

M#3

# General Science and Ability

## Part - II Section - I

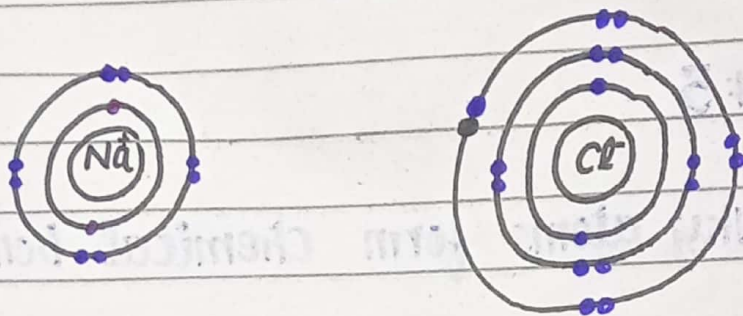
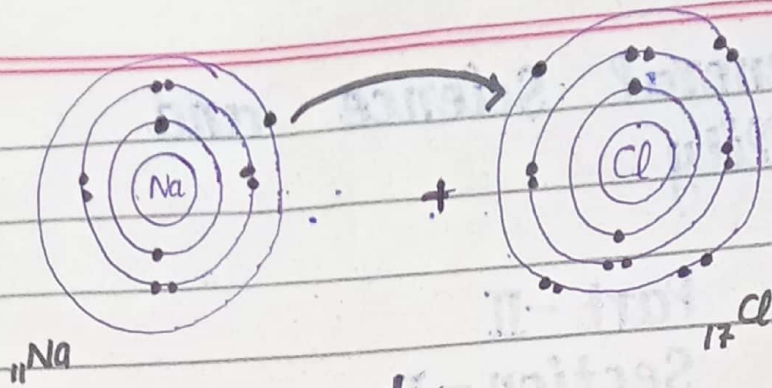
Q no # 3

a) Why atoms form chemical bonds?

Atoms form chemical bond to achieve stability. They do so either by gaining or losing electron. To have 2 electrons in the outermost shell is called **duplet rule**. Having 8 electrons in the valence shell is called **octet rule**.

### Example

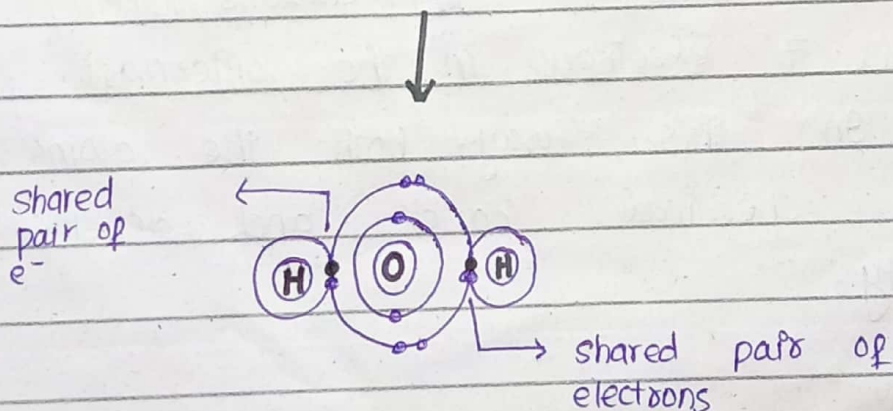
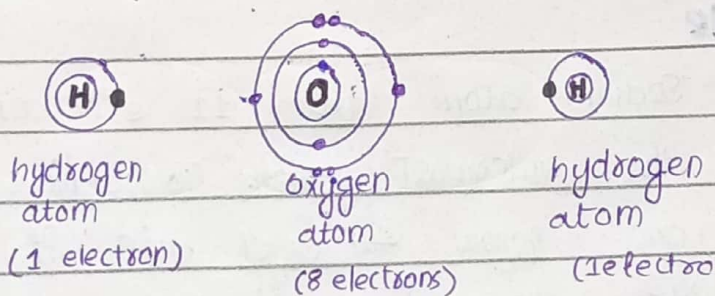
Sodium atom has 11 electrons. One in the outermost shell. To achieve stability and follow the octet rule it donates its electron to chlorine atom having 7 electrons in the outermost shell. In this way, both the atoms form chemical bond and achieve stability.



