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QUESTION NO: 2:

- a) What are black holes, how are they formed? Discuss.

THE REALITY OF BLACK HOLES:

A black hole is a cosmic body having highly intensified gravity in it. Due to the intense gravity even light cannot escape the black hole. Usually the formation of a black hole happens due to the death of a massive star. This strong gravity exists as a result of enclosure of large mass of star into very small space. Black holes are invisible. Scientists study and visualise black holes by using telescopes and satellites.

FORMATION OF BLACK HOLES:

An extensive research on the existence and process of

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formation, has been made - some of the black holes formed during the creation of universe. While the black holes much larger in size formed when very huge stars neared death. The inner content of stars being pressurized inside very small area. When the big stars collapse inside themselves, supernova is formed. The core of star at the end of their life becomes unstable and leads to collapse in itself. The crushing weight of the star is forced into very tiny space. This magnifies the effect of gravity. The volume of ^{dying} star according to some scientists become zero, the concept of singularity well explains this phenomena of singularity.

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b) Define octet rule? Explain in example of table salt in context of bonding.

OCTET RULE:

The octet rule defines the the formation of compounds that exist in nature. The natural tendency of every element to have atleast eight electrons in its outermost shell is what defines octet rule. The tendency of every element to attain eight electrons in its outermost shell to gain stability. Having eight electrons in the outermost shell stabilizes elements as exhibited by the noble gases.

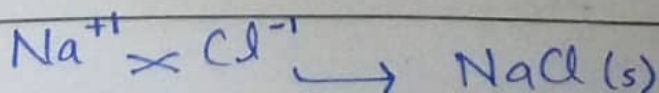
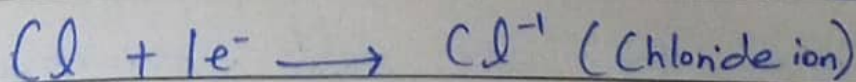
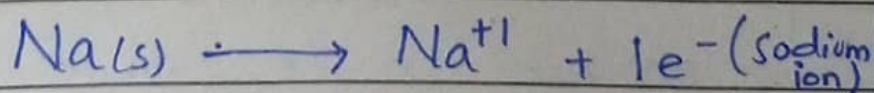
According to octet rule, the atoms in their ionic state either loose or gain electrons in their outershell to get stable. This stability ensures their presence in the form of compounds like the table salt, magnesium chloride etc.

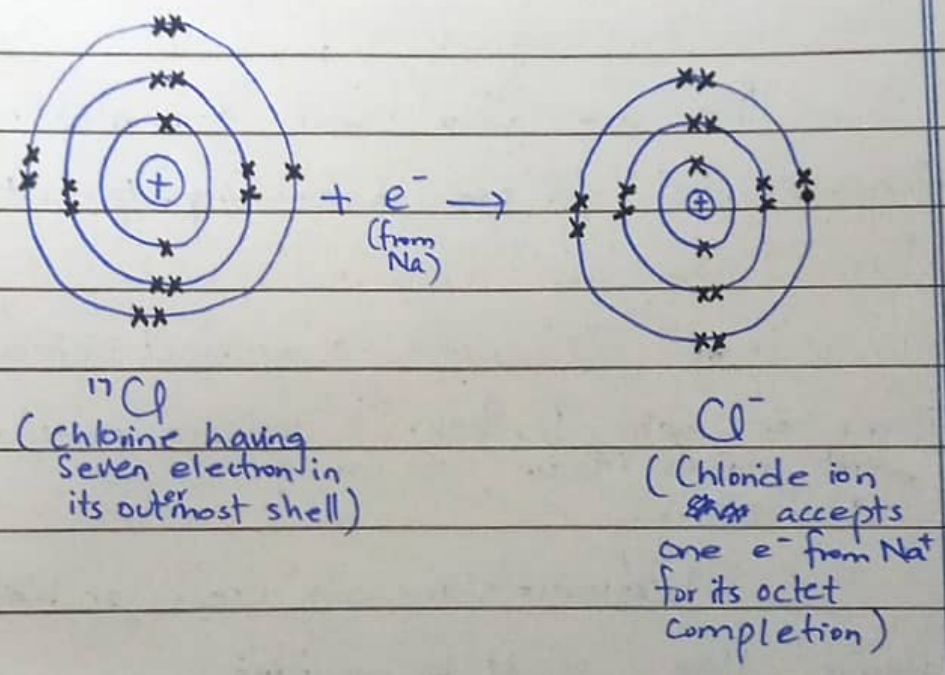
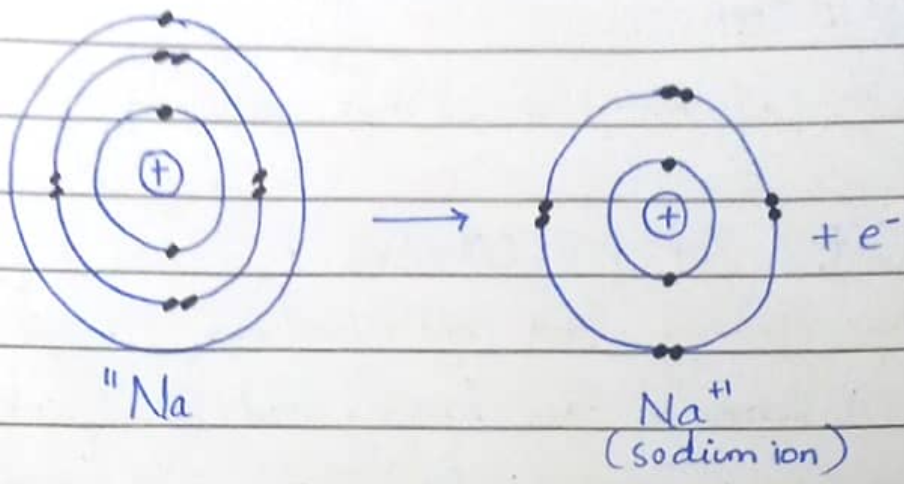
BONDING IN TABLE SALT:

