

Q 4 :-

## Floods:

Flood is a high water range in which water is out from the natural and artificial banks and cause deep devastation at a wide range.

### Main causes of Floods:

Flood can be caused due to certain factors. Some of those are natural and some are some are due to mans involvement. Some of the major causes are below:

#### (1) Excessive Rains:

Rain is a blessing, but immense rains cause devastative floods. That really disturbs the lives of many in the effected area.

#### (2) De-forestation:

Deforestation is another cause of floods. The removal of trees is an indirect invitation to the floods.

#### (3) Glacier melting:

The current situations in the Country is also due to the glof. ~~that~~ When glaciers melts, the level of water in the Country's rivers risen and become a cause of threat flood.

#### (4) Land erosion:

The land erosion is the another factor that contributed in floods causing.

#### (5) Global warming:

Global warming is itself a big problem but it is also responsible of the floods. Due to global warming the rain pattern has been changed.

#### (6) Population Growth:

The so called "boss" of several environmental issues including flood. As the population increases, the people also shifting and developing new cities. For which they adopt certain means that contributes in environmental degradation and flood causing as well.



## Floods of 2022 and Super flood 2010:

- Both the floods wreak havoc in the country, submerged many populated areas, cause fatalities, diseases, economic crisis, and destroyed the bread and butter of a large sector.
- But, the floods of 2022 were not that devastating which the super floods in 2010 were.
- The former floods caused an estimated loss of 30 billion dollars to Pakistan—according to the report of NDMA, while UN report ~~show~~ estimated it approximately 20 billions.
- While the latter one (super floods) caused an estimated loss of 100+ billion dollars to Pakistan's economy.
- There were also a difference in the fatalities rate of both major floods.
- As the super floods were the major in the country, so, the institutions were not that much prepared to combat it - while, the floods of 2022 had been easily overcome by the government.

### Role of NDMA:

NDMA (National disaster management Authority) is playing an effective role since its establishment. Their role is praise worthy at the time of disasters, especially, flood. During the floods of 2022 and 2010, NDMA played an effective role through different ways.

- ① Evacuated the people from effected areas.
- ② Provide first aid to the victims of flood.
- ③ Build shelters in the safer places for floods effectees.
- ④ Continuously instructed the people regarding the flood.



⑥

## Star:-

- A star is something that is stationary in the space.
- Which has their own light.
- Larger in size and always natural.
- Millions in numbers.
- Examples of stars is Sun, Betelgeuse, Sirius-A etc.
- A star passes through many stages during its life cycle.
- At the end, it ~~will~~ either converts to black hole or a white dwarf formation.

## Planets:

- Anything in the space revolving around a star is planet.
- Planet revolve in a fix orbit.
- It reflects the light of a star, because it has no own light.
- Some planets are small and some are larger enough i.e. dwarf planets and big planets.
- Our  $\neq$  solar system has eight big planets and five dwarf planets - yet discovered.
- The fate of a planet depend upon the star's fate around which the planet revolves.
- Examples of star's planet are Mercury, Venus, Earth, Mars, Makemake, Haumea, Eris (Dwarf planet + Big planets) etc.

Life cycle of a star: How it converts to a black hole:

The life of a star is about 8-10 billion years. During which, the star passes through three phases and at the end it converts to either a black hole or a white dwarf formation occurs. The phases of the star are:

① Main sequential stage:

A star from the time of birth to till 6 billion years, remains in this stage.



### ② Giant Shift:

The second stage in which a star remains for about two billion years.

- Betelgeuse, a star is now in this phase.

### ③ Red - Giant Phases

The last stage of a star's life is this one.

- Sirius - A is entered to red Giant phase.

### Black - hole formation:

- Not every star has to be converted to black hole, some are converted to white dwarf as well. Just like planets, some stars are too big and some are small. All the small stars convert to white dwarfs. A star will either expand, or contract. The small star adopts the latter status and upon contraction a big-bang happens and the white dwarf formation takes place. The future of sun is also of the white dwarf.

