GUIDANCE FOR PRACTICALS

PHYSICS

1. DETERMINATION OF WEIGHT OF AN OBJECT USING THE PRINCIPLE OF MOMENTS

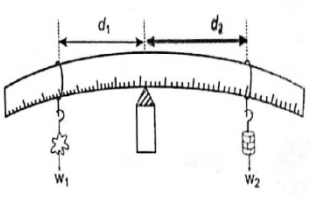
Aim: To determine the weight of an object using the principle of moments.

Apparatus required: Metre scale, knife edge, slotted weight, thread.

Formula: $\mathbf{W_1 = \frac{W_2 \times d_2}{d_1}}$ **(g)** here $w_1 \rightarrow$ Unknown weight $d_1 \rightarrow$ Unknown object distance
$w_2 \rightarrow$ Known weight $d_2 \rightarrow$ Known object distance

Procedure:

* A metre scale is supported at its centre by a knife-edge.
* W_2 and W_1 are suspended on either side of metre scale.
* Fix the position of W_2 and adjust the position of W_1 as the scale is in equilibrium.
* Measure and note d_1 and d_2.
* Repeat this for different positions and tabulate.



Observation:

S.No.	Known weight W_2 (g)	Distance d_1 (cm)	Distance d_2 (cm)	$W_2 \times d_2$ (g / cm)	Unknown weight $W_1 = \frac{w_2 \times d_2}{d_1}$ (g)
1	100	20	10	2000	200
2	100	30	15	3000	200
				Mean	200

Result: Using principle of moments, weight of unknown body, $\mathbf{W_1 = 200g = 0.2\ kg}$

2. DETERMINATION OF FOCAL LENGTH OF A CONVEX LENS

Aim: To determine the focal length of convex lens by 1) Distance object method 2) UV – method.

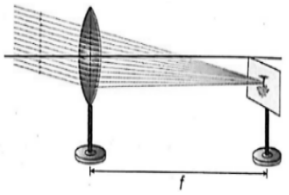
Apparatus required: A convex lens, stand, wire gauze object, screen & measuring scale

Formula: $f = \frac{uv}{u+v}$ (cm) Here, $u \rightarrow$ distance between object and lens , $f \rightarrow$ focal length
$v \rightarrow$ distance between image and lens

Procedure:

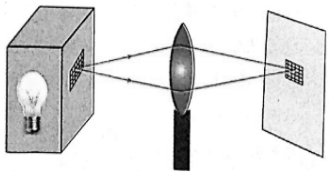
1. Distance object method:

* Fix the lens on the table near the open window.
* Locate a distance object through the open window.
* Adjust the position of the screen to get a sharp, inverted image.
* This distance between lens and the image is approximate focal length of a convex lens.



2. UV – method:

* Fix the convex lens on the table.
* Place the wire gauze object on the left side of the lens.
* Place the screen on the right side of the lens.
* Adjust the screen position to get a sharp, inverted image.
* Measure the reading 'u' and 'v'.
* Repeat the same by changing 'u' and tabulate.



Observation: *f by distance object method : f= 10* cm & *2f* = 20 cm

S.No	Size of the image	Position of the object	(u) cm	(v) cm	$f = \frac{uv}{u+v}$ (cm)
1	Diminished	u > 2f	25	17.2	10.18
2	Same size	u = 2f	20	20	10.00
3	Magnified	u < 2f	15	30.3	10.03
			Mean		10.07 cm

Result: The focal length of the given convex lens.
1. By distance object method **f = 10 cm** ; 2. By 'uv' – method **f = 10.07 cm**

3. DETERMINATION OF RESISTIVITY

Aim: To determine the resistivity of the material of the given coil of wire.

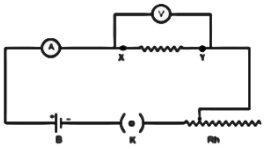
Apparatus required: A coil of wire, screw gauge, a metre scale, battery, key, ammeter, voltmeter, rheostat & connecting wires.

Formula:

$$\rho = \left(\frac{A}{L}\right) R(\Omega\text{m})$$

Where, $\rho \rightarrow$ resistivity, A → Area of cross section, L → Length & R → Resistance

Procedure:



- Connect the battery, ammeter, given wire, rheostat and key in series.
- Connect voltmeter in parallel to the unknown resistor & close the key.
- Adjust the rheostat such that the ammeter reads a current of 0.5A.
- Note the potential difference across the resistor as shown by the voltmeter.
- Adjust the rheostat and change the current in steps of 0.5 A (that is 0.5A, 1.0A, 1.5A, etc.).
- For each current, not down the corresponding potential difference as shown by the voltmeter.
- Tabulate the observations.
- Measure the diameter and length of the wire using a screw gauge and meter scale.

