Class: I1   **Mathematics**   **10th Feb,2024**

i.   If α, β, γ are the angles of a triangle ABC, then prove that $\cos(\frac{\alpha+\beta}{2}) = \sin\frac{\gamma}{2}$

ii. Prove that $\tan\frac{\alpha}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$

iii. Solve the triangle ABC If $\beta = 60°$, $\gamma = 15°$, $b = \sqrt{6}$

iv. Prove that $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$

v.   Show that $r_1 = s\tan\frac{\alpha}{2}$

vi. Show that $r = 4R\sin\frac{\alpha}{2}\sin\frac{\beta}{2}\sin\frac{\gamma}{2}$

vii. Find R if a=13, b=14, c=15

viii. If α, β, γ are the angles of a triangle ABC, show that $\cot\frac{\alpha}{2} + \cot\frac{\beta}{2} + \cot\frac{\gamma}{2} = \cot\frac{\alpha}{2}\cot\frac{\beta}{2}\cot\frac{\gamma}{2}$.

ix. If $\cot\theta = \frac{15}{8}$ and the terminal arm of the angle is not in 1st quadrant, find the values of $\cos\theta$ and $\csc\theta$.

Biology

Chapter No 11: Bioenergetics

**Lesson** This lesson is about photosynthesis and respiration.
Inquiry:

The electron transport chain is a series of four protein complexes that couple redox reactions, creating an electrochemical gradient that leads to the creation of ATP in a complete system named oxidative phosphorylation. It occurs in mitochondria in both cellular respiration and photosynthesis. In the former, the electrons come from breaking down organic molecules, and energy is released. In the latter, the electrons enter the chain after being excited by light, and the energy released is used to build carbohydrates.

Information:

Respiratory chain: In the Krebs cycle NADH and H+ are produced from NAD+ . NADH then transfers the hydrogen atom to the respiratory chain (also called electron transport system) where electrons are transported in a series of oxidation-reduction steps to react, ultimately, with molecular oxygen. (Fig. 11.14). The oxidation reduction substances which take part in respiratory chain are:

i.   A coenzyme called coenzyme

ii.   A series of cytochrome enzymes (b,c,a,a3)

iii.   Molecular oxygen (02) Cytochromes are electron transport intermediates containing haem of related prosthetic groups, that undergo valency changes of the iron atom. Haem is the same iron-containing group that is the oxygen-carrying pigment in hemoglobin. The path of electrons in the respiratory chain appears to be as follows.
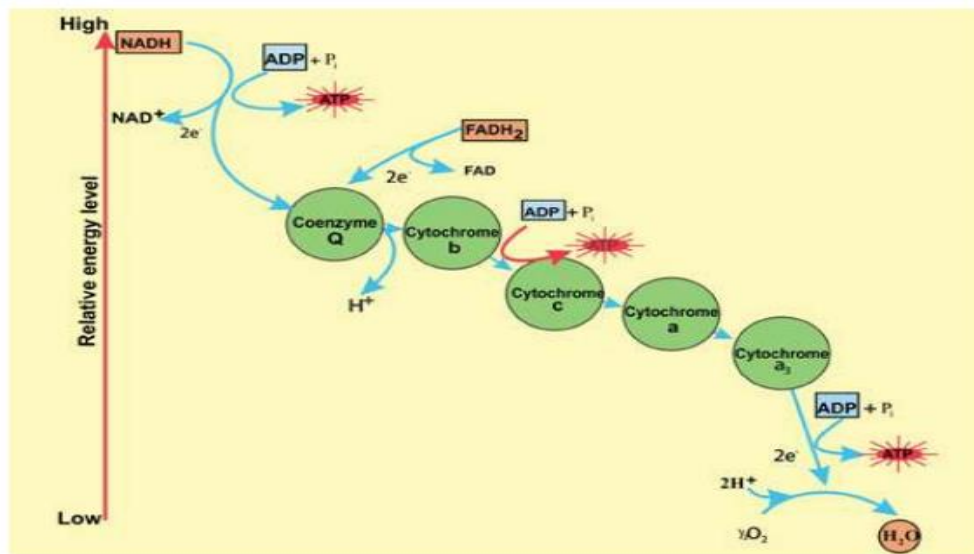