Table salt is chemically sodium chloride. The nature of bonding in sodium chloride is ionic.

This bonding demonstrates the fulfilment of octet rule. The sodium ion is formed when sodium donates its electron to chlorine.

The outermost shell of Na has one electron, in order to gain stability Na loses its electron, a complete transfer of electron to chlorine takes place. Likewise Chlorine has seven electrons in its outermost shell and it is feasible for chlorine to gain one electron rather than losing seven electrons. So Chlorine gains an electron from Na from a negative chloride ion. This leads to formation of ionic bond.





QUESTION : 2:-

c) Uses of microwave, x-rays, radio waves 3

a. USES OF MICROWAVE :

1- For cooking food and reheating:

Microwaves are largely used for quick heating or cooking food items like frozen items.

2- For melting ingredients:

They are also used for melting ingredients for use in cooking. Eg: butter.

3- For disinfecting items :

They are used to disinfect kitchen items or baby bottles. It sterilizes pacifiers and makes them safe for use.

4- For Baking:

Microwaves are also used for baking items like cakes and cookies -

5- Uses in medical health care:

These are being used in healthcare for relieving pain through their use in warm compressors -

b. USES OF RADIOWAVES:

1- Radio and television broadcasting:

The television and radio transmissions use radiowaves for working and resultantly connecting TV with its audience.

2- Use in cellular communications:

The communication through mobile phones uses radiowaves and results in sending texts and making calls.

3- Use in remote controls:

Remote controls for TV and other devices use radiowave communication.

4- Traffic light control system using radiowaves:

The automatic traffic light control system utilizes radiowaves to control traffic flow.

5- Wireless alarms and sensors:

Radiowaves are being utilized in home security devices. These include wireless alarms and sensors that communicate using radiowaves.

c. USES OF X-RAYS:

1) Use in medical imaging:

The use of x-ray in medical imaging for diagnostic purpose helps save many lives.

2. Applied in Airport security checks:

X-ray scanners are installed in airports for fast and easy checking of concealed items.

3. Analysis of materials:

X-ray spectroscopy is used for analysis of materials in chemistry. It leads to enclosure of valuable information.

4. Research and scientific study:

X-ray crystallography and X-ray diffraction being utilised for research and scientific study.

5. Use in security purposes:

X-ray scanners are largely installed at entrances. These detect any kind of concealed weapon or explosive material. The x-rays generate image of body enabling search.

Part (d)

Main points of Agenda of Conference regarding AI:

1. The first major agenda of the meeting was to control the misuse

of AI. The use of deepfake technology threatens the privacy of millions and needs to be controlled.

2. The involvement of some big names using deep fake to spread false news.

3. The use of AI in agriculture to be enhanced for gaining benefit.

4. Enhance collaboration among different stakeholders for more benefit.

5. The need for controlling security of branches through AI.

6. Advancement in AI to ensure more ease for humanity.

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QUESTION NO: 4:-

Part (a) One sentence differentiation -

- i) **Cyclone:** Characterized by low pressure at its center surrounded by high pressure from all sides.

Tornadoes:

Most violent form of wind circulation causing much more disaster and windspeed is 400kmph.