Observation:

i) To find the resistance :

S.No	I (ampere)	V (volt)	$R = \frac{V}{I}$ ohm
1	0.5	2	4
2	1.0	4	4
3	1.5	6	4
		Mean	4 ohms

ii) To find the diameter of the wire using screw gauge :

S.No	PSR (mm)	HSC (div)	HSR = (HSC ×LC)(mm)	TR = PSR +HSR (mm)
1	0	50	0.50	0.50
2	0	51	0.51	0.51
3	0	50	0.50	0.50
			Mean Diameter	0.50 mm

Calculation:

$$r = \frac{diameter}{2} = \frac{0.50}{2} = 0.25 \text{ mm} = 0.25 \times 10^{-3} m; L = 100\ cm = 1m$$

$$A = \pi r^2 = 3.14 \times (0.25 \times 10^{-3})^2 = 0.196 \times 10^{-6} m^2;$$

$$\rho = \left(\frac{A}{L}\right) R = \frac{0.196 \times 10^{-6}}{1} \times 4 = 0.784 \times 10^{-6} \Omega\, m$$

Result: The resistivity of the material of the wire $\boldsymbol{\rho = 0.784 \times 10^{-6} \Omega\, m}$

CHEMISTRY

4. IDENTIFY THE DISSOLUTION OF THE GIVEN SALT WHETHER IT IS EXOTHERMIC OR ENDOTHERMIC

Aim: To test the dissolution of given salt is exothermic or endothermic.

Principle: Exothermic reaction - Liberates Heat & Endothermic reaction - Absorbs Heat

Materials required: Two beakers, thermometer, stirrer & weighed amount of two samples

Procedure:

- Take 50 ml of water in two beakers A and B.
- Note the temperature of the water from beaker A and B.
- Add 5g of sample A into the beaker A & stir well until it dissolve completely.
- Record find temperature of the solution.
- Repeat the same for the sample B. Record the Observation.

Observation:

S.No	Sample	Temperature before addition of sample ($^\circ C$)	Temperature after addition of sample ($^\circ C$)	Inference
1	A	30	35	Increases
2	B	30	25	Decreases

Result: From the inference, made,

- The solution of sample A is **Exothermic reaction.**
- The solution of sample B is **Endothermic reaction.**

5. TESTING THE SOLUBILITY OF THE SALT

Aim: To test the solubility of the given salt based on the saturation and unsaturation of the solution at a given temperature.

Apparatus required: 250ml beaker, A Stirrer, distilled water, 100 ml measuring jar & table salt.

Principle: Saturated Solution - No more solute can be dissolved.

Unsaturated solution -More solute can be dissolved, after the point of saturation

Procedure:

- In a 250 ml beaker, pour 100 ml water.
- To this, add 25 g of table salt stir the content very well.
- Add 11 g of table salt following by constant stirring.
- Now add 1 g salt. Record your observation.

Observation:

S.No.	Amount of salt added	Observation	Inference
1	25 g	dissolved	unsaturated
2	11 g	dissolved	saturated
3	1 g	undissolved	super saturated

Result: From the above observation, it is inferred that the amount of salt required for saturation is **36 g.**

6. TESTING THE WATER OF HYDRATION OF SALT

Aim: To check whether the given sample of salt possesses 'water of hydration' or not. To verify the presence of water molecules in the given hydrated salt.

Principle: A hydrated salt is a crystalline salt molecule that is loosely attached to a certain number of water molecules. e.g: Crystalline copper sulphate (CuSO4.5H2O)

Apparatus required: A pinch of crystalline copper sulphate in a test tube, tongs, spirit lamp.

Procedure:

- **Test 1:** A pinch of crystalline copper sulphate taken in a test tube and heated.
- **Test 2:** A pinch of calsium chloride taken in a test tube and heated.

Observation & Inference:

Test 1: Water droplets are seen & hydration is present.

Test 2: Water droplets are not seen & hydration is absent.

Result: In the given sample of salt, water of hydration is present in **A**, absent in **B**.

7. TEST THE GIVEN SAMPLE FOR THE PRESENCE OF ACID OR BASE

a) Acid:

Aim: To identify the presence of an acid or a base in a given sample.

Apparatus required: Test tubes, test tube stand, glass rod, phenolphthalein, methyl orange, sodium carbonate salt, given sample & litmas paper.

