

19-July-2023

General Instructions

G.S.A.

1. Give numbering to headings
2. Do not write lengthy paragraphs. Write medium sized paragraphs with headings
3. Do not use table for comparison and contrast questions

4. Draw figures/diagram/flowchart where needed

5. Start new question from fresh page

6. Write unit of the answer in ability section.

7. Explain mathematical steps and the reasoning for better score.

8. Change colour scheme for references to give them more visibility.

9. Manage time well.

10. Wide page borders are discouraged.

11. Avoid writing wrong references.

12. Give more weightage to expressedly asked part/s of the question.

Artificial Intelligence is the use of computer science programming to imitate human thoughts and actions by analyzing data, solving problems, predicting outcomes, self-learning or adapting to various tasks. Artificial intelligence is the next big thing in technology and has already started to revolutionize our lives. AI algorithms are designed to go through huge sets of data and also real-time data to make informed decisions. AI systems have the ability to learn and adapt as they make decisions e.g. autonomous vehicles take advantages of other vehicles experience on the road and the entire experience is immediately transferred to other configured vehicles. All the navigational decisions are also made by AI systems.

Poor presentation. Subheadings missing.

Q4b)

Water scarcity is when demand for water outweighs the supply of water. Some ways to ~~red~~ combat water scarcity ^{are:}

- a) Developing water filtration systems so that people have access to water that is safe to drink and use.
- b) One biggest way is to ~~de~~ reduce your water usage by taking short showers, collecting rainwater for garden use or invest in sustainable water reduction initiatives.
- c) Protecting more wetlands as they are a natural water filtration system. Currently wetlands are disappearing at an alarming rate but conserving them could have a huge payoff.
- d) Improving irrigation efficiency by reducing water drainage, for example switching from flood irrigation to sprinklers or drip irrigation system could help save a lot of water.
- e) Increasing water storage in reservoirs by capturing and storing floodwater and then treating it easily to be used in difficult times.

Q

Q4c)

A4c) A vaccine is a biological preparation that provokes active acquired immunity to a particular infectious or malignant disease. It is a simple, safe and effective way of protecting oneself against harmful ~~these~~ diseases before coming into contact with them. There are several type of vaccines

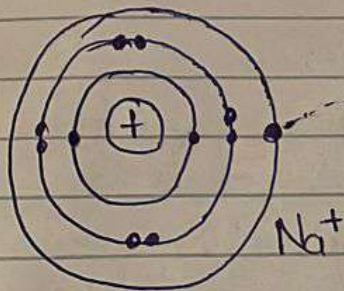
- a) Inactivated Vaccines :- They use the killed version of the germ that causes a disease. Inactivated vaccines are used to protect against Hepatitis A, Polio, Rabies etc.
- b) Live Vaccines :- They use a weakened form of the germ that cause a disease. Live vaccines are used to protect against measles, smallpox, yellow fever etc.
- c) Messenger RNA Vaccines or mRNA :- They make proteins in order to trigger an immune response. mRNA vaccines were used to protect against COVID-19.
- d) Toxoid Vaccines :- They use a toxic made by the germ that causes a disease. They are used to protect against Tetanus.
- e) Viral Vector vaccines :- They use a modified version of a different virus

as a vector to deliver protection. They are used to protect against Ebola, COVID-19 etc.

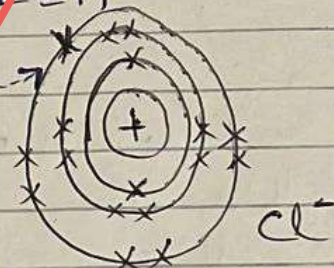
(Q4d)

(A4d) Ionic bond is formed from the electrostatic attraction between oppositely charged ions in a chemical compound. For example NaCl.