- The stars, that are too big, expanding continuously. This expansion is going throughout the life of star and it continuously convert its own stars to planets to its body. It attracting the planets and becomes bigger enough, at stage comes that too big size is beyond the control of the star and an explosion occur. With this, the center of the star converts to a black hole, while some of the parts of stars scatters in the space.

- In case of small stars, the center closes upon itself and in bigger stars, the center is so dense that it converted to black hole.



Q4 = c

### Chemical bondings

- Chemical bonding is the sharing or complete transfer of electrons (sometimes more than one) between the atoms.
- In chemical bonding the atoms share or transfer the electrons from their outer-most shell.
- Chemical bonding is of four kinds: (i) Ionic bond (ii) Covalent bond (iii) Co-ordinate covalent bond and (iv) Metallic bonding.

### Why atoms form chemical bond:

Every system and every body in the world tries to achieve stability, and for the sake of that, they adopt many different approaches. So, in parallel to this, the atoms that are unstable independently, trying to achieve stability in nature, atoms form chemical bonds. For this purpose, the atom either lose electrons, gain, or share the electrons. In chemical bonding, one atom lose electron and the other would accept that.

Examples: NaCl, CaCO<sub>3</sub>, HCl, O<sub>2</sub> etc.

### Which atom will form a chemical bond

These are two rules to attain stability: Duplet rule and Octet rule. The atoms having valence electrons less than eight, try to achieve and attain stability by completing eight electrons in its valence<sup>shell</sup> if its valence shell is not the first shell. In case of first shell as a valence shell, the atom would try to retain two electrons in it to stable. The atoms with a single shell, like hydrogen, need only one electron for stability, and the atoms like: oxygen, chlorine etc, need different number of electrons to complete eight electrons in valence band for stability.

• There are several noble atoms that do not need any bond because they are stable. Examples of which are Helium (one-shell with two electrons), Neon, Argon, Xenon etc has eight

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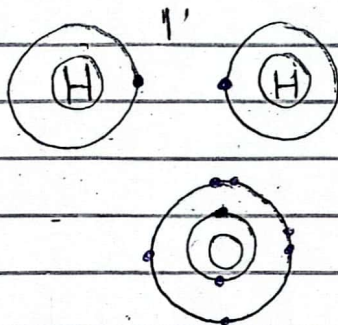


Electrons in valence band.

Structure of water: "H<sub>2</sub>O"

- In water "H<sub>2</sub>O" the covalent bond formed by the sharing of two electrons by oxygen atom with two hydrogen atoms, each having one electron.
- In hydrogen atom there is only a single lone pair while oxygen atom has two lone pairs and two bond pair electrons.
- When the hydrogen atoms share their electrons with a single oxygen atom, a repulsion between lone pairs and bond pairs of electrons took place.
- Due to this repulsion, the bond pair has been shifted at a specific angle and in H<sub>2</sub>O this angle is 109.5°.

Structure:



- With the sharing of electrons in water, both hydrogen and oxygen atoms achieve the state of stability.

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## Q4 = (D)

### Conductors:

- Anything that allows the flow of electrons is conductor.  
OR, A conductor is that, ~~is~~ through which electric current passes.
- It would be formed of metals.
- It contains free electrons.
- Example: Silver, Copper, Iron etc.
- ~~A~~

### Semiconductors:

- Semi-conductors lies between the category of conductors and insulators.
- It allow electric current sometimes to pass through it, while sometime it does not allow.
- Mostly formed by the doping from other groups i.e. adding elements from the non-metal and metallic groups.
- Examples are: Diode, Registers etc.
- Current is not passed through it all the times.

### Metal:

- Metal is everything that allow current to pass through it just like conductors. But the difference is, some ~~can~~ metals are more sensitive to heat and some are less.
- Metals are ductile and shiny.
- Not all the metals are used as conductors.
- Examples are: Gold, ~~A~~ Lead, Silver etc.