- ii) **Hypocenter:** The point of origination of earthquakes with depth depending on severity of earthquake.

Epicenter: This is point on Earth's surface directly above the hypocenter marking the area of effect.

- iii) **GPS:** GPS is satellite based navigating system providing location and time information anywhere on Earth.

GIS:

It is a system designed to analyze, store, manage and present geographic data.

- iv) **RAM:** It is a type of volatile memory storing data temporarily.

ROM:

It is non-volatile memory that stores data permanently, retaining memory when even turned off.

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v) **Pesticides:** Chemicals that are used to control or kill variety of pests including insects, fungi etc.

Insecticides:

Specific type of pesticide, targetting control of insects only.

Part (b)

A. **Volcanic eruption:**

Eruption of molten rocks of the earth's crust from the surface of earth is what comprises a volcanic eruption.

How Volcanic eruption occurs:

The volcanic eruption occurs due to the movement of magma beneath the earth's surface. During the initial stages the formation of magma takes place.

i. **Magma Formation:**

The first step is magma formation whereby magma is formed

due to melting of rock due to high temperature and pressure.

2- Magma Chamber:

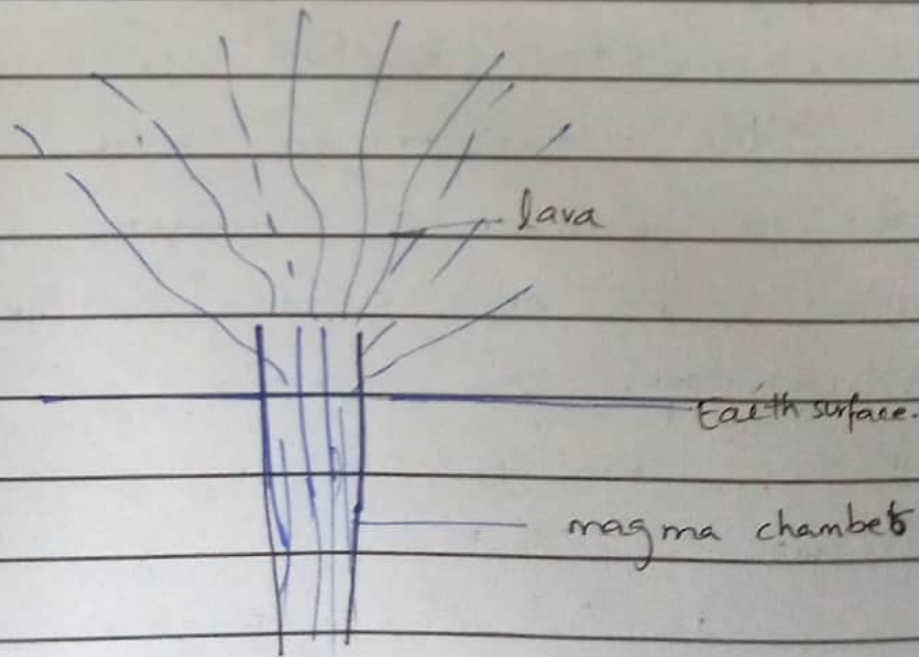
The accumulation of magma builds pressure inside the surface of earth. The collection occurs in the magma chambers.

3- Pressure buildup:

The more and more accumulation builds pressure within the chamber

4- Eruption of volcano:

This pressure leads to eruption of volcano and the release of lava.



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Part (c)

PYROLYSIS :

Pyrolysis is a technique applied for solid waste management. This chemical procedure involves the use of heating. The organic material are heated to very high temperatures in the absence of oxygen. This absence of oxygen is used to enable decomposition into simpler compounds.

BENEFIT:

Pyrolysis can be environmental friendly as it provides mean for converting organic waste into useful products. It also helps reduce the greenhouse gas emissions.

INCINERATION:

It is a process of solid waste management that involves combustion of organic substances in the waste material.

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Waste collection

↓
Waste sorting

↓
Combustion

↓
Energy recovery (Energy from combustion used to produce steam)

↓
Utilization

Pros and Cons:

-) Reduce volume of waste sent to landfill.
-) Energy of combustion is utilized.
-) But it has environment impact ↴
-) Includes air emissions, ash disposal and addition of toxic pollutants.

COMPOSTING:

It is the natural process of conversion of organic material into nutrient rich soil i.e the compost.

Feedstock collection → Aeration ↴
Moisture management

Temperature regulation ← Microbial activity ↴

↳ Maturation

↳ Use of Compost

PRO'S of Composting:

-) Environment friendly way to manage organic waste.
-) Creates valuable resource for soil
-) Recycles organic materials back to soil.

