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(online  
6pm-9pm)

MOCK EXAM

AUGUST-2024

GENERAL SCIENCE & ABILITY

SECTION-II

### QUESTION # 6

Part a: A primary school had an enrollment of 850 pupils in January of 2022. In January of 2023, the enrollment was 1120. What was the percentage increase for the enrollment?

SOLUTION:

Data:

Number of students enrolled in January 2022 =  $J_1 = 850$

Number of students enrolled in January 2023 =  $J_2 = 1120$

Required:-

Increased percentage for enrollment =  $J_x = ?$

Solution:-

Increase in number of enrolled students =  $J_2 - J_1$

(Putting in values)

Increase in number of enrolled students =  $1120 - 850$   
 $= 270$

Now,

$$\text{Percentage increase} = \frac{\text{increase}}{\text{original}} \times 100.$$

(Putting values)

$$\begin{aligned} \text{Percentage increase (J)} &= \frac{270}{850} \times 100 \\ &= 31.7 \end{aligned}$$

$$J_x \approx 32\%$$

This implies that a percentage increase of 32% has occurred in the enrollment of students from January of 2022 to January of 2023.

Part (b): A man is 5 times as old as his son, 2 years ago the sum of squares of their ages was 114; Find the present age of his son.

Data:-

Present Age of ~~man~~ Father =  $x$

Present age of son =  $y$ .

Conditions:

Present;

$$5x = y \rightarrow \textcircled{1}$$

~~Two~~

two years ago;

$$(5x-2)^2 + (y-2)^2 = 114 \rightarrow (2)$$

Required:-

Find present age of son;  $y = ?$

Solution:-

As we have two unknown variables;  $x$  and  $y$ , we will use linear algebraic equation to solve this problem.

BUT! the value "114" does not work in this question as it will lead to a quadratic equation.

— Left unsolved —

Part(c): A man has some hens and cows. If the number of heads be 48 and number of feet is equal to 140, find the number of hens.

Data:-

~~Man has.~~

A man has a certain number of hens and cows -

Let number of hens =  $x$

number of cows =  $y$

Conditions:-

Total Number of heads = 48

Total number of feet = 140

1 hen = 1 head ; 1 cow = 1 head.

1 hen = 2 feet ; 1 cow = 4 feet.

Required:-

Find the number of hens.

Solution:-

According to the given conditions;

$$x + y = 48 \rightarrow \textcircled{1}$$

and;

$$2x + 4y = 140 \rightarrow \textcircled{2}$$

Multiplying equation 1 by 2 with (x2).

$$\text{Eq } \textcircled{1} \Rightarrow 2x + 2y = 96 \rightarrow \textcircled{3}$$

Subtracting  $\textcircled{3}$  from  $\textcircled{2}$

This implies that;

$$\begin{array}{r} 2x + 4y = 140 \\ 2x + 2y = 96 \\ \hline - \quad - \quad - \\ \hline 2y = 44. \end{array}$$

$$\Rightarrow y = \frac{44}{2}$$

$$y = 22$$

Put value of  $y$  in equation (1):-

equation (1)  $\Rightarrow x + y = 48$

$$x + 22 = 48$$

$$x = 48 - 22$$

$$x = 26$$

The total number of hens = 26. **Answer.**

Part (d): A car runs at a speed of 40 km/h during first half of the journey and at the speed of 60 km/h the 2<sup>nd</sup> half of journey. What is the average speed of a car?

Data:-

Initial speed of car for 1<sup>st</sup> half of  $v_1 = 40$  km/h.

Journey

Speed of car for 2<sup>nd</sup> half of journey  $v_2 = 60$  km/hr.

Required:-

Find the average speed of the car.

Solution:-

The average speed of car is calculated by;

$$\text{Average speed} = \frac{V_1 + V_2}{2}$$

putting values:-

$$\text{Average speed} = \frac{40 \text{ km/h} + 60 \text{ km/h}}{2}$$

$$\text{Average speed} = \frac{100 \text{ km/h}}{2}$$

$$\text{Average speed} = 50 \text{ km/h.}$$

Thus the average speed of the car throughout the journey is 50 km/h.