NADH is oxidized by coenzyme Q. This oxidation yields enough free energy to permit the synthesis of a molecule of ATP from ADP and inorganic phosphate. Coenzyme Q is in turn oxidized by cytochrome b which is then oxidized by cytochrome c. This step also yields enough energy to permit the synthesis of a molecule of ATP. Cytochrome c then reduces a complex of

two enzymes called cytochrome a and as (for convenience the complex is referred as cytochrome a). Cytochrome a is oxidized by an atom of oxygen and the electrons arrive at the bottom end of the respiratory chain. Oxygen is the most electronegative substance and the inal acceptor of the electrons. A molecule of water is produced. In addition, this inal oxidation provides enough energy for the synthesis of a third molecule of ATP. Oxidative phosphorylation: Synthesis of ATP in the presence of oxygen is called oxidative phosphorylation. Normally, oxidative phosphorylation is coupled with the respiratory chain. As already described ATP is formed in three steps of die respiratory chain (Fig. 11.14). The equation for this process can be expressed as follows:

$$NADH + H^+ + 3ADP + 3Pi + 1/2O_2 \rightarrow NAD^+ + H_2O + 3ATP$$
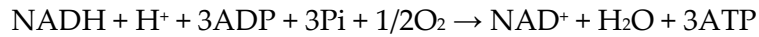
Where Pi is inorganic phosphate. The molecular mechanism of oxidative phosphorylation takes place in conjunction with the respiratory chain in the inner membrane of the mitochondrion. Here also, as in photosynthesis, the mechanism involved is chemiosmosis by which electron transport chain is coupled with synthesis of ATP. In this case, however the pumping/movement of protons (H+) is across the inner membrane of mitochondrion folded into cristae, between matrix of mitochondrion and the mitochondrion's intermembrane space. The coupling factors in respiration are also different from those in photosynthesis.
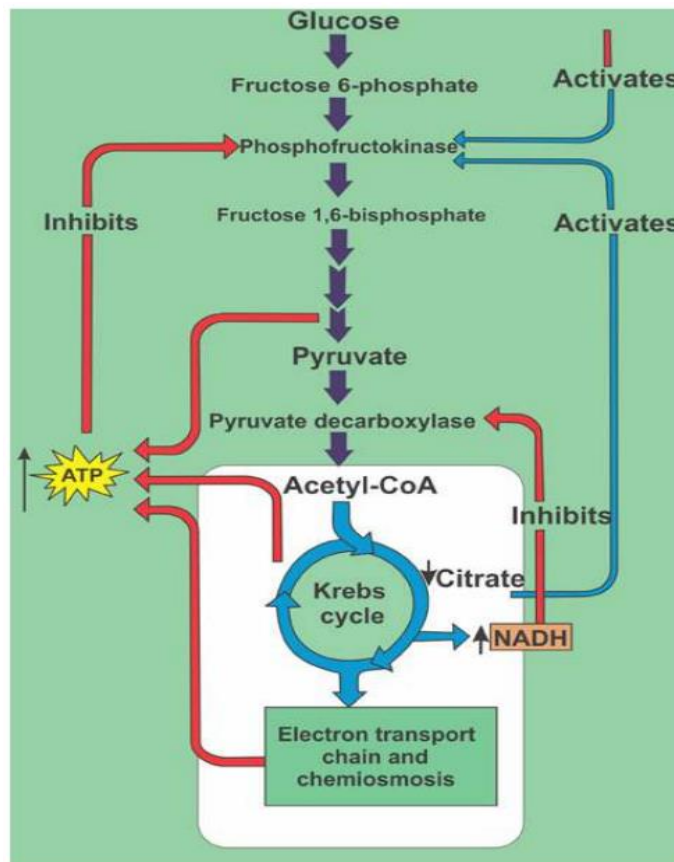
C:Synthesising/ absorbing the information

Write your own summary-notes in your notes book based on information you read in information section and what your book says about Electron transport chain.

D:Practising.(Readyourtextbookfordetailedinformation)

1.   Write down the name of substances which take part in ETC?

2.   Write in your own words about respiratory chain?

3.   Draw respiratory chain?

English

Revise Letters/ Applications (Bright Grammar)

Letters: 29, 30 (Write anyone in your notebook)Or

Applications: 14, 15 (Write anyone in your notebook)

Statistics

Chapter 7short numericals; Q.No. 41 ot 50

Computer

RollNo:_____
Lesson: Printing a document   (Ch. # 8)

Inquiry:

Printing of a document.

