frac{10}{10}$

Page
Date 2020-21

Assigement

Q.1. State the newton's first, second & third law of motion.

→ 1) Newton's first law of motion :- every body Continuous to be in it's state of rest or uniform motion in a straight line unless acted upon by an external unbalanced force.
ex:- moving bus

2) Second law:- The rate of change of linear momentum is proportional to impressed force takes place in the direction of applied force.

$$\therefore f = ma$$
$$f \propto \frac{mv - mu}{t}$$
$$f \propto m\left(\frac{v-u}{t}\right)$$
$$f \propto ma$$
$$f = ma$$
$$f = \frac{dp}{dt}$$
$$f = \frac{d(mv)}{dt}$$
$$f = m\frac{dv}{dt}$$
$$f = ma \quad \left(\frac{dv}{dt} = a\right)$$

3) Newton's third law:- Every actio
their is equal and opposite reac
thus if f_{12} & f_{21} the forcess extert
on each other by two interacting
bodies respectively they could hav
$F_{12} = F_{21}$

$$= \frac{-Px}{2\eta L}\,dx$$

$$V = \frac{-P}{2\eta L}\int x\,dx$$

$$V = \frac{-P}{2\eta L}\,\frac{x^2}{2} + C$$

$$\boxed{V = \frac{-Px^2}{4\eta L} + C}$$

Now $V = 0$ & where $x = r$ where layer of constant.

$$0 = \frac{-Pr^2}{4\eta L} + C$$

$$\frac{-Pr^2}{4\eta L} = -C$$

$$\boxed{C = \frac{Pr^2}{4\eta L}}$$

Put this value in eqⁿ ②

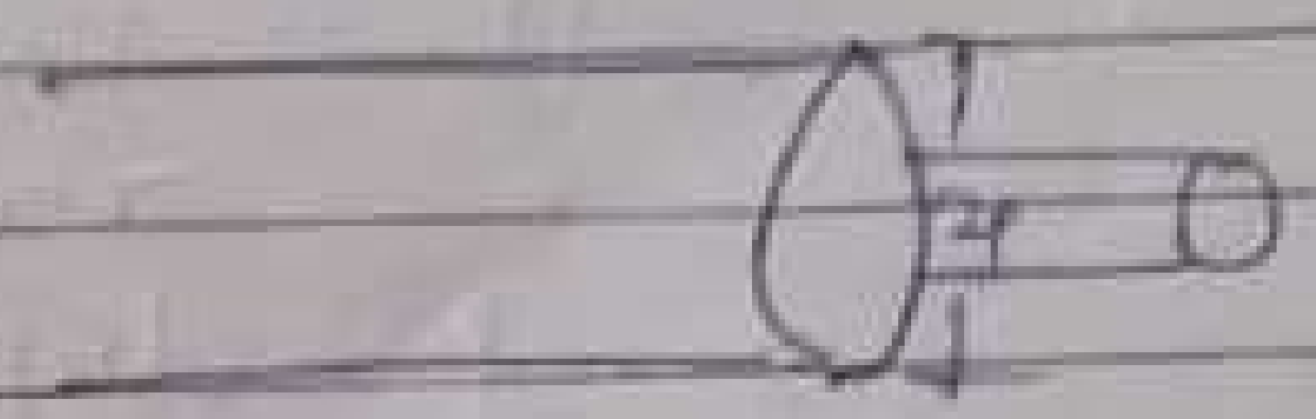
$$V = \frac{-Px^2}{4\eta L} + \frac{Pr^2}{4\eta L}$$

$$= \frac{P}{4\eta L}(-x^2 + r^2)$$

$$\boxed{V = \frac{P}{4\eta L}(r^2 - x^2)}$$

velocity of flow of liquid

State & prove Coaxial cylindrical tube.