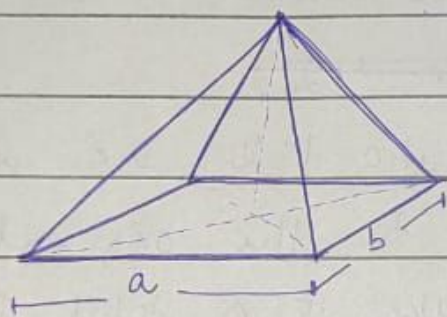
## **QUESTION # 8**

Part (a):-

Faisal Mosque in Islamabad constructed by a Turkish architect with worship halls of a certain geometrical shape. Write the formula for the area of specific shapes used as an outer view of worship halls.

### SOLUTION ::

Faisal Mosque in Islamabad is constructed in the shape of a Bedouin tent; if we simply it in a geometric shape, it is basically a pyramid shape.



$$\text{Volume of Pyramid} = \frac{1}{3} (\text{base})(\text{height})$$

$$\text{Volume of pyramid} = \frac{1}{3} ab.$$

Part (b): In a mixture of 60, the ratio of milk and water is 2:1. If this ratio is to be 1:2, then what is the quantity of water to be further added?

Data:-

Litres of mixture = 60 l.

Ratio of milk and water = 2:1.

Required:-

If ratio is 1:2, what is the quantity of water to be added?

Solution:-

In 2:1; total parts of mixture = 2+1=3.

In 60 litres of mixture; water is 1 part;  
this implies;

$$\frac{60}{3} = 20$$

In 2:1, the amount of water will be  
20 liters; thus milk will be 40 ml.

~~Similarly in the ratio 1:2.~~

~~In the new ratio 1:2;~~

To make this ratio 1:2, we will add  
60 liter of water to the original 20 liters  
of water to make it a total of 80 liters.

~~By this~~

In this way;

80 liters of water is twice the ~~value~~  
~~volume~~ amount of 40 liters of milk; thus the  
original ratio of 2:1 is converted to  
1:2.

Part (c) :-

If A is the brother of B and B is the  
sister of C, C is the father of D. How is  
D related to A, D being a male member?

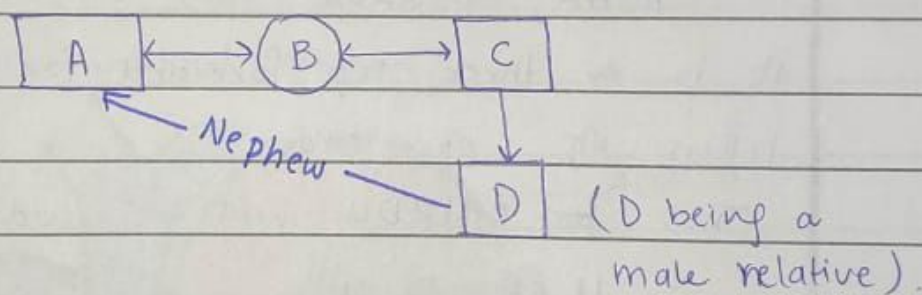
SOLUTION:-



To solve this question we will take the help of symbols that are;

□ male    ○ female    ↔ Brother/sister  
↓ son/daughter    = husband/wife

According to the statement;  
A is the brother of B and B is the sister of C and C is the father of D.



Thus D is the nephew of A.

Part (d):

In a certain code ROAR is written as URDU. How is URDU written in the same code.

**SOLUTION:-**

To ~~code~~ <sup>URDU</sup> ~~ROAR~~ we have to find the specific sequence followed;

+3 →

A	B	C	D	E	F	G	H	I
J	K	L	M	N	O	P	Q	R
S	T	U	V	W	X	Y	Z.	

+3 →

R	O	A	R
↓ +3	↓ +3	↓ +3	↓ +3
U	R	D	U

In the given code; of the question;

ROAR → URDU

it is a three step forward for all the letters of code.

Thus for URDU will be coded as;

U	R	D	U
+3 ↓	+3 ↓	+3 ↓	+3 ↓
X	U	G	X

Required code!