•   Please read what your textbook says about Table. (Page no 246 - 247)
•   Watch this brief YouTube video on how to print:
https://www.youtube.com/watch?v=v5PIRRpt4xc
Information:
 In this lesson we learned about printing.

•   How to print a document
Practising:
Q.) Write procedure of printing a document?

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Q.) State use of page setup dialog.

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Economics

Lesson: Chapter No. 10   **[Analysis of Firm's Revenue]**

A)   Inquiry: Do you know what is meant by revenue in economics? Can you give examples of revenue that incurred by sale of goods and services? Can you explain various variants of revenue?

B)   Information:

(Read your text book pages from Page no. 207 to 209

Revenue refers to the amount received by a firm from the sale of a given quantity of a commodity in the market. Revenue is a very important concept in economic analysis. It is directly influenced by sales level, i.e., as sales increases, revenue also increases. The main aim of every firm is to maximize its profit.

While profit = Total revenue – Total cost

= TR – TC

Thus revenue concepts must be discussed along with cost concepts to find out the output units of the firm which will bring maximum profit.

There are three main concepts if revenue:

Total Revenue (TR):

Total Revenue refers to total receipts from the sale of a given quantity of a commodity. It is the total income of a firm. Total revenue is obtained by multiplying the quantity of the commodity sold with the price of the commodity.

$$\text{Total Revenue} = \text{Quantity} \times \text{Price}$$

For example, if a firm sells 10 chairs at a price of Rs. 160 per chair, then the total revenue will be: 10 Chairs × Rs. 160 = Rs 1,600

Average Revenue (AR):

Average revenue refers to revenue per unit of output sold. It is obtained by dividing the total revenue by the number of units sold.

$$\text{Average Revenue} = \text{Total Revenue/Quantity}$$

For example, if total revenue from the sale of 10 chairs @ Rs. 160 per chair is Rs. 1,600, then:

Average Revenue = Total Revenue/Quantity = 1,600/10 = Rs 160

Marginal Revenue:

Marginal revenue is the additional revenue generated from the sale of an additional unit of output. It is the change in TR from sale of one more unit of a commodity.

We know, MR is the change in TR when one more unit is sold. However, when change in units sold is more than one, then MR can also be calculated as:

MR = Change in Total Revenue/ Change in number of units = $\Delta TR/\Delta Q$
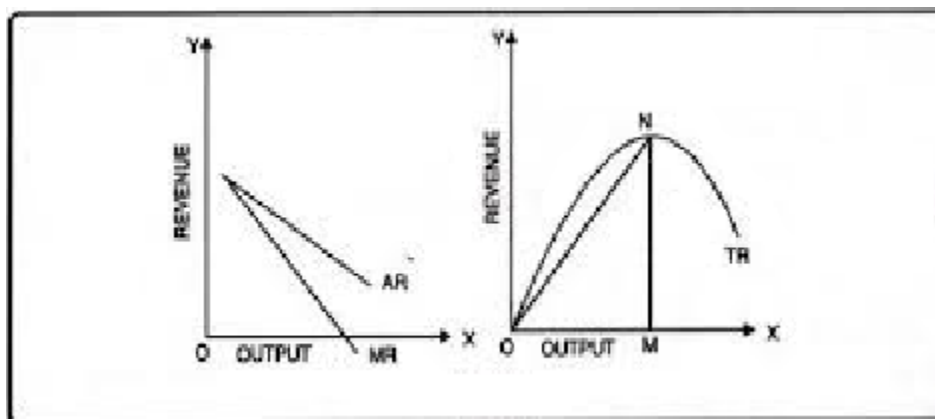
Let us understand this with the help of an example: If the total revenue realized from sale of 10 chairs is Rs. 1,600 and that from sale of 14 chairs is Rs. 2,200, then the marginal revenue will be:

MR = TR of 14 chairs – TR of 10 chairs / 14 chairs -10 chairs = 600/4 = Rs. 150

Revenue Curves under Perfect Competition:
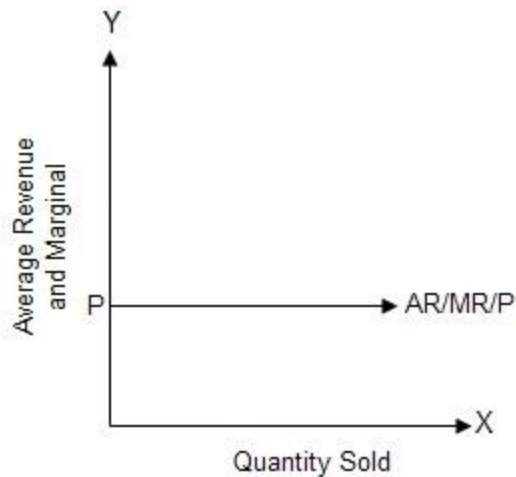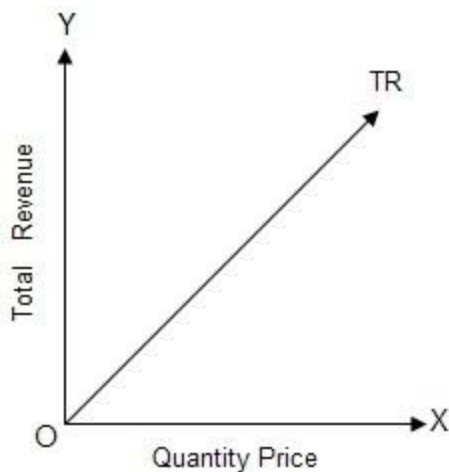
Revenue Curves under Monopoly:

C) **Synthesizing / Absorbing information**

- What do you know about TR, AR and MR?
- Derive revenue curves under perfect competition and monopoly.

D) **Practising:**

For practice read your textbook chapter No. 10 Page No. 207 to 209

Watch this video to learn more about:

<u>Revenue Curves</u>

Chemistry

Lesson: In this worksheet we will learn about Atomic structure chapter-05

SHORT QUESTIONS

1. Electrons are fundamental particles of atom comment on it?
Ans: When a substance is heated its atoms become excited and spectrum obtained is due to the electrons moreover electrons are present in every substance when energy is given to an atom

electrons are released. Rutherford also gave the information about that electrons are the fundamental particles.

2.   Write balanced equation for two nuclear reactions?
Ans: $^{14}_{7}N + n \rightarrow B + He$

   $42He + Be \rightarrow C + n$

3.   Write De-Brogle Equation. What does it show?
Ans: $=h/mv$ this equation shows that wavelength associated with electron is inversely proportional to the momentum.

4.   Discuss Pauli's Exclusion principle?
Ans: It states that "Two electrons in orbitals should have opposite spins (↑↓). It means that no two electrons in an orbital have the same values of four quantum numbers.

5.   How is atomic emission spectrum obtained?
Ans: The atomic spectrum whish is obtained from such light radiations which are emitted by the excited atoms of a substance is called atomic emission spectrum.

6.   What particles are formed by the decay of neutron?
Ans: A free neutron decays into proton (P) with the emission of an electron (e) and neutrino (n)
$n \rightarrow P + e + n$

7.   What are two different types of spectrum?
Ans: There are two different types of spectrum: (i) Continuous spectrum   (ii) Line spectrum

8.   Why the e/m ratio of cathode rays is independent of the nature of gas?
Ans: Cathode rays consist of electrons. The mass and charge of electrons do not change because electrons are the fundamental particles of any substance. The charge to mass ratio remains same therefore it does not depend on the nature of gas.

9.   Why positive rays are called canal rays?
Ans: Positive rays are called canal rays because these rays move towards cathode and are passed through holes of cathode therefore these are called canal rays.

10.   Why e/m value of canal rays depends upon the nature of gas?
Ans: Anode rays are produced as a result of encounter of cathode rays with the atoms or molecules of a gas enclosed in the discharge tube. The positive ions are produced from these gas molecules. If low molecular mass gas like H_2 is filled in the discharge tube e/m value would be high. The e/m ratio for high molecular gas becomes less due to its high molecular mass positively charged particles. So e/m value for anode rays is not fixed for every gas.

11.   Justify cathode rays are material particles?

Ans: Cathode rays can move light paddle wheel placed in their path. This shows that these rays posses momentum. From this observation it is concluded that cathode rays are material particles have definite mass and velocity.