NaCl

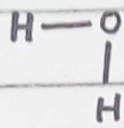
## Covalent bond in water

H<sub>2</sub>O (water) molecule is held together by covalent bonds. Covalent bond is formed by sharing of electrons.





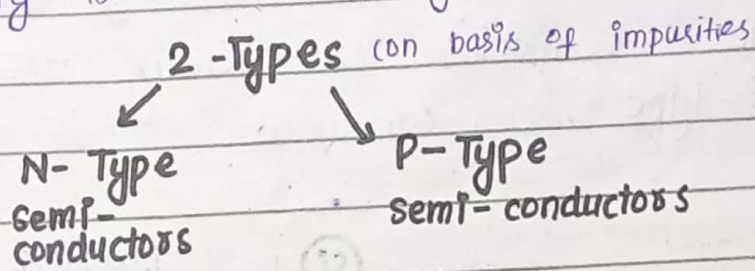
Both Hydrogen atoms share their electrons with oxygen atom and form a covalent bond.



(water)

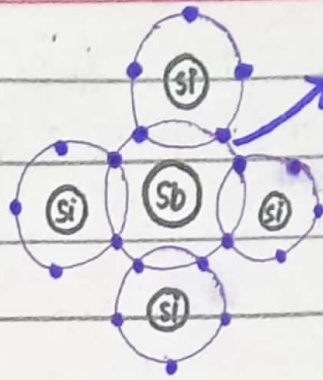
## (b) Doping

"The process in which impurity is introduced into the semi-conductor to enhance its conductivity is called Doping."



### 1- N-Type Semiconductor

The semiconductors formed as a result of doping of a pentavalent electron donor impurity like Arsenic or Antimony in the Germanium or Silicon are called N-Type semiconductors.

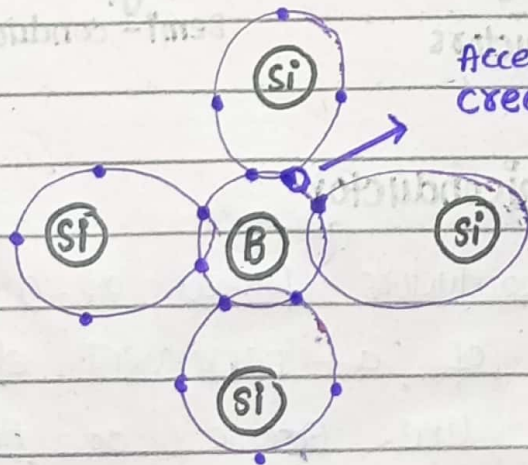


• Donor impurity contributes free electrons

Sb = Antimony  $\Rightarrow$  added as impurity  
 Si = Silicon

### P-Type semiconductor

The semi-conductors formed as a result of doping of a trivalent electron deficient impurity like Boron in Germanium or Silicon are called P-type semi-conductors



Acceptor impurity creates a hole

B  $\Rightarrow$  Boron  $\Rightarrow$  Added as impurity.



# Types of Ceramics

Types	Description	Uses	Examples
Earthenware	<ul style="list-style-type: none"> <li>• Clay-based</li> <li>• Clay fired at relatively low temperature</li> <li>• These are porous, brittle and colorful.</li> </ul>	<ul style="list-style-type: none"> <li>• Tableware</li> <li>• Decorative objects</li> </ul>	<ul style="list-style-type: none"> <li>• Delft</li> <li>• Majolica</li> </ul>
Stoneware	<ul style="list-style-type: none"> <li>• Clay-based</li> <li>• Clay fired at mid temperature (1200°C)</li> <li>• These are dense, strong and water resistant</li> </ul>	<ul style="list-style-type: none"> <li>• Cookwares</li> <li>• cups, Mugs</li> </ul>	<ul style="list-style-type: none"> <li>• Ceramic plates</li> </ul>
Porcelain	<ul style="list-style-type: none"> <li>• Clay-based</li> <li>• Fired at high temperature in between (1300 - 1450°C)</li> <li>• They are translucent, strong and durable</li> </ul>	<ul style="list-style-type: none"> <li>• Fine china</li> <li>• Decorative figurines</li> </ul>	<ul style="list-style-type: none"> <li>• Fine china dinner sets</li> </ul>