Part (d)

Balanced diet:

A balanced diet comprises of an ideal and balanced intake of daily diet. It is important to balance this intake. Balanced diet includes the following:

- 1- Controlled intake of Fruits and vegetables.
- 2- Intake of Grains.
- 3- Ensuring balanced protein intake.
- 4- Including balanced dairy intake.
- 5- Inclusion of healthy fats.
- 6- Ensuring intake of dietary fibre.
- 7- Hydration status of body.

Balanced diet is very vital

as it ensures :

-) Normal body growth and function -
-) Proper function of immune and nervous system.
-) Avoids diseases due to obesity and over-eating -
-) Avoids malnutrition.

QUESTION NO. 7.-

Part (a)

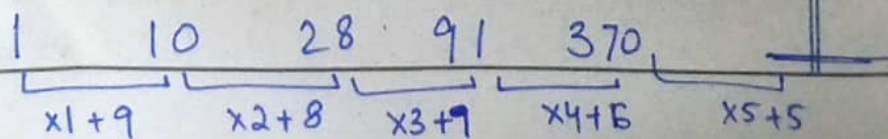
i) 11, 13, 17, 19, 23

⇒ This is list of prime numbers so the prime number after 17 would be 19.

11, 13, 17, 19, 23

ii) 10, 28, 91, 370, 1855.

⇒ The huge difference indicates use of multiplication.



$$370 \times 5 = 1850$$

$$1850 + 5 = 1855$$

Part (b) :-

Price of each shirt = Rs 280

Price of each shirt sold = Rs 308

$$\text{Profit} = 308 - 280$$

$$\text{Profit} = 28$$

per shirt

$$\text{Profit percentage} = \frac{\text{Profit}}{\text{Cost price}} \times 100$$

$$= \frac{28}{280} \times 100$$

$$\text{Profit percentage} = 10\%$$

Part (c)

Mental age = 10 years

Chronological age = 12 yrs.

$$IQ = \frac{\text{Person's mental age}}{\text{Chronological age}} \times 100$$

$$IQ = \frac{10}{12} \times 100 = 83.33\%$$

Part (d)

$$\text{Average height} = 150 \text{ cm} = m$$

$$\text{Wrong Missing value} = 135 \text{ cm}$$

$$\text{Correct value} = 165 \text{ cm} -$$
$$\text{No of boys} = 30 = n$$

$$\text{Mean} = \frac{\text{Sum of observations}}{\text{No of observations}}$$

$$150 \text{ cm} = \frac{29 \text{ obs} + \text{one}}{30}$$

$$\text{New mean} = \frac{[m \times n + (165 - 135)]}{n}$$

$$= \frac{150 \times 30 + 30}{30}$$

$$= \frac{453}{3}$$

$$= 151$$

Correct mean is 151.

QUESTION NO. 6 :-

Part (b):

Candidate gets = 30% votes

Defeated by = 15000 votes

Votes of winning candidate = ?

Solution:-

$$\text{Percentage of votes of winning party} = 100 - 30 \\ = 70\%$$

$$\text{Difference in both percentages} = 70 - 30 \\ = 40\%$$

Suppose,

total votes = x

$$\frac{40}{100} \times x = 15000$$

$$x = \frac{15000 \times 100}{40}$$

$$x = 37500$$

Thus the no of votes of winning party
= 70% \times 37500 = 26250.

Part (c) :

Solution :

If the original mixture contains 25% water then

amount of milk = 75%

Amount of milk in the original

$$40L \text{ mixture} = 40 \times \frac{75}{100} = 30 \text{ litres}$$

∴ Adding 10L of water, now
Total mixture volume = 50L.

Percentage of milk in final mixture,

$$\% \text{ of milk} = \frac{30}{50} \times 100$$

$$\% \text{ of milk} = \boxed{60\%}$$

after adding
10L of water

Part (d) :-

Solution:-

Ali does work in 15 days

Aslam does work in 10 days

Najam worked in 20 days.

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$$= \text{Work done by Aslam in one day} = \frac{1}{10} \text{ of work}$$

$$\text{Work done by Ali in one day} = \frac{1}{15} \text{ of work}$$

$$\text{Work done by Najam} = \frac{1}{20}$$

→ Aslam + Ali + Najam's one day work

$$= \frac{1}{10} + \frac{1}{15} + \frac{1}{20}$$

$$= \frac{6+4+3}{60} = \frac{13}{60}$$

$$= \frac{13}{60} = 0.21 \text{ days}$$

Together they can perform in
0.21 days -