Principle: In acid medium, (a) Phenolphthalein is colourless.

(b) Methyl orange is pink in colour.

(c) Sodium carbonate gives brisk effervescence.

Procedure:

Test 1 : Take 5 ml of the test solution in a test tube and add Phenolphthalein in drops to this content

Test 2 : Take 5 ml of the test solution in a test tube and add Methyl orange in drops.

Test 3 : Take 5 ml of the test solution in a test tube and add a pinch of sodium carbonate salt.

Observation & Inference :

Test 1 : No change in colour & Presence of acid.

Test 2 : Pink & Presence of acid.

Test 3 : Brisk effervescence occurs & Presence of acid.

Result: The given test solution contains **Acid**.

a) Base:

Aim: To identify the presence of an acid or a base in a given sample.

Apparatus required: Test tubes, test tube stand, glass rod, phenolphthalein, methyl orange, sodium carbonate salt, given sample & litmas paper.

Principle: In base medium, (a) Phenolphthalein is pink in colour.
(b) Methyl orange is yellow in colour.
(c) Sodium carbonate does not give brisk effervescence.

Procedure:
Test 1: Take 5 ml of the test solution in a test tube and add Phenolphthalein in drops to this content
Test 2: Take 5 ml of the test solution in a test tube and add Methyl orange in drops.
Test 3: Take 5 ml of the test solution in a test tube and add a pinch of sodium carbonate salt.

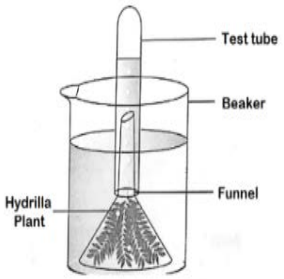
Observation & Inference :
Test 1: Pink & Presence of base.
Test 2: Yellow & Presence of base.
Test 3: No Brisk effervescence & Presence of base.

Result: The given test solution contains **Base.**

BIO-BOTANY

8. PHOTOSYNTHESIS – TEST TUBE AND FUNNEL EXPERIMENT (DEMONSTRATION)

Aim: To prove that oxygen is evolved during photosynthesis.



Materials required: Test tubes, funnel, beaker, pond water & hydrilla plant.

Procedure:
* Take a few twigs of Hydrilla plant in a beaker of pond water.
* Place an inverted funnel over the plant.
* Invert a test tube filled with water over the stem of funnel.
* Keep the apparatus in the sunlight for few hours.

Observation After an hour, it is noted that water gets displaced down from test tube.

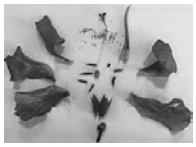
Inference
* During photosynthesis, oxygen is evolved as a by-product. Gas bubbles liberated from the Hydrilla plant reach the top of the test tube and it displaces the water downwards.
* Take the test tube and keep the burning stick near the mouth of the test tube. Increased flame will appear.
* Hence, it is proved that oxygen is evolved during photosynthesis.

9. PARTS OF A FLOWER

Aim To dissect and display the floral parts like Calyx, Corolla, Androecium and Gynoecium of the given flower.

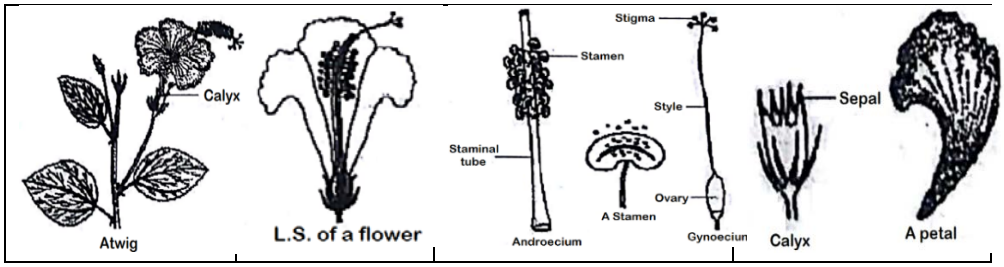
Materials Required: Flower, needle & paper.

Procedure:
* With the help of the needle dissect the different whorls of the flower.
* Calyx, corolla – Accessory organ
* Androecium – Male part } Reproductive
* Gynoecium – Female part } organ



Dissection

Diagram:



Result: The parts of the flower are drawn and labelled.

10. MENDEL'S MONOHYBRID CROSS

Aim

To study the monohybrid cross by using model / picture / photograph. To find out the phenotypic ratio and genotypic ratio in pea plant using checkerboard.

