

# General Science and Ability -

## SECTION-I

Question no 3:

(a) Why atoms form covalent bond?  
Discuss covalent bond in a water molecule.

Answer:

(1) Atoms form covalent bond to achieve stability

Atoms form covalent bonds primarily to achieve greater stability by attaining a full outer electron shell, often referred to as the octet rule. In most elements, particularly non-metals, achieving a stable electron configuration similar to that of noble gases (which naturally have full outer shells) is energetically favorable.

In a covalent bond, atoms share pairs of electrons, allowing each atom to count shared electrons towards its own valence

shell. This mutual sharing helps each atom reach the desired stable electron configuration.

Additionally, the formation of covalent bonds releases energy, lowering potential energy state and thus making the bonded atoms more stable than they were as individual atoms.

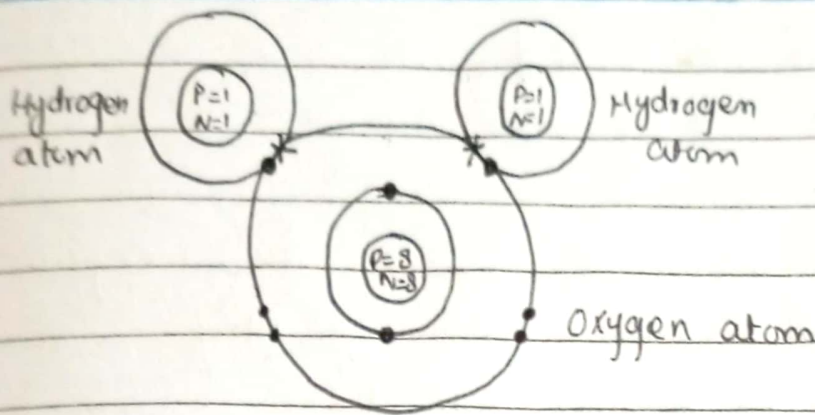
### (2) Covalent bond in hydrogen.

#### a water molecule :

A water molecule has two covalent bonds formed between two hydrogen atoms and one oxygen atom. The valence shell of hydrogen atom has one electron and as it is its first shell as well as it seeks to complete its valence shell ~~by~~ ~~with~~ with two electrons.

Similarly oxygen has 6 electrons in valence shell making it deficient of two electrons. One oxygen and two hydrogen atoms form a covalent bond by sharing four electrons, one from each hydrogen atom and two from oxygen atom.





(b) What is doping? Discuss different types of ceramics.

Answer:

(1) Doping:

Doping is the mechanism of intentionally adding impurities into a pure semiconductor to change its electrical properties and gain more control over its conductivity. Depending upon the type of impurity added, it can be divided into two

Types:

(a) n-type doping:

A donor atom (usually from V group <sup>elements</sup> of periodic table) is added to semiconductor (IV group element) to increase number of electrons.

(b) p-type doping:

A acceptor atom (usually from 3<sup>rd</sup> group elements in periodic

table is added to semiconductor to create holes.

## (2) Ceramics:

Ceramics are non metallic, inorganic materials that are typically crystalline in nature.

### Types of Ceramics

#### (a) Traditional Ceramics:

These are made from natural material like Feldspar, quartz or clay.

There are three types of traditional ceramics: stoneware, earthenware and porcelain.

#### (b) Silica:

Silica ( $SiO_2$ ) is a material widely recognized for remarkable thermal shock resistance.

#### (c) Bone China:

It is a porcelain variety renowned for its strength, chip resistance and translucency. ~~The material~~

It is formed from bone ash, kaolin and feldspathic material.

#### (d) Silicon Carbide:

Silicon carbide is composed of silicon & carbon atoms. It is formed by heating a mixture of ~~silica~~ <sup>sand</sup> and coke at high temperature.



(c) What are some merits and demerits of global warming.

**Answer:**

① Merits of Global warming:

- i- Extended growing seasons in some regions resulting in multiple harvests per year.
- ii- Diversification of Agricultural regions due to changing landscape of cold regions.

~~iii~~

② Demerits of Global warming:

Even though there might appear to be some merits of global warming, but the demerits of global warming outweigh its merits. Following are some of the major demerits:

- i- Due to Global warming Earth's temperature is increasing resulting in the melting of polar ice - melted polar ice and glaciers contribute to rising of sea levels and lead to floods.
- ii- Global warming is causing increased frequency and severity of extreme weather events such as droughts or heatwaves.

iii - Changing climates ~~is~~ due to global warming<sup>is</sup> also threatening habitats of many plants and animals and causing their extinction. Thus, global warming is also becoming the cause of biodiversity loss.

(d) what is polio? what are challenges in eradication of polio in Pakistan.

Answer:

① Polio: an infectious disease.