### Plastic

- The word plastic derived from the Greek word "Plastikos" that means to shape and mould.
- Plastic is widely using material of the world.
- All plastics are insulators in nature.
- Examples of plastics are: Shopping bags, PVC etc.

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## "Ceramics"

- Ceramics are those materials formed from clay when heated on high degree temperature.
- This become hard enough that are even difficult to break.
- Ceramics are globally used because of its toughness.
- Examples of Ceramics are: Diodes, cups, Tiles etc.

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## Q 05 :- Part (a)

### Radioactivity:

- The spontaneous decay of an element through radiations is known as Radioactivity. And the element is said to be Radio-active Element.
- The life-span of this decay ranges from microseconds to thousands of years.

### Discovery:

Henry Becquerel and Marie Kevsi discovered radioactivity in 1907.

### Definition:

Radioactivity is the process by which an unstable nucleus release energy by means of radiations.

Examples are: Uranium, Thorium etc.

- Radioactivity has several good effects but a lot of threats on human health, atmosphere, and ecosystem.

### Types of Radioactivity:

There are two major types of Radioactivity: one is Natural Radioactivity and other one is artificial Radioactivity.

### "Natural Radio-activity"

- By natural radioactivity we mean that the spontaneous release of energy from any unstable nucleus.
- This can happen anywhere and in every situation.
- This type of radioactivity can't be controlled easily.
- Most of them are hazardous for the life on earth.
- Inclusion waste is the major source for natural radioactivity.

Mostly used in Nuclear Reactors.

Examples are Uranium and Thorium.



## Artificial Radioactivity

- Artificial Radioactivity is that when a stable nucleus is bombarded with particles, the radiations emitted are Artificial Radio-activity.
- The stable nucleus is bombarded with charged particles i.e.  $\alpha$ -particles,  $\beta$ -particles, and sometimes  $\gamma$ -particles (chargeless particles) as well.
- Examples are: Boron, Magnesium etc.

## Qs: Part (b)

### "Polio": or "Poliomyelitis"

- Polio is a disease caused by virus.
- Mostly infected the infants and children upto the age of 5.
- Polio virus attacks children because of the weak immune system. It was one of the incurable disease of 20<sup>th</sup> Century.

### "Symptoms"

Symptoms of Polio patient is headache, fever, stiffness, imbalance, and sore throat, ~~et~~ muscle pain, Fatigue.

### "Causes"

Polio is caused by many ways. The major one is by touching the faeces of infected child, other causes are sneezing and coughing. Sometimes eating contaminated food, and drink contaminated water can also cause Polio.

### "Prevention"

- Prevention from poliovirus is possible only through cleanliness, ~~eat~~ eating healthy food, and drinking clean water.
- Don't be in touch with with the effected person.



- Polio ~~virus~~ be prevented through vaccines as well.

### "Vaccination"

- There are two types of Polio vaccines. One is ~~to~~ given through mouth and other through injection.
- IPV is given by injection while OPV by mouth.

### Qs:- Part (a)

The Country of Pakistan is very sensitive toward Population growth. The Population rate in the Country is 2.5%, which is one of the highest among South Asian region. There is a need of Population growth which is possible through Population Planning.

### Population Planning:

Population planning is an approach toward the Population growth. The mentality is needed to control the burgeoning ratio of Population growths and we need to adopt it. Population growth with any specific mentality is devastating for the Country and its Control is in favour of the majority.

### Benefits of Population Planning:

Population planning holds uncountable benefits for the different sectors. The significant has not only over the economy but an environment and society as well.

### "Environmental Benefits"

Population planning means the Control of Population, and if Population is controlled, it brings environmental benefits like:

- (i) Reduce deforestation.
- (ii) Land erosion.



- (iii) Reduce Carbon emission.
- (iv) Reduce the emission of GHGs.