# SECTION - I

## QUESTION # 3 :-

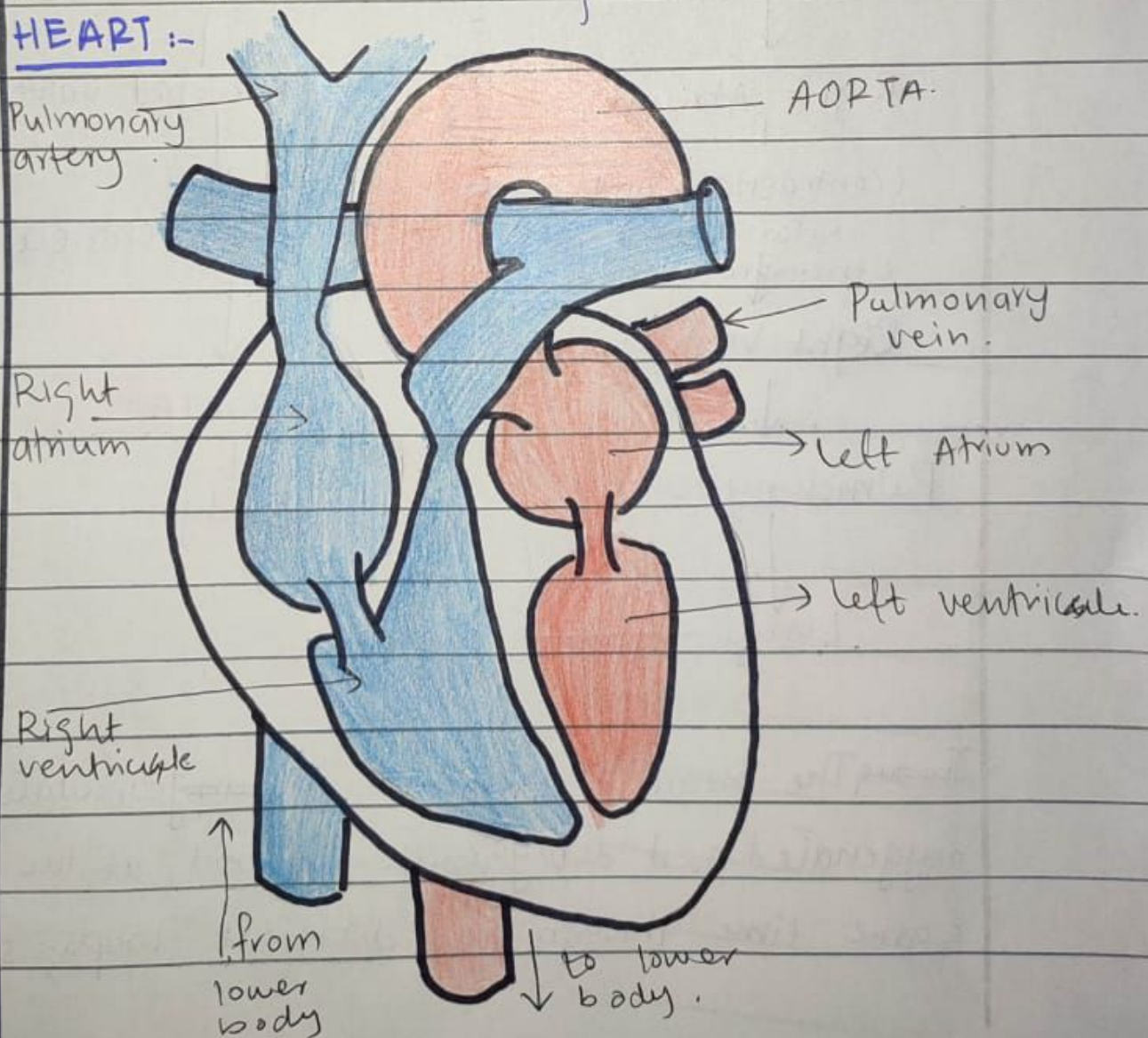
Part (a): What is meant by double circulation?  
Briefly describe how the heart is adapted to keep blood flowing in a double circulation.

ANSWER :-

### DOUBLE CIRCULATION:-

Double circulation is the process through which blood flows in two loops through the heart without mixing.

### HEART :-



The structure of heart is adapted to keep blood flowing in a double circulation. Right and left sides of the heart are separated from each other so that the blood does not mix up.



Through the heart is designed to ~~carry~~ circulate oxygenated and deoxygenated blood at the same time through two different loops, such that

there is no mixing of oxygenated and deoxygenated blood.

Part (b):-

Liver is a chief chemist. Comment.

LIVER:-

Liver is the largest gland in the human body. It has many functions in the body; some of the major functions include;

• Bile production:-

Bile production helps small intestine break down and absorb fats, cholesterol and vitamins.

• Generating blood cells:-

Liver stores iron released from haemoglobin, which makes the next generation of cells.

• Metabolism:-

Liver helps in the metabolism of protein, fats and carbohydrates.

## Immunity:-

Cells involved in immune activity; called Kupffer cells are present in high numbers in liver. These destroy bacteria, viruses and other micro-organisms.