$(x+dx)$

$2\pi x \, dx$

$2\pi x \, dx . v$

$$V = \int_0^r 2\pi x \, dx \, v$$

$$V = \int_0^r 2\pi x \frac{P}{4\eta l}(r^2 - x^2)\,dx$$

$$V = \frac{2\pi P}{4\eta l}\int_0^r x(r^2 - x^2)\,dx$$

$$V = \frac{2\pi P}{4\eta l}\int_0^r xr^2 - x^3 \, dx$$

$$V = \frac{\pi P}{2\eta l}\left[\frac{x^2 r^2}{2} - \frac{x^4}{4}\right]_0^r + c$$

$$V = \frac{\pi P}{2\eta l}\left[\frac{x^2 r^2}{2} - \frac{x^4}{4}\right]_0^r + c$$

$$V = \frac{\pi P}{2\eta l}\left[\frac{r^4}{2} - \frac{r^4}{4}\right] + c$$

$$V = \frac{\pi P}{2\eta l}\frac{r^4}{1}\left[\frac{1}{2} - \frac{1}{4}\right] + c$$

$$\boxed{V = \frac{\pi P r^4}{8\eta l} + c}$$

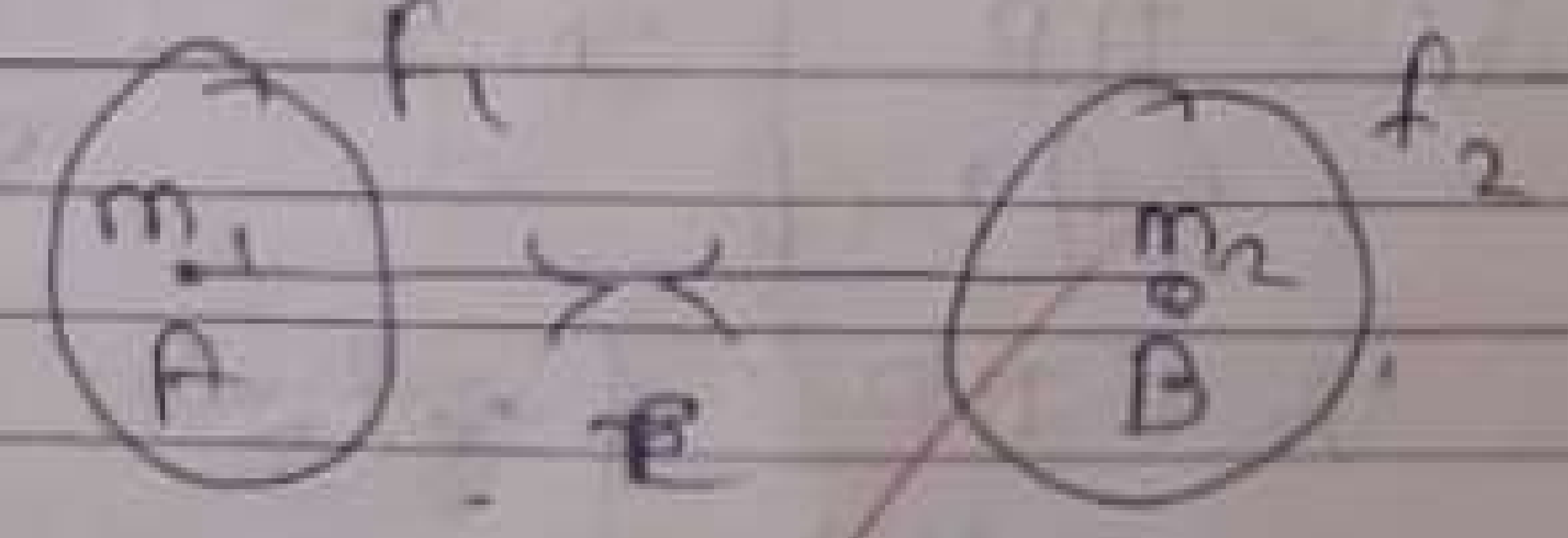
$V = \pi P r^4$

thus if we know that

P - pressure
V - volume of tube
r - radius
l - length

5. State and prove newton's law's of gravitation?

In 1687 the newton's state the gravitational law it is stated that every partical of matter the universe attract's every othe particles with force which is direct proportional to the product of thei masses and inversolly proportiona to the square of the distance betn them.



If m_1 & m_2 be the masses of two particles distance r aperts and be the force of attraction bet^n them

We have $f \propto \frac{m_1 m_2}{r^2}$

$$F = G \frac{m_1 m_2}{r^2}$$

Where dimension is $[m^{-1}L^{3}T^{-2}$
Gravitational constant in CGS unit is
6.669×10^{-8} dyne cm²/gm²