12.   Why the neutrons are used as projectile?
Ans: The particles, which hit the nucleus and can change its nature are called projectile. A projectile must be charge less otherwise it will be captured or repelled by the nucleus. The slow moving neutrons cause nuclear reactions like fission and are used in artificial radioactivity. They are charge less; therefore they can be used as projectile in nuclear research.

$n + Cu \rightarrow Cu + hv$ (γ- radiations)

$Cu \rightarrow Zn + e$ (β-particle)
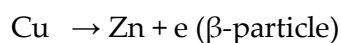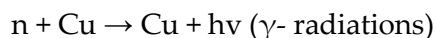
13.   How nucleus was discovered?
Ans: Rutherford passed the α-particles through gold foil. Most of the particles passed un-deflected. Only few of them were deflected at certain angles. Some were renounced back on their original path. He concluded that most part of atom is empty from which the α -particles were passed without hindrance. Avery small portion deflected the α-particle. This central part of the atom is nucleus.

14.   What are the defects in Rutherford's model?
Ans: Rutherford's model is based upon laws of gravitation and motions. He suggested that the atomic structure is like solar system and the motion of electron is like planetary motion. Actually in atoms the particles are charged while in solar system the motion of charge less bodies is studied. According to Rutherford, electrons continuously emit energy during motion. So ultimately electron should fall into the nucleus and atom should collapse. This does not happen

15.   Define wave no. & frequency?
Ans: The no. of waves in unit length is called wave no.

Unit: per meter (m^{-1})

The no. of waves passing through a point per second is called frequency.

Unit: cycles/second and hertz.

16.   What is Zeeman Effect and Stark effect?
Ans: Stark effect: When excited hydrogen atoms are placed in the electrical field then splitting of spectral lines takes place called stark effect.

When excited hydrogen atoms are placed in the magnetic field then the splitting takes place called Zeeman Effect.

17. Why the velocity of electron decreases as the distance from the nucleus increases?
Ans: $V^2 = Ze^2/4\ rm$

$V2\alpha\ 1/r$ this equation shows that increase in distance from the nucleus; the velocity of the electron decreases

18. Who suggested the dual nature of electron?
Ans: Debrogle suggested the dual nature of electron

19. Why do macroscopic particles show wave like properties?
Ans: Heavy particles have waves associated with them, but they can not be captured and we can say that macroscopic bodies don't have waves.

20. What is Moseley's law?
Ans: This law states that the square root of frequency of x-rays is directly proportional to the atomic no. of the metal i.e.

$$\sqrt{V} = a\ (z-b)$$

21. What is difference between continuous and line spectrum?
Ans: The spectrum in which different colours are not separated by dark spaces but are diffused into one another called continuous spectrum.

The spectrum in which different colours are not diffused and are separated by dark spaces are called is called line spectrum

22. What is Summerfield's modification of Bohr's Model?
Ans: Summerfield suggested electron do not revolve around the nucleus in circular paths rather in elliptical paths,

23. How X-Rays are produced?
Ans: When cathode rays strike with the heavy metal anode in the discharge tube then energy is released in the form of electromagnetic waves called x-rays.

24. What is Heisenberg Uncertainity Principle?
Ans: The square root of the frequency of x-rays is directly proportional to the atomic no. of the metal i.e.

$$V = a\ (Z-b)$$

Where 'a' and 'b' are the constants.

25. What is (n+l) rule?
Ans: This rule states that sub-shells are arranged according to the increasing order of n+ l value .The sub shell, which has lower n+ l value will be filled first. If any two sub-shells having equal values of n+ l. Then that sub-shell is filled first which has less value of 'n'

26.   What is Auf-bau principle?

Ans: This law states that the electron should be filled in the energy sub-shells in the increasing order of energy values. The electrons are placed in the sub-shells in the order as:

1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p and so on.

27.   Give the relationship between energy and frequency?

Ans: $E=hv$ where 'E' is energy of the photon is ergs or joules. 'V' is the frequency of the photon.

28.   What is Hund's Rule?

Ans: If degenerate orbitals are available and more than one electrons are to be placed in them, they should be placed in separate orbitals with the same spin rather than putting them in the same orbit with opposite spins.

29.   Why it is necessary to decrease the pressure in the discharge tube, the nature of the cathode rays remains the same?