Na = Sodium
Z = 11



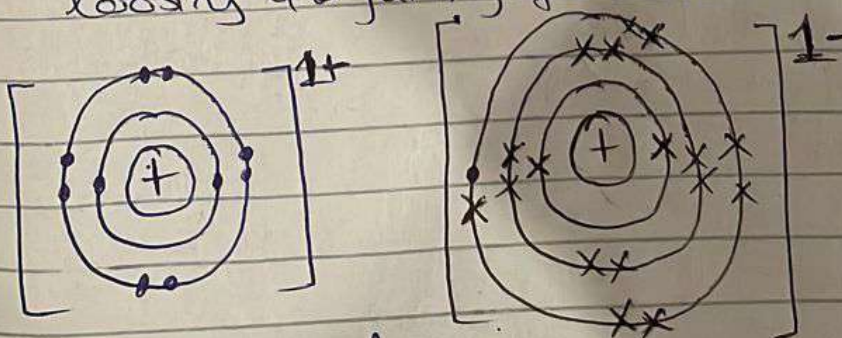
Cl = Chlorine
Z = 17



As Sodium has 1 electron in its outermost shell it will lose its 1 electron to Chlorine and gain a positive charge.

Chlorine has 7 electrons in its outermost shell so it will gain 1 electron from Sodium, gaining a negative charge.

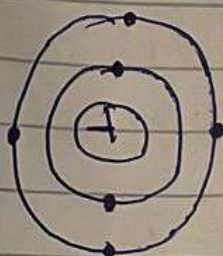
So the ~~combined~~ ionic bond formed after losing and gaining of electron is NaCl.



NaCl.

Covalent bond is a bond which is formed by the mutual sharing of electrons between the atoms.
For example CH_4 (methane).

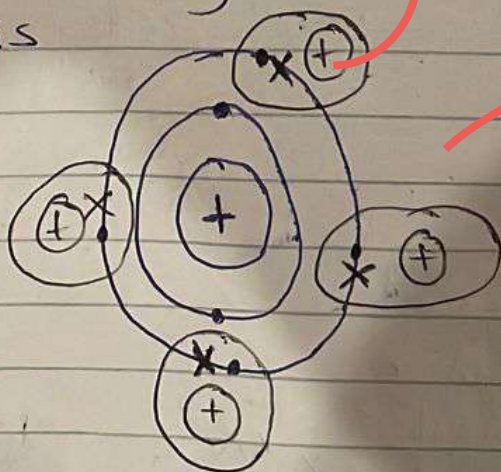
C = Carbon
 $z = 6$



H = Hydrogen
 $z = 1$



Carbon has 4 electrons in its outermost shell and needs 4 more electrons to complete its shell. As hydrogen has 1 electron in its outermost shell so 4 hydrogen atoms will combine with carbon sharing their electrons. So CH_4 is



(Q5a)

Ans) An avalanche is the rapid descent of huge mass of snow, rock or ice that tumbles down a hill or mountain.

Different types of avalanches are

- 1) Loose snow avalanche :- They are common on steep slope and are seen after a fresh snowfall. The snow is made light by sunlight and have a single point of origin.
- 2) Slab avalanche :- Slab avalanches are characterized by the fall of a large block of ice down the slope. There are thin slabs and thick slabs avalanches.
- 3) Powder snow avalanche :- It is a mix of loose snow and slab avalanche. The bottom half consists of a slab of ice or snow, while the above half is a cloud of powdered snow which can snowball into a larger avalanche as it progressed down the slope.
- 4) Wet snow avalanche :- This avalanche comprises of water and snow. They travel down the slope slowly due to friction and collect debris from the path easily.

Diagram?

Some examples of avalanche include the Winter of Terror, Austria-Switzerland border, 1950-1951, when in just a 3-month ~~more~~ span 649 avalanches were recorded resulting in a death of 265 people.

Another example is of the 2015 Panjshir avalanches in Afghanistan, which is just a 4-day span killed at least 310 people due to a series of lethal avalanches.