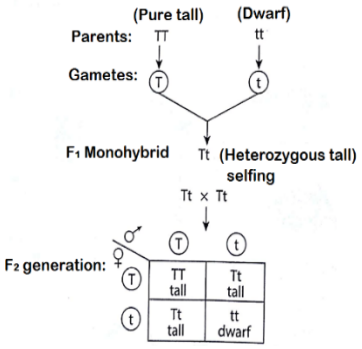
Definition:

Monohybrid cross- cross involving one pair of contrasting characters.

Procedure:

1. Pure breeding tall plant is crossed with pure breeding dwarf plant.
2. All the F_1 hybrid plants were tall (Tt)
3. Selfing the F_1 hybrid plants resulted in tall and dwarf plants in F_2 generation.

Diagram



Result:

Phenotypic ratio = **Tall: Dwarf = 3 : 1**

Genotypic ratio = **Pure Tall : Hybrid Tall : Pure Dwarf = 1 : 2 : 1**

11. OBSERVATION OF TRANSVERSE SECTION OF DICOT STEM AND DICOT ROOT

Aim

To observe transverse section (T.S) of Dicot Stem / Dicot Root from permanent slides.

Observation:

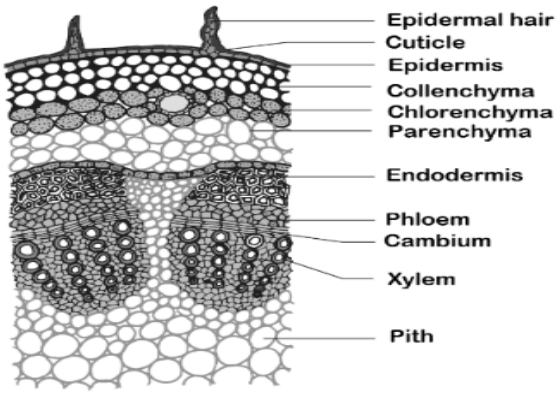
A) The given slide is identified as **T.S of Dicot Stem.**

Reasons:

- Vascular bundles are arranged in a ring.
- Conjoint, collateral, endarch & open vascular bundle.
- Ground tissues: cortex, endodermis, pericycle & pith.
- 3 to 6 layer of collenchymas tissues in hypodermis.

Diagram:

Dicot Stem :



Observation:

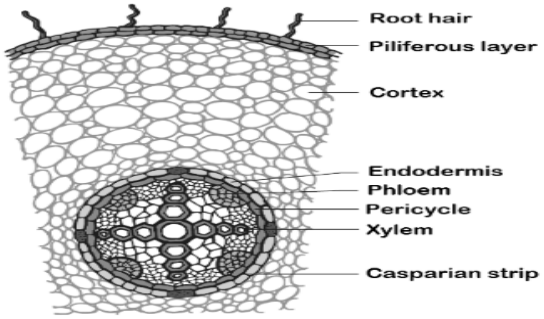
B) The given slide is identified as **T.S of Dicot Root.**

Reasons:

- Vascular bundle are radial.
- Xylem is exarch and Tetrarch.
- Casparian strips & passage cells are in endodermis.
- Cortex is made up of parenchymatous cells.

Diagram:

Dicot Root :



BIO-ZOOLOGY

12. OBSERVATION OF MODELS – HUMAN HEART AND HUMAN BRAIN

a) Human Heart:

Aim: To identify the given model, draw labelled diagram and write a note on it.

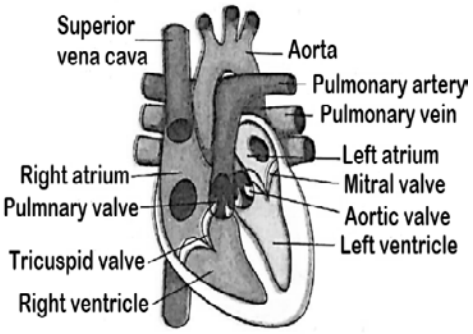
Materials Required: Model showing the L.S of human heart.

Identification: The given model is identified as L.S. of **Human Heart.**

Notes:

1. The heart has four chambers namely two auricles and two ventricles.
2. The auricles are separated by interauricular septum and ventricles are separated by interventricular septum. It prevents the mixing of oxygenated and deoxygenated blood.
3. Tricuspid valve – It is located between the right auricle and the right ventricle.
4. Bicuspid valve – It is located between the left auricle and the left ventricle.
5. Heart is covered by a protective double walled membrane called pericardium.
6. The heart pumps blood to all parts of the body.