## Production of Albumin:-

Albumin is the most common protein in the blood serum. It is produced in the liver as well.

## Part (c):-

Comment, the greenhouse effect is a blessing. Also discuss enhanced greenhouse effect and its relation in global warming.

## GREEN HOUSE EFFECT:-

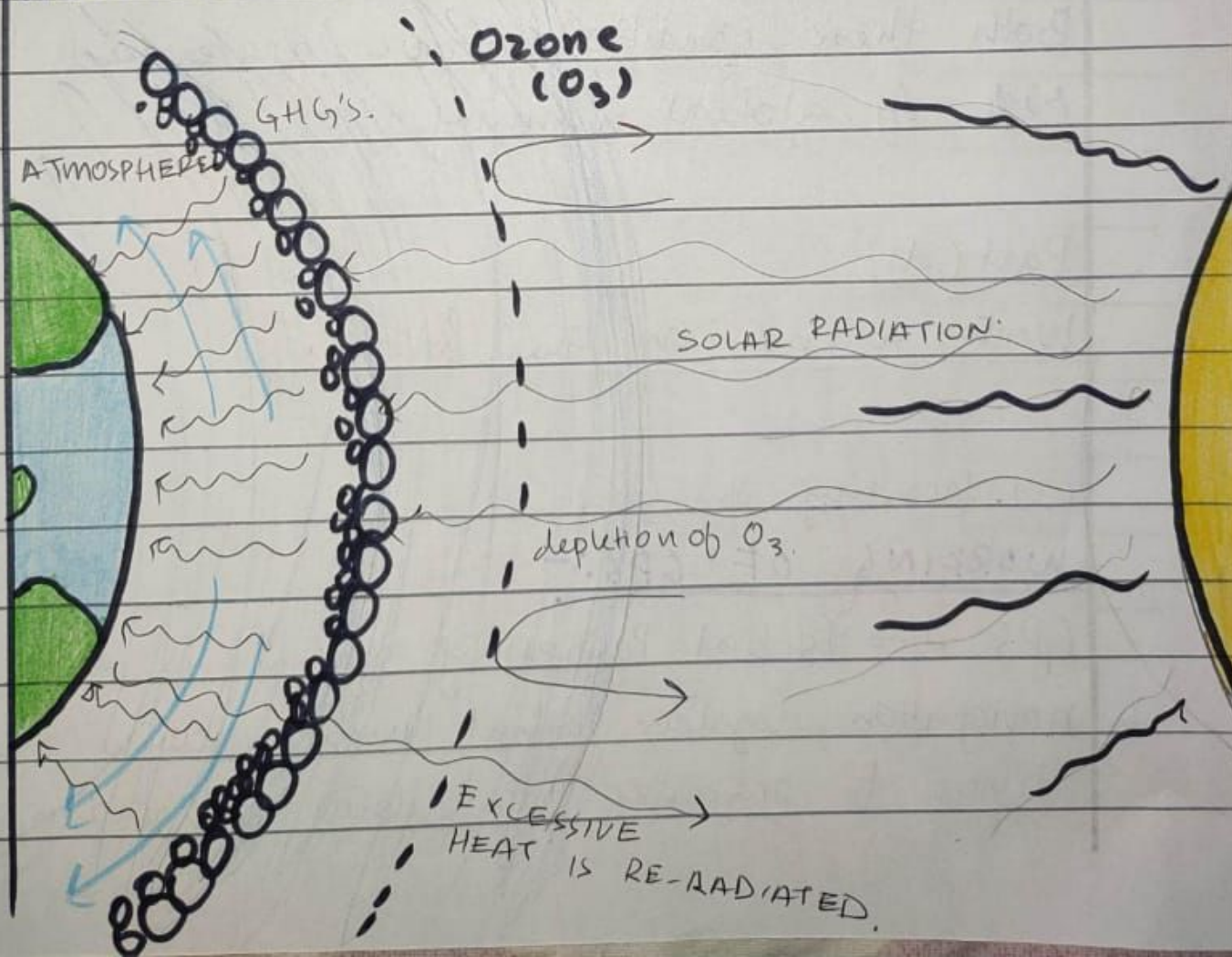
Green house effect is a natural phenomenon through which the incoming/incident rays from the sun are ~~captured~~ encapsulated in the Earth's atmosphere by the presence of green house gases.

Green house effect is a blessing as it

Creates a natural blanket around the earth; so that the temperature can sustain life on earth. It also acts as a protective shield against harmful UV radiations ~~its~~ coming from the sun.

### ENHANCED GREEN HOUSE EFFECT :-

The unnatural increase in the amount of green house gases present in the atmosphere as a result of human activities has enhanced ~~resulted in a~~ phenomenon called the intensity of greenhouse effect to an undesirable and abnormal level.



Acceleration of green house effect and depletion of ozone layer due to human activities have resulted in two main phenomena.

(a) Depletion of ozone layer has resulted in more penetration of solar radiation towards the earth.

(b) These radiations are absorbed by the Earth and the excess are re-emitted into the atmosphere; here they are trapped in the atmosphere as a result of enhanced green house effect.

Both these conditions have aggravated the risk of global warming.

Part (d):

Write a note on the following:

(i) Working of GPS:-

WORKING OF GPS:-

GPS also "Global Positioning system" is a navigation system that uses satellites and devices to organize data related to location, time



and velocity for air, land and sea travel.

### ELEMENTS OF GPS:-

GPS is basically made up of three components or segments.

#### ① SPACE / SATELLITES:-

Satellites that are orbiting the earth ~~etc~~ transmit signals to users.

#### ② GROUND CONTROL:-

Ground control includes control stations, monitor systems and ground antennas. Control activities include tracking and operating of satellites.

#### ③ USER EQUIPMENT:-

GPS receivers include cell phones, smart watches etc.

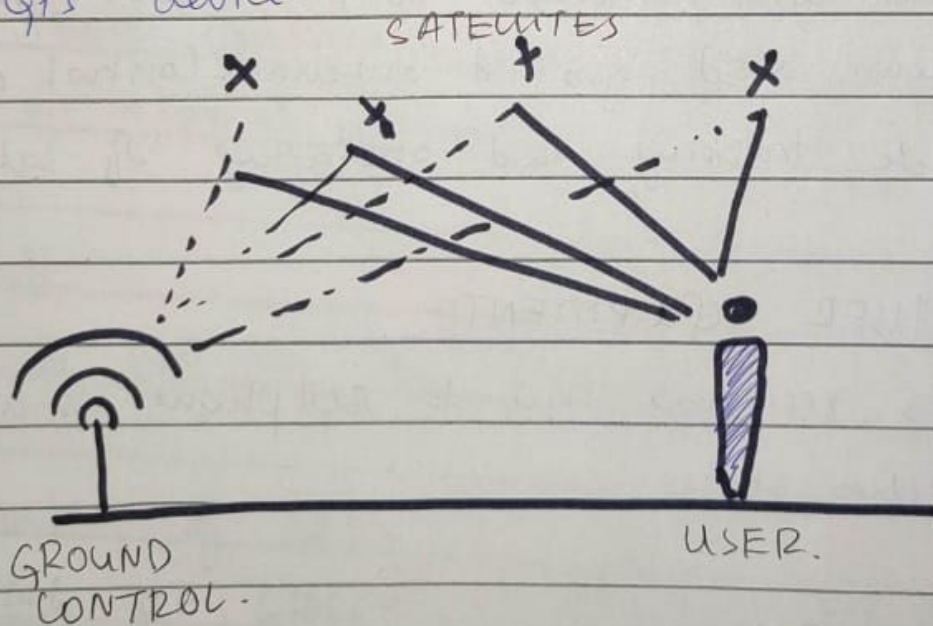
### TECHNIQUE:-

GPS works through a technique called "Trilateration"; this means to collect signals from satellites to output location information.

Satellites orbiting the earth send signals that are received and read by GPS devices, and is used to calculate the distance from the GPS device to the satellite.

As the GPS moves, the distance/radius from the satellite changes and new data is created and presented.

As we live in a three dimensional world; at least four satellites are required to pinpoint the exact location of the GPS device.



## QUESTION # 4:

Part (c):

Why do atoms form chemical bonds?

Explain structure of water.

### STRUCTURE OF ATOM:

An atom comprises of a positively charged nucleus and negatively charged electrons.



These electrons revolve around the nucleus in orbits called 'shells'.

The outermost shell is called the valence shell

and its electrons are called valence shell electrons.

Each shell of an atom has a ~~specific~~ specific capacity to accommodate a specific amount of electrons.

If the number of electrons present in an atom do not satisfy ~~this~~ the required number of electrons in a shell it will be unstable.

To achieve stability, an atom forms a chemical bond with other atoms, thus forming ~~a~~ matter.