Q5b)

A5b) Electromagnetic radiations is an energy that is transmitted at the speed of light through oscillating electric and magnetic fields. It is a form of energy that is generated when electrically charged particles move through a matter or vacuum.

Whereas the electromagnetic spectrum is defined as the ~~the~~ range of all types of electromagnetic radiation. These types of EM radiation includes:-

- 1) Gamma rays:- They have the highest frequency and photon energy in the EM spectrum, and have the shortest wavelengths. Used to identify cracks in building etc.
- 2) X-rays:- They have frequency and photon energies slightly lower than gamma rays, but more than UV rays. X-rays have

wavelength which greater than gamma but shorter than UV. They are used in medical purpose to visualize the structure of body.

~~at~~
ii) UV Rays :- They have frequency and photon energies slightly lower than X-ray but more than visible light. Their wavelengths are greater than X-ray but shorter than visible lights. They are found in ozone layer.

iii) Visible light :- They have frequency and photon energy less than UV rays but more than infrared rays. They have wavelength which is greater than UV but shorter than infrared.

iv) Infrared Rays :- Their frequency and photon energies are less than visible light but greater than microwaves. Their wavelength is greater than visible lights but shorter than microwaves.

v) Microwaves :- The frequency and photon energy is less infrared but greater than radio waves. And their wavelength is greater than infrared but less than radio waves. Used in microwave ovens.

vi) Radio waves :- They have the least frequency and photon energy in the spectrum but have the highest wavelength. Used in satellite, TV, radio etc.

Diagram?

Q5d)

Ans) GPS is the global positioning system which tells about someone's location and provide information about a given point on earth.. GPS has 3 segments on which it functions:

- 1) The space segment which consists of 28 satellites, each in its own orbit
- 2) The user segment which consist of receivers.
- 3) The control segment consists of ground stations which are 5 of them located around the world that make sure the satellites are working properly.

Q5d)

Ans) There are 3 types of computer buses.

- 1) Address bus:- It carries memory address from the processor to other components such as I/O devices. It is unidirectional.
- 2) Data bus :- It carries the data between the processor and other components. It is bidirectional.
- 3) Control bus:- It carries control signals from processor to other components. The control bus also carries clock pulses. It is unidirectional.

The Central processing unit (CPU) is the brain of the computer containing all the circuitry needed to process input, store data and output results. The CPU is constantly following instructions of computer programs that tells it which data to process and how to process it.

(Q6a)

A6a) Son current age = 30 years ~~20~~.

Father age = x .

Son age 5 years ago = $30 - 5 = 25$.

5 years ago Father was thrice the age of son so ~~$x - 5 = 3(x - 5)$~~ ~~$x - 5 = 3(25)$~~ ~~$x - 5 = 75$~~ ~~$x = 80$~~

$$\Rightarrow x - 5 = 3(x - 5)$$

$$\Rightarrow x - 5 = 3(25) \Rightarrow x - 5 = 75 \Rightarrow x = 80$$

Current age of Father = 80 ^{Years} Ans

(Q6b) 10

Explain steps

A6b) $\frac{10}{100} \times \text{Income} = 1500$

$$\Rightarrow \text{Income} = 1500 \times 10 = 15000 \text{ Rs. Ans}$$

$$\begin{array}{r} 50.4 \\ 3 \\ \hline 151.2 \end{array}$$

(Q6c)

A6c) Avg a = 20 of 6 numbers.
Avg b = 15 of 5 numbers

So Sum of Avg a = $20 \times 6 = 120$.

Sum of Avg b = $15 \times 5 = 75$.

So removed number $\Rightarrow 120 - 75 = 45$ Ans.

(Q6d)

A6d) i) 8, 4, 32, 7, 5, 35 Ans

ii) 17, 19, 23, 29, 31, 37 Ans

Reason?