(c)  
Merits and demerits  
of Global Warming

Merits of Global Warming

The merits of global warming are as follows:

- 1- The Arctic, Antarctic, Siberia and other frozen regions of earth may experience more plant growth and milder climates.
- 2- The next ice-age could possibly be prevented.
- 3- The Northwest passage through the formerly icy Canadian Arctic Archipelago could arguably open up to transportation.
- 4- Fewer deaths or injuries due to arctic conditions.
- 5- Longer growing seasons could mean increased agricultural growth in some areas.



## Demerits of Globalization

1- Changes in ocean circulation and the resulting warmer temperatures disrupt the world's normal weather patterns, bringing about more extreme weather.

2- Higher sea levels lead to flooding of lowland. Islands and coastlands are engulfed by water leading to deaths and disease due to flooding.

3- Deserts become drier, leading to increased desertification.

4- Decreased agricultural productions leads to the food shortages.

5- Insect-borne diseases increase.

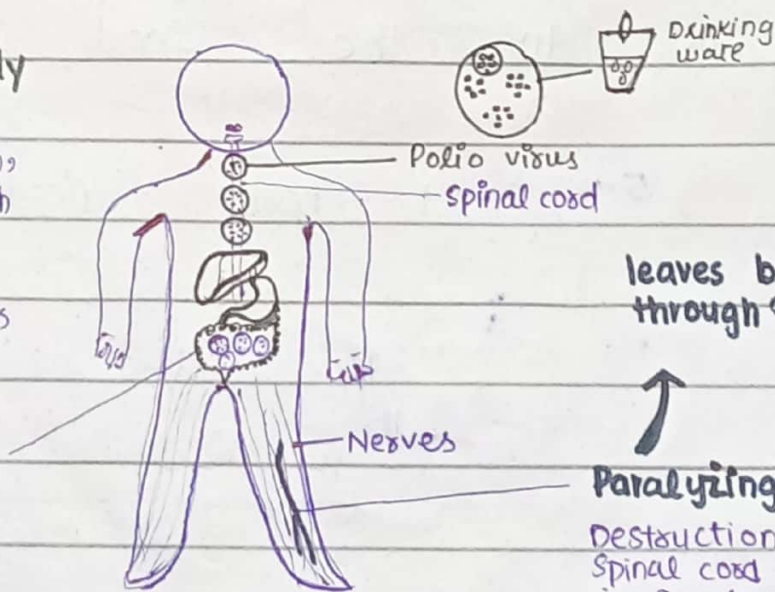
## (d) Polio

The poliomyelitis (polio) is derived from a Greek word which refers to the inflammation of grey matter of spinal cord. It is a viral infectious disease that sometimes cause paralysis.

### Life cycle of Polio

#### ① Entering the body

Poliovirus enters the body through mouth, direct contact with infected person or indirectly via contaminated items



#### ② Settling in

virus first infects and replicates in cells of intestine. From where it can enter main bloodstream

#### ③ Attacking body

out of every 200 virus attack central Nervous System destroying cells of spinal cord

leaves body through faeces

#### Paralyzing

destruction of spinal cord results in paralysis



Polio infects mostly children and young adults.

## Challenges for eradication of Polio in Pakistan

There are several challenges for eradication of Polio in Pakistan

- 1- **Security challenges** in some parts of country, particularly in the Southern region of Khyber Pakhtunkhwa Province
- 2- **Vaccine hesitancy** in some areas
- 3- **Surveillance gaps** in Pakistani system needs improvement for detection of polio, which leads to delayed detection and response to outbreaks
- 4- **Inadequate coverage and low immunization rates** in certain provinces and districts.
- 5- **Insecurity and attacks** on polio workers and their security personnel
- 6- **High population mobility and migration** across the border with Afghanistan
- 7- **Limited access to healthcare services** in remote and conflict-affected areas.