Diagram



Result: The given model is identified as L.S. of **Human Heart**.

b) Human Brain:

Aim: To identify the given model, draw labelled diagram and write a note on it.

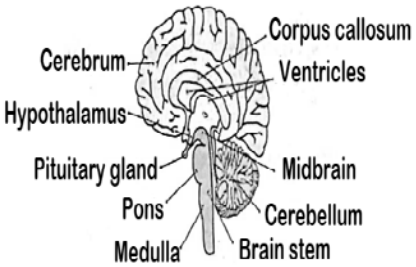
Materials Required: Model showing the L.S of human brain.

Identification: The given model is identified as L.S. of **Human Brain.**

Notes:

1. Human brain is placed inside the cranial cavity.
2. It is the controlling centre of all the body activities.
3. It is covered by three connective tissues.(Duramater, Arachnoid, Piamater)
4. Human brain is divided into three major parts namely forebrain, midbrain and hind brain.

Diagram



Result: The given model is identified as L.S. of **Human Brain**.

13. IDENTIFICATION OF BLOOD CELLS

a) Red Blood Cells

Aim: To identify the given slide, draw neat labelled diagram and write a note on it.

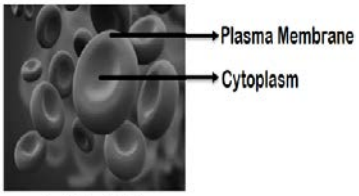
Materials Required: i) Microscope ii) Slide

Identification: The given slide is identified as **Red Blood Corpuscles - (Erythrocytes).**

Reasons:

1. RBCs are biconcave and disc shaped.
2. Mature mammalian RBC's do not have nucleus.
3. Haemoglobin is a respiratory pigment which gives red colour.
4. It transports oxygen from lungs to tissues and carbon-dioxide from tissues to lungs.

Diagram



Red Blood Cells

Result: The given slide is identified as **Red Blood Corpuscles** – (Erythrocytes).

b) White Blood Cells:

Aim: To identify the given slide, draw neat labelled diagram and write a note on it.

Materials Required: i) Microscope ii) Slide

Identification: The given slide is identified as **White Blood Corpuscles (Leucocyte).**

Diagram:

Reasons:

1. WBCs are colourless and they have nucleus.
2. They show amoeboid movements.
3. They fight against germs and other foreign bodies and thus protect the body from microbial infections and diseases.
4. There are five different types of WBC namely Neutrophils, Eosinophils, Basophils, Lymphocytes and Monocytes.

Result: The given slide is identified as **White Blood Corpuscles (Leucocyte).**

14. IDENTIFICATION OF ENDOCRINE GLANDS

a) Thyroid gland :

Aim: To identify the endocrine gland, its location, hormones secreted and functions.

Materials Required:

- Endocrine glands – Thyroid gland
- Any one endocrine gland should be flag labelled.

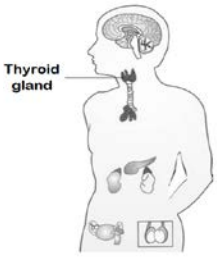
Identification: The marked endocrine gland is identified as **Thyroid gland.**

Location: Thyroid gland is a bilobed gland located in the neck region on either side of the Trachea.

Hormones Secreted: Triiodothyronine (T3) & Thyroxine (T4)

Functions of hormones:

1. Thyroxine increases the basal metabolic rate (BMR).
2. It is required for normal growth and development.
3. It is a personality hormone.



Result: The flag labelled endocrine gland is identified as **thyroid gland**.

b) Islets of Langerhans :

Aim: To identify the endocrine gland, its location, hormones secreted and functions.

Materials Required:

- Endocrine glands – Pancreas - Islets of Langerhans.
- Any one endocrine gland should be flag labelled.

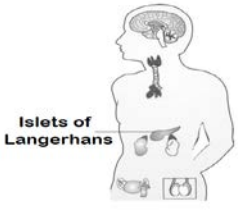
Identification: The marked endocrine gland is identified as **Islets of Langerhans** in the Pancreas.

Location: Islets of Langerhans are seen embedded in the Pancreas which is located in the abdominal region.

Hormones secreted: Glucagon, insulin

Functions of Hormones:

1. Insulin converts glucose into glycogen and stores it in liver and muscles.
2. Glucagon converts glycogen into glucose.
3. Decrease in Insulin secretion causes **Diabetes mellitus.**



Result: The flag labelled endocrine gland is identified as **Islets of Langerhans** in the Pancreas.