(Q8a)

A8a) 3 litres cover 24 m^2
x litres cover 50.4 m^2

$$3 = 24 \Rightarrow 24 \times x = 50.4 \times 3$$

$$x = 50.4$$

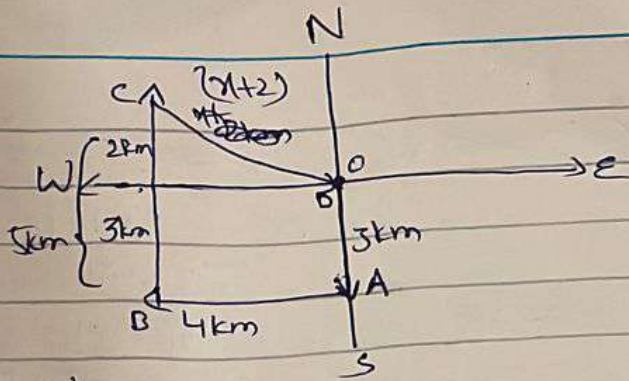
$$\Rightarrow 24x = 151.2 \Rightarrow x = \frac{151.2}{24}$$

\Rightarrow So x = 6.3 litres of paint to cover 50.4 m^2 .

Percentage Increase = $6.3 - 3 = 3.3$

So $= \frac{3.3}{3} \times 100 = 110\%$ - Ans.

Q8b)
A8b)



For above triangle

$$H^2 = B^2 + P^2$$

$$\Rightarrow (x+2)^2 = (4)^2 + (2)^2$$

$$\Rightarrow (x+2)^2 = 16 + 4 \Rightarrow$$

~~$$\Rightarrow x^2 + 2(x+2) + 4 = 20$$~~

~~$$\Rightarrow x^2 + 4x + 4 = 20 \Rightarrow$$~~

$$\Rightarrow (x+2)^2 = 20 \Rightarrow \sqrt{(x+2)^2} = \sqrt{20}$$

$$\Rightarrow x+2 = \sqrt{20} \Rightarrow x = \sqrt{20} - 2$$

$$\Rightarrow x = 2.47 \text{ km Ans.}$$

Q8c)

A8c) Investment of Tabir in a year = $15,000 \times 12 = 180,000$

Investment of Umar in a year = $30,000 \times 7 = 210,000$

Investment of Usman in a year = $45,000 \times 4 = 180,000$

Ratio of Investment

$$180,000 : 210,000 : 180,000$$

$$\Rightarrow 18 : 21 : 18$$

$$\Rightarrow 6 : 7 : 6$$

∴ Total share = $6 + 7 + 6 = 19$

Total Profit earned = 406,000

$$\text{Share of Tahir} = \frac{406,000}{19} \times 6 = 128,210.5 \text{ Rs.}$$

$$\text{Share of Umar} = \frac{406,000}{19} \times 7 = 149,579 \text{ Rs}$$

$$\text{Share of Usman} = \frac{406,000}{19} \times 6 = 128,210.5 \text{ Rs.}$$

Q8d)

A8d) Total Property = 640,000 -

Debt = 40,000, Burial charges = 5000

Property remained after death and
burial charges = 640,000 - 40,000 - 5000
⇒ 595,000.

Acc to Islamic law

Widow gets $\frac{1}{8}$ of property, daughter gets

$\frac{1}{2}$ of share of son. So

$$\text{Widow Share} = \frac{1}{8} \times 595,000 = \boxed{74,375 \text{ Rs}} \text{ A}$$

$$\text{Property left} = 595,000 - 74,375 = 520,625 \text{ Rs}$$

Share left of 2 sons and daughter
= 2 + 2 + 1 = 5

$$\text{Share of Son 1} = \frac{520,625}{5} \times 2 = 208,250 \text{ Rs}$$

$$\text{Share of Son 2} = \frac{520,625}{5} \times 2 = 208,250 \text{ Rs}$$

$$\text{Share of daughter} = \frac{520,625}{5} \times 1 = 104,125 \text{ Rs}$$

$$\text{Share of Widow} = 74,375 \text{ Rs.}$$