Q# 4

(a)  
**Bile Juice**

Bile is a bitter tasting, dark green to yellowish brown fluid, produced by the liver and it is stored in gallbladder and upon eating is discharged into duodenum.

The principal function of gallbladder is to serve as a storage reservoir for bile

**Composition of Bile Juice**

- i- water (85%)
- ii- Bile salts (10%)
- iii- Pigments (3%)
- iv- Bile pigments
- v- Fats (1%)

**Physical properties of bile**

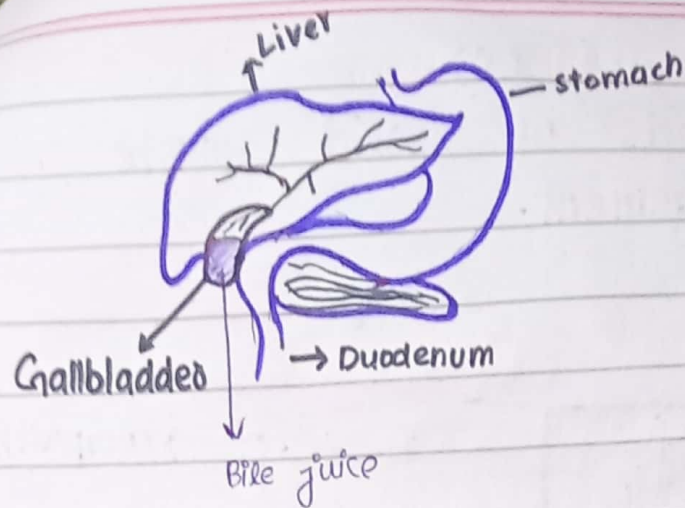
**Hepatic bile**

→ pH 7.4  
→ color golden yellow

**Bladder bile**

→ pH 6.8  
→ Color green  
dark to yellow

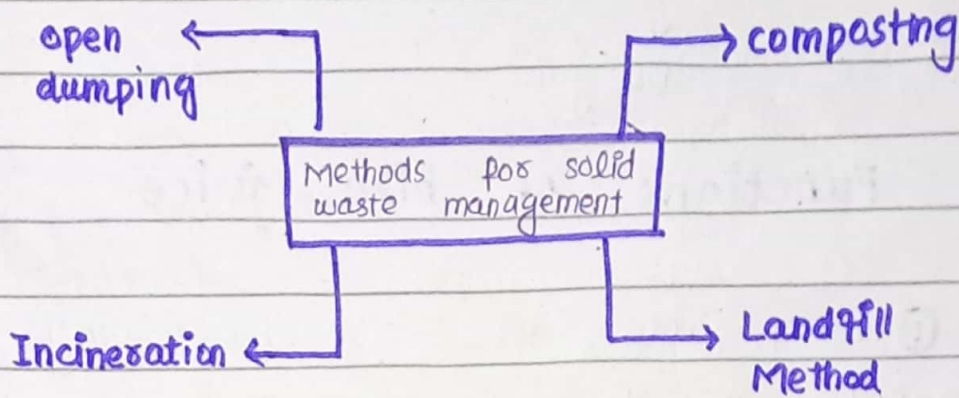




## Functions of bile juice

- ① - Bile salts acts as emulsifying agents in the digestion and absorption of fats.
- ② - Bile salts also acts as bactericides, destroying many of microbes that may present in food.
- ③ - One of the important function of bile is the neutralization of excess acid in stomach, before it enters the ileum.

# (C) Methods of solid waste management.



## 1- Open dumping

- It is common practice which involves the open deposition of wastes in the surroundings.
- Dumping sites should be away from residential, commercial areas, crops and water bodies

## Composting

- It is the controlled biological degradation of waste mostly organic wastes (plants, animals wastes)
- Some parameters need to be adjusted for composting process
  - ↳ Carbon, Nitrogen Parameters
  - ↳ PH
  - ↳ Availability of Oxygen



Bacterial and fungal species are used for decomposition.

**Bio-fertilizer:** As a result of composting waste in the end the compost formed can be used as biofertilizers, rich in nutrients essential for plant growth.

### 3- Incineration

- Burning of waste material (other than organic) using incinerators is called incineration.

Incinerators used are:

- ↳ Simple - chambered
- ↳ Multi - chambered
- ↳ Industrial incinerators

### 4- Landfill Method

- Burying of the waste in barren lands.

- Specific pits and landfills are filled after depositing waste.

(d)

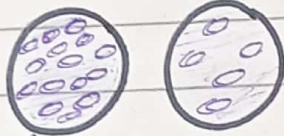
## is Anemia

• Anemia is a blood disorder that happens when a person does not have enough red blood cells or red blood cells are not working as they should.

• Anemia can be inherited or acquired during lifetime

### Symptoms

- ↳ Chest Pain
- ↳ Dizziness
- ↳ Fatigue
- ↳ Pale skin color
- ↳ Shortness of breath



Normal  
RBCs

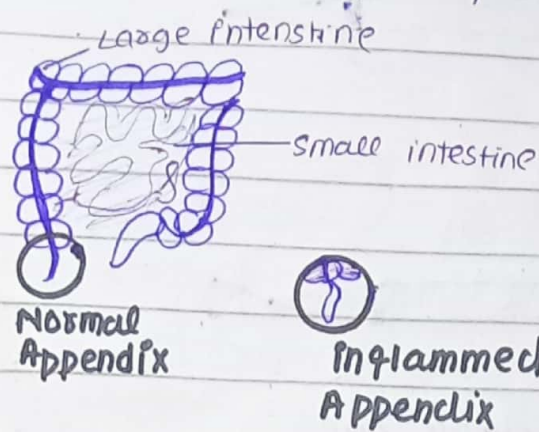
Anemia

## ii) - Appendicitis

Appendicitis is a condition in which appendix becomes inflamed. It almost always requires.



surgery as soon as possible



### ii) Spleen

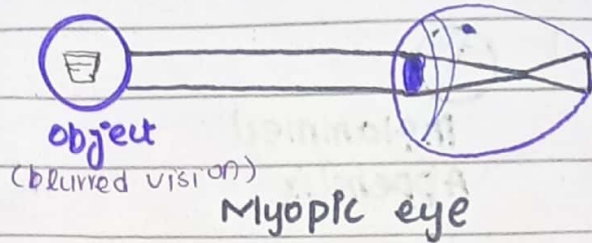
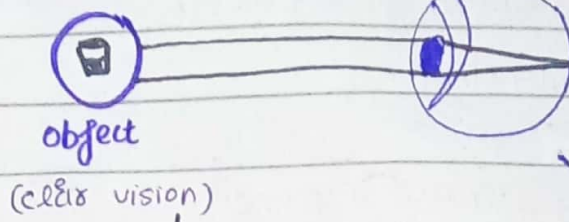
It is a small organ inside the left rib cage, just above the stomach.

It is the part of lymphatic system and stores and filters blood. It also makes white blood cells that protect from infection.

### iv) Myopia

Myopia also known as nearsightedness is an eye-disease where light from distant objects focuses in front of, instead on, the retina. As a result, objects appear blurry while close objects appear normal.

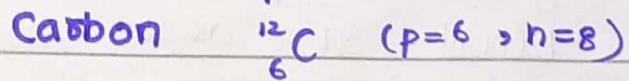
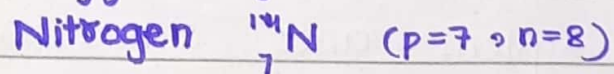
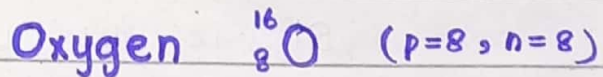
Normal eye



## v) Isotones

Species having same number of neutrons are called isotones

ex.



p = proton

n = neutron



## Section - II

Q no 7

(a)