### "Economic Benefits"

Population Control has certain meaningful benefits on the national economy like:

- ∴ Reduce the burden over economy through
- (i) Reduction in Poverty
- (ii) Can increase the GDP of the country.
- (iii) Can reduce the dependency on foreign aids and exports.

### "Social Benefits"

Population Planning has several social benefits like:

- (i) Provide employment.
- (ii) Well education opportunities.
- (iii) Reduce crime ratio.

### "Agriculture Benefits"

Along with social, economic, and environmental advantages, Population Control has a lot of advantages for agriculture sector as well:

- (i) Increase the land for cultivation.
- (ii) Habitate for wild life.
- (iii) Growth of different seasonal seeds would be easy.

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Q No 7:- (a)

Given: One number is divided by 6.

Addition of number with 50

$$\text{Sum} = 60$$

Required:

Find the number = ?

Calculation:

Let the number is =  $x$

Divided by 6 =  $\frac{x}{6}$

Added with 50 =  $\frac{x}{6} + 50$

The sum is 60 =  $\frac{x}{6}$

$$\frac{x}{6} + 50 = 60$$

$$\frac{x}{6} = 60 - 50$$

$$\frac{x}{6} = 10$$

$$x = 10 \times 6$$

$$x = 60$$

The number is 60.

Part (b)

Given:

Sequence 8, 16, 24, 34, 40, 48.

Required:

Odd one in series.

Calculation:

In the given series, the numbers are multiple of 8 except 34, which is the only odd in the series.

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## Part (c)

Given:

Tower height  $h = 15\text{m}$

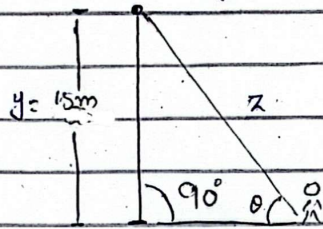
Base distance =  $20\text{m}$

Required:

Aerial distance = ?

Calculations:

As, The tower is straight of  $15\text{m}$  height.



To find aerial distance we need to know the base angle. As, the image looks like right angle triangle.

So, we know

$$\tan \theta = \frac{\text{Perp}}{\text{Base}}$$

$$\tan \theta = \frac{15}{20}$$

$$\tan \theta = 0.75$$

$$\theta = \tan^{-1} 0.75$$

$$\theta = 36.8^\circ$$

Now we know that

$$\cos \theta = \frac{\text{Base}}{\text{Hyp}}$$

$$\cos \theta = \frac{x}{z}$$

Put values

$$\cos 36.8^\circ = \frac{20}{z}$$

$$0.8 = \frac{20}{z}$$

$$\Rightarrow z = \frac{20}{0.8} \Rightarrow z = 25\text{m}$$

The required aerial distance is  $25\text{m}$ .

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## Q7: Part (d)

Given:

Tariff for odd days = Rs. 1000 Per day

Tariff for even = Rs. 2000 Per day

Amount paid = Rs. 30000

Required:

For how many days the man stayed = ?

Calculation:

First find the average of even and odd days

$$\text{Average} = \frac{\text{Tariff of even} + \text{Tariff of odd}}{2}$$

$$= \frac{1000 + 2000}{2}$$

$$\text{Average} = \frac{3000}{2}$$

$$\text{Average} = 1500 \text{ Per day}$$

Now

$$\text{Man will stay} = \frac{\text{Amount paid in total}}{\text{Average Per day tariff}}$$

$$= \frac{30000}{1500}$$

$$= \frac{20}{15}$$

$$= 20 \text{ days}$$

The man will stay for 20 days on the amount paid by him.