Ans: When the pressure inside the tube is very high, and then the discharge tube is fully packed with the molecules of the gas. Due to this saturation of molecules the cathode rays fail to move away from the cathode and very small no. of molecules are ionized. The charges can not move towards their respective poles. Hence current failed to pass through the gas under high pressure.

30.   What is nodal plane?

Ans: The space or region around the nucleus where the probability of electron is minimum or zero is called nodal plane or nodal surface. For example the region between the 1s and 2s is called nodal plane.

Urdu

اشارات:	سبق "ابوالقاسم زہراوی"کا خلاصہ اپنی نوٹ بک پر تحریر کریں۔	سبق کا خلاصہ	10 فروری
☆مسلم سائنسدانوں کے کارنامے			بروزہفتہ
☆ہسپانیہ میں مسلمانوں کے عروج کا دور			
☆ابوالقاسم زہراوی کا تفصیلی تعارف			
☆ابوالقاسم زہراوی کی خدمات کا جائزہ			

Islamiat/ Tarjuma tul Quran

سوال:سورۃ انفال کے اہم علمی و عملی نکات تحریر کریں۔

Topic: Optical Instruments (Topic 10.6)

A: Inquiry:
In this topic we will be able to learn what is spectrometer? How is it constructed and how does it work? And what are its uses in Physics?

B: Information:

Topic 10.6 Spectrometer

Definition

The optical device which is used to study the spectrum of various sources of light is called a spectrometer.

Spectrum of light beam can be obtained either by refraction by prism or by diffraction from a grating.

**Construction**
It has three parts:

(i) Collimator
The function of is to make the rays coming from a nearby source parallel. At one end of the tube a convex lens is fixed on the other end, an adjustable slit is provided. When slit is just at the focus of convex lens then light rays entering from slit become parallel after passing through the lens.

(ii) Turn Table
Turn table is capable to rotate about the fixed vertical axis. A circular scale is also attached at the bottom of turn table. A prism or grating is placed on the turntable to observe the spectra.

(iii) Telescope
A telescope fixed on the stand and is rotatable about the same axis as that of turntable. A vernier scale is also attached along with the telescope.

Fig. 10.6 (a)
Schematic diagram of a spectrometer.
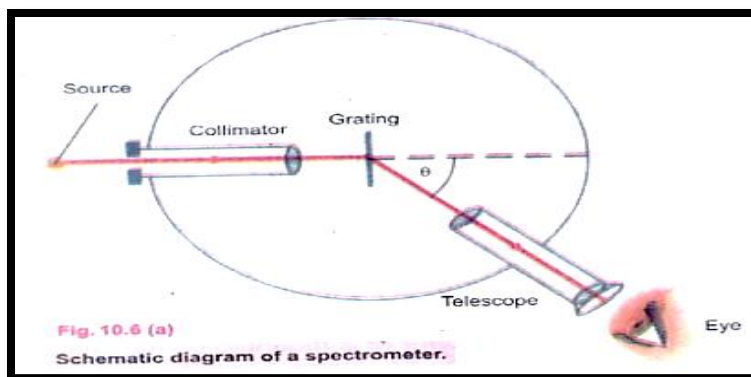
Working

• Before using the spectrometer, one should carefully adjust the turntable horizontally by traveling screws. The collimator is adjusted to get the parallel rays of light.
• The telescope should focus so that the parallel rays entering it are focused at the crosswire near the eye piece.

Uses of Spectrometer
It is used to;
• Study the spectra of different light sources.
• Study the deviation of light by glass prism.
• Calculate the refractive index of material of prism.
• Measure the wave length of light by grating.

- Read pages # 222-223 of textbook.
- Watch the following videos for further understanding:
  https://youtu.be/pxC6F7bK8CU?feature=shared
  https://youtu.be/OI3pIvLhVcc?feature=shared

C: Synthesising/absorbing information:
In your notebooks,
➢ What is spectrometer? Describe its construction and working also write down its uses?

D: Practicing:
1. **Answer the following questions and write in your notebooks.**
   i.   What is spectrometer?
   ii.   How can spectrum of light beam be obtained?
   iii.   Name three essential components of a spectrometer.
   iv.   What is the purpose of collimator in spectroscope?
   v.   Write uses of spectrometer.