Given

$$\begin{aligned}\text{Radius of cylinder} &= R = 30\text{cm} \\ &= \frac{30}{100} = 0.3\text{m}\end{aligned}$$

$$\text{Height of cylinder} = h = 1\text{m}$$

Find  
volume of cylinder =  $V = ?$

$$\text{volume} = \pi \times \text{radius}^2 \times \text{height}$$

$$V = \pi \times (0.3)^2 \times (1)^2$$

$$= 3.14 \times 0.09 \times 1$$

$$= 0.2826\text{m}^3$$

volume of cylinder is  $0.2826\text{m}^3$

(b)

Average age of <sup>three</sup> boys = 15 years

Age of boys in ratio = 3:5:7

Age of youngest boy = ?

As average age of 3 boys is

15 year so,

$$\text{Total age} = 15 \times 3$$

$$= 45\text{ years}$$

Age in ratio means?

$$3x : 5x : 7x$$

Total age of boys

$$3x + 5x + 7x = 45$$

$$15x = 45$$

$$x = \frac{45}{15}$$

$$x = 3$$

Age of youngest boy is  $3x$

$$= 3x$$

$$= 3(3)$$

$$= 9 \text{ years}$$

Hence, the age of youngest boy is 9 years.



(c)

Identify the series

i) 8, 19, 45, 151, 447, —

Series is obtained by multiplying the previous terms by 2.37 approximately

$$8 \times 2.37 = 19$$

$$19 \times 2.37 = 45 \Rightarrow \text{this is correct}$$

$$45 \times 2.37 = 151$$

$$151 \times 2.37 = 447$$

$$447 \times 2.37 = 1060$$

$\Rightarrow$  wrong no in the series is 52 because the answer obtained after multiplying the 19 with 2.37 is 45

complete series

19, 45, 151, 447, 1060

ii) 13, 17, 19, 23, —

This series appears to be obtained by adding 2, then 4, then 2, then 4 and so on in the previous terms

$$13 + 2 = 15$$

$$15 + 4 = 19$$

$$19 + 2 = 21$$

$$21 + 4 = 25$$

$$25 + 2 = 27$$

13, 17, 19, 23, 25

Q6

(a)

Ratio of blocks = A : B : C : D

4 : 7 : 3 : 1

The number of 'A' blocks is 50

more than the number of 'C' blocks

Calculations:

Let the blocks A, B, C and D be

4x, 7x, 3x and x

$$A = 4x$$

$$B = 7x$$

$$C = 3x$$

$$D = x$$

$$4x = 3x + 50$$

$$4x - 3x = 50$$

$$x = 50$$

No. of B Block

$$7x \Rightarrow 7(50)$$

$$7x \Rightarrow$$

$$B = 350$$

Therefore, there are 350 B blocks



(b)

Original cost of shoes = \$80

Discount on original cost = 15%

Sale tax = 10%

Final Price = ?

Discount calculation

$$15\% \text{ of } \$80 = \frac{15}{100} \times 80$$
$$= 0.15 \times 80$$

$$\text{Discounted price} = \$80 - \$12 = \$68$$

Sale tax calculation

$$\text{Sale tax} = \frac{10}{100} \times 68$$
$$= \$6.80$$

$$\text{Final Price} = \$68 + \$6.80$$
$$= \$74.80$$

So, the final price is \$74.80

(c)

Departure time of train = 4pm

Distance travelled  
between two stops = 42km

speed of train = 36km/hr

Time = Distance / speed

$$= \frac{42 \text{ km}}{36 \text{ km/hr}}$$

$$= 1.17 \text{ hours}$$

Since, the train departs at 4pm,

you can add travel time  
to find the arrival time

Arrival time = 4pm + 1 hour 17 min

$$= 5:17 \text{ pm}$$

So, the train arrives at 5:17pm.

(d)

Arrange jumbled words

i) teninsupeoted

Superintendent.

ii) hweti

White

$$\begin{array}{r} 42 \\ 36 \\ \hline 1.17 \end{array}$$

hweti  
white

superinten  
der