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Q6: (a)

Given:

Total enrollment in Jan 2022 = 850 pupils

Enrollments in Jan 2023 = 1120 pupils

Required:

Percentage increase in ~~total~~ enrollment  $\Rightarrow$

Calculation:

Let enrollments of Jan 2022 =  $x$

Enrollments of Jan 2023 =  $y$

Difference b/w  $x$  and  $y$

$$y - x = 1120 - 850$$

$$y - x = 270$$

Now Percentage increase from  $x$  to  $y$ :

$$\text{Percentage increase} \times x = (\text{Difference in enrollments}) \times 100$$

~~% inc.~~ Percent increase  $\times 850 = 270 \times 100$

$$\text{Increase} = \frac{270}{850} \times 100$$

$$\text{Increase} = 0.3176 \times 100$$

$$\boxed{\text{increase} = 31.76}$$

31.76% increase in enrollments from Jan 2022  
to Jan 2023.

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## Q6: Part (c)

Given:

$$\text{Number of heads} = 48$$

$$\text{No. of feet} = 140$$

Required:

$$\text{No. of Hens} = ?$$

Calculation:

As each head must have 2 legs

$$\text{So, } 48 \times 2 = 96$$

$$\begin{aligned} \text{Remaining feet} &= 140 - 96 \\ &= 44 \end{aligned}$$

These must be of Cows. Also, the two legs are carried out with 48 heads.

$$\text{So, No. of Cows} = \frac{44}{2}$$

$$\boxed{\text{No. of Cows} = 22}$$

$$\begin{aligned} \text{Legs of Cows} &= 22 \times 4 \\ &= 88 \end{aligned}$$

$$\begin{aligned} \text{Legs of Hens} &= 140 - 88 \\ &= 52 \end{aligned}$$

$$\text{No. of Hens} = \frac{52}{2} \quad \because 2\text{-legs}$$

$$\boxed{\text{No. of Hens} = 26}$$

## Part (B)

Given

$$\text{Let Age of Son} = x$$

$$\text{Age of father} = y = 5x$$

Required

$$\text{Percent of Son's age} = ?$$

Calculation

As two years ago, sum of <sup>5 year</sup> age was 114

So,

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$$(x-2)^2 + (y-2)^2 = 114$$

$$x^2 + 4 - 2(2)(x) + y^2 + 4 - 2(2)(y) = 114$$

$$x^2 + 4 - 4x + y^2 + 4 - 4y = 114 \rightarrow (1)$$

Put ~~at~~  $y = 5x$

$$x^2 + 4 - 4x + (5x)^2 + 4 - 4(5x) = 114$$

$$x^2 + 8 - 4x + 25x^2 - 20x = 114$$

$$26x^2 - 24x + 8 = 114$$

$$13x^2 - 12x + 4 = 57$$

$$13x^2 - 12x + 4 - 57 = 0$$

$$13x^2 - 12x - 53 = 0$$

Q. formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(13)(-53)}}{2(13)}$$

$$x = \frac{12 \pm \sqrt{144 + 2756}}{26}$$

$$x = \frac{12 \pm \sqrt{2900}}{26}$$

$$x = \cancel{12 \pm \sqrt{\quad}} \quad x = \frac{12 \pm 53.85}{26}$$

$$x = \frac{12 + 53.85}{26}$$

$$x = \frac{12 - 53.85}{26}$$

no possible

$$x = \frac{65.85}{26}$$

$$x = 2.53 \rightarrow \text{Age of son}$$

Now Age of father as per calculation

$$y = 5x$$

$$y = 5(2.53)$$

$$y = 12.65$$

$\therefore$  Simplified form after  
Q. Equation.

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$$\begin{aligned}\text{Percent of Son} &= \frac{2.53}{12.65} \times 100 \\ &= 20\%\end{aligned}$$

Q6: (D)

Given:

Speed in first half = 40 km/hr.

Speed in 2nd half = 60 km/hr

Required:

Average speed  $\langle v \rangle = ?$

Calculation:

$$\text{As ; Average speed} = \frac{\text{Total distance}}{\text{Total time}}$$

But here the speeds are given.

$$\text{So, Average} = \frac{\text{Sum of data}}{\text{Total Number of events}}$$

$$= \frac{40+60}{2}$$

$$= \frac{100}{2}$$

$$\text{Average speed} = \boxed{\langle v \rangle = 50 \text{ km/hr}}$$