## CHEMICAL BOND:-

A chemical bond is formed between atoms through ~~simple~~ either complete transfer or mutual sharing of electrons.

These include: ionic bond, covalent bonding, hydrogen bonds etc.

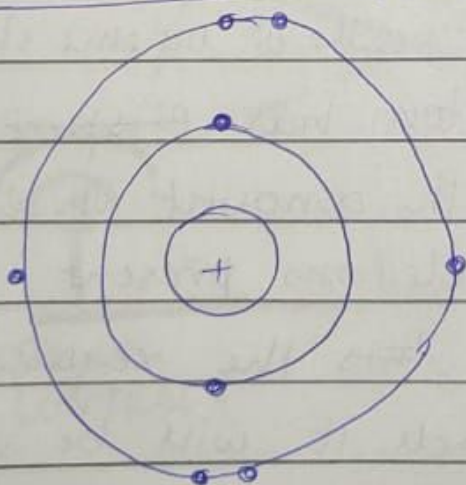
## STRUCTURE OF WATER:-

Water chemical composition of water is  $H_2O$ ; that means there is 1 oxygen atom and 2 hydrogen atoms.

The atomic number of Oxygen is 8.

atomic number of hydrogen is 1.

### Structure of oxygen:-

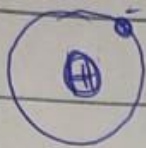


The second shell of oxygen can ~~accommodate~~ accommodate upto 8 electrons; whereas it only has

6. This makes oxygen unstable.

To achieve stability, it will have to complete its valence shell.

## Structure of Hydrogen:-

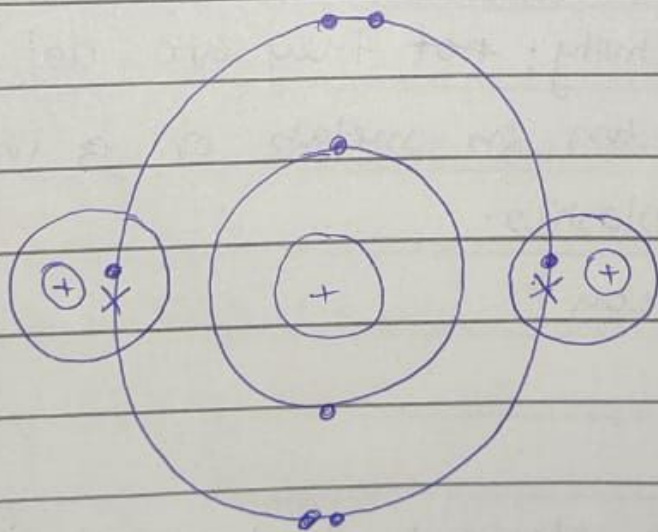


Hydrogen only has one electron - Its valence shell can accommodate 2 as it is the first shell and the

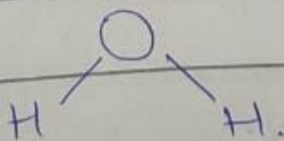
only shell.

## WATER (H<sub>2</sub>O)

Since neither Oxygen nor Hydrogen can give up their electrons; both will achieve stability by mutual sharing of electrons.



Oxygen will have a slight negative charge as its nucleus is more positively charged as compared to hydrogen; thus it will attract the electrons more



towards itself, where as H will have a slight positive charge.

Part (d):-

What are conductors, semi-conductors, metals; plastic and ceramics - Give an ex-ple of each.

### 1- Conductors:-

Conductors are materials that allow the flow of charge through <sup>presence of</sup> free electrons -

Ex-ple:

- Metals are good conductors.

### 2- Semi-conductors:-

Semi-conductor is a material that has some conductivity; ~~not~~ they are not as good conductors as metals or ~~a~~ insulators such as plastics.

Ex-ple; Silicon.

### 3- Metals:-

Metal is an element that is characterized by high conductivity, both thermal and electrical.

Ex-ple; Gold; silver.

#### 4- PLASTICS :-

Plastics are synthetic or semi-synthetic materials made from polymers. Their plasticity make them ~~at~~ easily moldable into various shapes and sizes.

Ex-ple: Poly Vinyl Chloride (PVC) - used in pipes; as furniture and even as a structural component in buildings.

#### 5- CERAMICS :-

Ceramics are hard, brittle, heat-resistant insulator materials made by shaping and firing inorganic, non-metallic material at a high temperature.

Ex-ple; Earthenware, porcelain.

- END -