Polio is a highly infectious and viral disease caused by ~~viral~~ poliovirus. It primarily affects children under the age of 5. The virus spreads from person to person through contaminated food and water. In this disease poliovirus invades nervous system<sup>and</sup>, damages it causing paralysis and even death in certain cases.

② Challenges in eradication of polio in Pakistan:



In Pakistan combating polio is met with following challenges:

- i- Vaccination Resistance due to mistrust misinformation fueled by cultural and religious misconceptions.
  - ii- Difficulty in accessing areas with ongoing conflict of violence and militancy - resulting in hindered vaccination campaigns.
  - iii - logistical issues due to remote and hard to reach areas and infrastructure limitations.
  - iv- limited financial resources affect the sustainability of vaccine campaigns.
  - v- Disruptence in ongoing vaccination programs due changes in government and policies.
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## SECTION-II

Question no. 6:

(a)

Solution:

Given ratio of blocks.

$$A : B : C : D$$

$$4 : 7 : 3 : 1$$

$$\text{and, } A = B + 50 \rightarrow \text{①}$$

Let's assume number of blocks labelled D are  $x$ , then.

$$A = 4x \text{ --- (ii)} \quad C = 3x \text{ --- (iv)}$$

$$B = 7x \text{ --- (iii)} \quad D = x \text{ --- (v)}$$

Now from eq ①

$$4x = 3x + 50$$

$$\text{rearr. } 4x - 3x = 50$$

$$x = 50$$

Putting value of  $x$  in eq (iii)

$$B = 7x$$

$$B = 7(50)$$

$$B = 350$$

Thus, there are 350 "B" blocks.

(b)

Solution:

Original Price of shoes = 80 \$

Discount = 15%

Sale Tax = 10%



$$\text{Discount in } \$ = \frac{15 \times 80}{100}$$

$$= 12 \$$$

$$\text{Price after discount} = \text{Original Price} - \text{Discount}$$

$$= 80 \$ - 12 \$$$

$$= 68 \$$$

$$\text{Sale tax on discounted price} = \frac{10 \times 68}{100}$$

$$= 6.8 \$$$

$$\text{Final Price of shoes} = \text{Discounted Price} + \text{Sale Tax}$$

$$= 68 \$ + 6.8 \$$$

$$= 74.8 \$ \text{ Ans.}$$

(c)

**Solution:**

Given values:

$$\text{distance covered} = d = 42 \text{ km}$$

$$\text{speed of train} = s = 36 \text{ km/hr}$$

$$\text{Time of departure} = 4 \text{ pm.}$$

To find:

$$\text{Time of arrival} = ?$$

**Solution:**

$$\text{Time taken} = \frac{s}{d} = \frac{36}{42}$$

$$\text{Time taken} = \frac{d}{s} = \frac{42}{36} = 1.16 \text{ hr}$$

$$= 66 \text{ min}$$

$$= 1 \text{ hr } 6 \text{ min}$$

$$\text{Time of arrival} = \text{Time of departure} + \text{time taken}$$

$$= 4 + 1 \text{ hr } 6 \text{ min}$$

$$= 5:06 \text{ pm.}$$

(d)

Solution

(i) - teninsuperted

~~superintended~~ superintended

(ii) - hweti

white.

Question no. 7:

(a)

Solution:

$$\text{radius } r = 30 \text{ cm} = 0.3 \text{ m}$$

$$\text{height } = h = 1 \text{ m} \quad \text{---} \quad \text{100 cm}$$

$$\text{Volume of cylinder} = \pi r^2 h$$

$$V = \pi r^2 h$$

$$V = \left(\frac{22}{7}\right) (0.3)^2 (1)$$

$$V = 0.28 \text{ m}^3$$

(b)

Solution:

$$\text{average age of 3 boys} = 15$$

Ratio of their age :

$$A : B : C$$

$$3 : 5 : 7$$



Let's assume their actual ages are  $3n$ ,  $5n$  and  $7n$  respectively.

Then:

$$\text{Average of their ages} = \frac{3n + 5n + 7n}{3}$$

$$15 = \frac{3n + 5n + 7n}{3}$$

$$3 \times 15 = 15n$$

$$\frac{3 \times 15}{3} = n$$

$$n = 3$$

Then the ages of boys are

$$A = 3n = 3 \times 3 = 9$$

$$B = 5n = 5 \times 3 = 15$$

$$C = 7n = 7 \times 3 = 21$$

The age of youngest boy is 9 yrs.

(c)

Solution:

~~(i) Identify the~~

$$(i) 8, 19, 52, 151, \textcircled{447}, \underline{1339}$$

$$(ii) 11, 13, 17, 19, 23, \underline{25}$$

447 is wrong number. The correct number is 448

(d)

Solution: