GSA - Mock: Part - II

Question: 01: (a):

Briefly explain lipids. What are some ------- functions?

Lipids:-

i) Definitions-

"Lipids are hydrophobic organic molecules, including fats, oils and phospholipids, they serve as energy storage, structural components of cell membranes and signalling molecules."

Lipids are found throughout the living world in microorganism, higher plants and animals in-cluding all cell types. Lipids help in developing the cell structures, provide stored energy, and take part in certain biological processes. The energy released from one gram of lipids is 9.1 cal.

ii) Structure:

Lipids are polymers of fatty acids. The basic unit of lipids is a Triglyceride, which is sythesized from glycerol and fatty acids. Triglycerides are the most common form in which most fatty acids exists in food as well as in body.
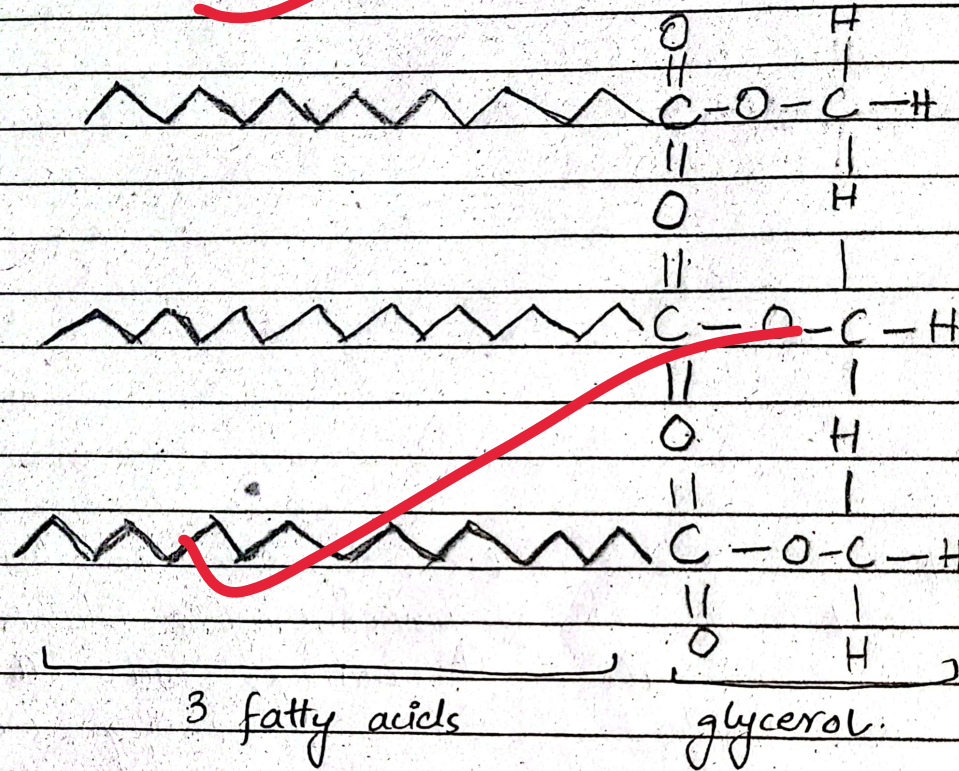
The second most common class of lipids are Phospholipids. They are found in

membranes of animals and plant cells. Phospolipits along with glycerol and fatty acids ; also contain phosphoric acid, which is an alcohol of low-molecular weight.

O   H
|| |
~~~~~~C—O—C—H
|| |
O   H

O
||
~~~~~C—O—C—H
|| |
O   H
|| |
~~~~C—O—C—H
|| |
O   H

3 fatty acids   glycerol.

"Triglyceride molecule".

Major types of Lipids:

There are four major types of lipids based on their structure and functions.

1. Fats (Triglycerides):-

i- Fats are composed of a glycerol molecule and three fatty acids. They primarily serve as long term storage molecules. Commonly fats are found in adipose tissues in animals and oils in plants. Further, the provide insulation and cushioning for the organs. During metabolic processes they are broken down to release energy. The major sources are butter, vegitable oil and animal fat etc.

2. Phospholipids:

They are primarily made up of a glycerol, two fatty acids and a phosphate group. They majorly are known for formation of the basic structure of cell membranes called phospholipid bilayer. They have an amphipathic nature that means they have a hydrophillic head and hydro phobic tails, which helps in facilitating membrane dynamics. They assist in cell signaling and the formation of lipid-based vesicles. They guards the cell membrane and monitor the per- miability for entry and exit of subs-

-tances from the cell. They are mostly found in lecithin, a key component in both biological membranes and food additives.

3. Steroids:

Steroids have a structure characterised by four fused hydrocarbon rings. Cholestrol is a major steroid, which is critical for cell membrane fluidity. Steroids are a precursor for the steroid hormones like estrogen, testosterone and cortisol. They are involved in regulating metabolism, immune fuchions, and reproduction. Found in animal products like eggs and meat and is also synthesised in human body itg — self.

4. Waxes:-

Waxes are composed of long chain fatty acids. They are waterproof or hydrophobic that provide water proof coating to plants (cuticle) and animals (feathers). They serve a structural components, eg., in beeswax for honeycomb construction. They protect the sufaces against dehydration. and environmental damage. Examples include lanolin (sheep wool wax) and carnauba wax (from palm leaves).

5. Glycolipids:

The structure contains lipids attached to carbohydrate chains. They're present on outer surface of cell membranes, and involved in cell recognition and communication processes. They contribute to the stability of cell membranes, and play a role in immune responses. by identifying foreign particles. They're found in nervous system, particularly in myelin sheaths.

Question: 1: (b):

Enlist a few measures for energy conservation and its sustainable use.

Energy Conservation:

i) Definition:

"The practice of reducing energy consumption by using it more efficiently or minimizing unnecessary use is called energy conservation."

ii) Measures for energy Conservation:

Energy conservation and sustainable use are essential to mitigate environmental impacts and ensure the availability of resources for future generations. The key measures include the following.

1. Enhancing energy efficiency:

Improving energy efficiency is a key measure for conservation. This involves using appliances and machinery that consume less energy while maintaining performance. For example, upgrading to energy efficient HVAC systems and improving building insulation can significantly reduce heating and cooling requirements. Switching to LED further minimizes electricity consumption.

2. Promoting Renewable energy Sources:

Transitioning to renewable energy sources is essential for sustainable energy use. Solar, wind and hydropower provide clean alternatives to fossil fuels, reducing green house gas emissions, governments and industries can invest in bio energy and geothermal technologies to diversify energy production. Encouraging households to adopt solar panels and other renewables can also make a substantial impact.

3. Adopting Sustainable Transportation:

Sustainable transportation reduces consumption of energy and environmental impact. Encouraging public transportation, cycling and walking can lower dependency on fossil fuels. The shift to electric and hybrid vehicles is another

critical step towards reducing carbon emissions. Developing urban infrastructure to support non-motorized transport options further enhances sustainable mobility.

4. Implementing energy saving Practices:

Simple energy saving habits contribute significantly to conservation efforts. Turning off lights and appliances when not in use, optimising thermostat settings, and scheduling equipment maintenance are practical measures. These actions when widely adopted can lead to substantial reduction in energy demand across households & industry.

5. Raising Education and awareness:

Public awareness and education are vital for encouraging energy conservation. Informing communities about energy efficiency and energy efficient practices can identify areas for improvement. Schools businesses and governments can collaborate on campaigns to promote responsible energy use and participation in conservation programmes.

By adopting these measures, societies can move toward a more sustainable future while reducing their carbon footprint.

Question: 01: (C):

What is hydrogen bonding? Give elaborating structures as examples.

Hydrogen Bonding :-

i) Definition:

"A type of intermolecular force that occurs when a hydrogen atom, covalently bonded to an electro-negative atom, bearing a lone pair of electrons"

The interaction is weaker than covalent bonds but stronger than van der Waals forces, playing a crucial role in the properties of substances.
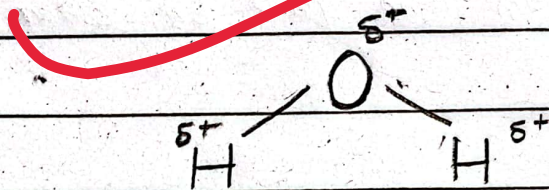
ii) Structure and explanation:

Hydrogen bonding occurs due to polarity created by the large difference in electronegativity between hydrogen atom and the bounded atom. For example H_2O (water).

a. In Water molecule:

i. Each water molecule has two hydrogen atoms bonded to an oxygen atom

ii. The oxygen atom is partially negatively charged (δ) and the hydrogen atoms have partial positive charges (δ^+)
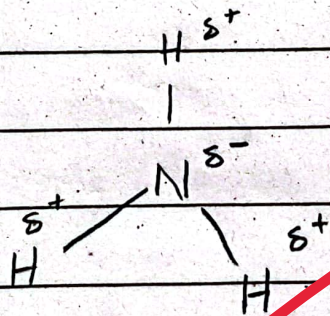
iii. The positive hydrogen from one molecule forms a hydrogen bond with the lone pair on the oxygen of a neighbouring molecule.

$$\overset{\delta^+}{O}$$
$$\underset{H}{\overset{\delta^+}{}} \qquad \underset{H}{\overset{\delta^+}{}}$$

2. Ammonia: (NH_3)

i. Nitrogen being electronegative pulls electrons towards itself, creating partial charges.

ii. The hydrogen atom of one ammonia molecule forms a hydrogen bond with lone pair on nitrogen of another molecule.
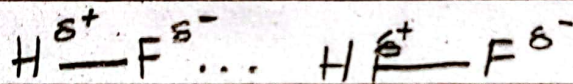
$$H \overset{\delta^+}{}$$
$$\underset{H}{\overset{\delta^+}{}} N \overset{\delta^-}{} \underset{H}{\overset{\delta^+}{}}$$

3. Hydrofloric Acid (HF_2):

i. Florine being highly electronegahive, forms a dipole.

ii. The hydrogen of one HF molecule interacts with lone pair on other flourine.

$$H^{\delta^+}\!\!-\!\!F^{\delta^-}\ldots H^{\delta^+}\!\!-\!\!F^{\delta^-}$$

Conclusion:

Hydrogen Bonding is a vital interaction in chemistry and biology, influencing structural and physical properties of compounds.

Nervous System of Human Body:

i) Definitions:

"Human nervous system is a complex and highly organized network responsible for co-ordinating and controlling bodily functions."

It allows communication between different parts of body and the external environment through sensory input, integration, and motor output.

ii) Parts of Nervous System:-

1. ~~Brain~~ Centeral Nervous System (CNS):

CNS is a control system of human body, comprising brain and spinal cord.

a. Brain:

It is responsible for processing sencory information, decision making and controlling voluntary and involuntary actions.

b. Spinal Cord:

Acts as a condit for transmitting signals between the brain and the rest of the body. It also

co-ordinates reflex eactions independently
of brain.

2. Peripheral Nervous System: (PNS):-
PNS connects the CNS to the rest
of the body and is further divided into

a. Somatic Nervous System:
It controls voluntary movements by
transmitting signals to skeletal muscles.
It also relays sensory information from
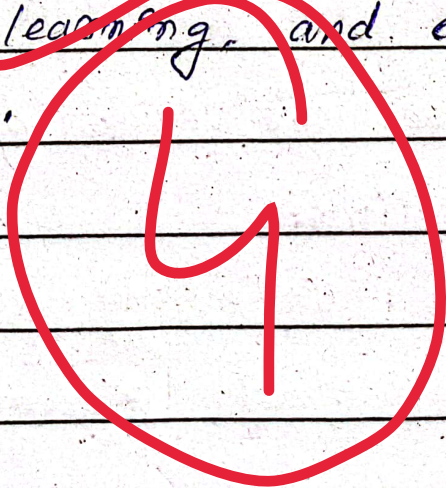skin, muscles and joints to the CNS.

b. Autonomic Nervous System:-
It regulates involuntary functions such
as heartbeat, digestion, and respiratory
rate. It is subdivided into Sympath-
atic nervous system; which prepares the
body for fight or flight responses, and
Parasympathatic nervous system; which
promotes "rest and digest" functions.

iii) Key functions of Nervous Systems

1. Sensory Input: Detects stimuli from enviro-
   nment (eg, touch, temperature, sound)

2. Intigeration: Processes and interprets sen-
   sory information to make decisions.

3. Moitor Output: Sends signals to muscles
   and glands to perform specific actions.

4. Homeostasis: Mantains internal balance
   by regulating involuntary processes
   like blood pressure and temprature.

5. Cognition and emotion: Enables thinking,
   memory, learning and emotional
   responses.

Question: 02: (a):

What is hepatitis? explain its causes, symptoms ----- ?

Hepatitis:-
Definition:

"Hepatitis refers to inflammation of the liver, typically caused by viral infections, but it can also result from toxins, excessive alcohol consumption, or autoimmune disease."

Causes:

Following are some causes of hepatitis:

1. Viral infections:

- Hapititus A : Caused by consuming contaminated food or water (fecal-oral route).

- Hapititus B: Spread through contact with infected bodily fluids, such as blood, semen, or through vertical transmission. (mother to baby)

- Hepatitis C: Primarily spread through blood to blood contact, often via sharing needles or contaminated medical equipment.

- Hepatitis D: Occurs only in individuals infected with hepatitis B. It can be transmitted through blood.

- Hepatitis E: Similar to hepatitis A, typically spread through contaminated water.

2. Non-Viral Causes:

- Alcohol Abuse: Choronic alcohol consumption can cause alcoholic hepititis.

- Auto immune diseases: It sometimes occurs when immune cells attacks the liver.

- Toxins and Medications: Certain medications and environmental toxins can lead to hepatitis.

- Fatty Liver: A build up of fat in liver, often linked to obesity, diabeties and high cholestrol.

Symptoms of Hepatitis:

The symptoms vary on the type of hepatitis. and wether is acute or chronic, but common symptoms include.

i- Fatigue and weakness.

ii- Jaundice.

iii- Dark urine.

iv- Abdominal pain.

v- Loss of apetite

vi- Nausea and vomiting.

vii- Joint pain

viii- Fever

Chronic hepatitis may lead to liver damage, cirrhosis or liver cancer if left untreated.

Prevention:

1. Vaccination:

   Hapititis A and B vaccines are avalable to prevent infection A's vaccine is typically given in childhood, and Hapitites B vaccine is a part of routine immuni-zations.

2. Safe practices:

Avoid sharing needles, razors, or other personal items that may be contaminated with blood. Ensure that tattoos, piercings and medical procedures are done with sterile equipment.

3. Good Hygiene:

Wash hands frequently, especially after using bathroom and before preparing food, to prevent hepatitis A and E infections. Drink clean, filtered water and avoid raw or undercooked food.

4. Limit Alcohol Consumption:

Reducing alcoholic intake can help prevent hepatitis and reduce risk of of liver damage.

5. Safe sex practices:

Use barrier methods - to reduce the risk of Hepatitis B and C transmission through sexual contact.

Question: 2: (b):

Elaborate few methods of food preservation?

Methods of Food Preservation:

Food preservation is essential for prolonged shelf life of food, maintain its nutritional value, and reduce waste. Various methods are used to prevent spoilage caused by microorganisms, enzymes, and environmental factors. Here are few common methods.

1. Refregeration and freezing:

Refregeration slows down the growth of bacteria and molds by lowering the temprature of food, typically between 0°C to 40°C. Freezing commonly used for preserving nutrients and flavours over longer periods compared to refraginatian.

2. Canning:

It involves placing foods in airtight containers, typically glass jars or metal cans. and then heating them to a high temprature. This process kills micro-organisms and vacuum seal prevents new bactaria.

3. Drying:

Drying removes moisture from food, which is essential for the growth of bacteria, molds, and yeasts. There are different dying methods:

- Sundrying: Traditional method where food is dried under the sun, usually used for fruits and herbs.

- Air drying: Involves drying food in well-ventilated area, ideal for meats and certain vegetables.

- Dehydrators and Freez-Drying: Electric dehydrators or freez-drying machines are used to remove moisture. while preserving foods texture, color & flavour.

4. Pickling:

Pickling involves immersing food in acidic solution, typically vinegar, or in a salt brine which preserves food by creating an inhospitable environment for harmful micro-organisms.

There are two types of pickeling, Fermentation (involves salt and water) and vinegar pickeling (uses vinegar solutions)

Question: 2: (B):-

Explain fertilizers. what are their types?

Fertilizers:-

"Fertilizers are substances that are added to soil or plants to supply essential nutrients that promote growth, improve yield, and enhance quality of crops"

These nutrients are critical for plant development, and fertilizers help restore or supplement them when the soil's

natural nutrient content is insufficient

Types of Fertilizers:

1. Organic Fertilizers:
They are derived from natural sources such as plants, animals, or minerals. They typically contain a wide range of nutrients, including primary secondary and micronutrients, in slow-release forms.

Benifits:
2. Improve soil structure and water retention.

8. Enhance benificial soil micro-organisms.

3. Provide slow-release nutrients reducing the risk of nutrient leaching

Drawbacks:
1. May be slower in providing immediate nutrients.

2. Requires larger quantities to achieve the same nutrient levels as chemical fertilizers.

Examples:

1. Compost
2. Manure
3. Bone meal.
4. Fish Emulsion.
5. Green manure

2. Inorganic / chemical Fertilizers:

They are sythetically manufactured. to provide specific nutrients directly to plants. They are highly concentrated.

Benifits:

1. Provide immediate and easily available nutrients.
ii. Highly efficient and concentrated, requiring smaller quantities.
iii. Procise application for specific nutrient needs.

Drawbacks:

i. Can lead to nutrient imbalances in soil if used excessively.
ii. May harm soil health by disrupting microbial ecosystems.

iii. High risk of nutrient leaching; which cause water pollution.

Examples:

1. Nitrogen fertilizers (urea, ammonium nitrate and ammonium sulphate)
2. Phosphorus fertilizers (superphosphate and ammonium sulphate)
3. Potassium Fertilizers: (Potassium Chloride and potassium sulphate)
4. NPk fertilizers: (mixed nitrogen, phosphorus, potassium).

Question: 02: (d):

Anatomy of Human tooth:

A human tooth is a complex structure composed of multiple layers and distinct parts, each serving specific functions. Teeth are divided into two main parts; the crown and the root.

1. Crown:

Crown is the visible part of tooth above the gumline.

1. Enamel: The outermost hardest and most ~~marginalize~~ mineralized layer, providing protection.

2. Dentin: Layer beneath enamel, less hard but supports the enamel and protects the pulp.

3. Pulp Chamber: Contains nerves, blood vessels, and connective tissue; It nourishes the tooth and senses stimuli.

2. Root:

The root anchors the tooth into the jawbone below gumline.

1. Cementum: A calcified layer, covering the root, connecting it to the periodontal ligament.

2. Periodontal ligament: A fibrous cover tissue that attaches the tooth to the surrounding bone and absorb chewing forces.
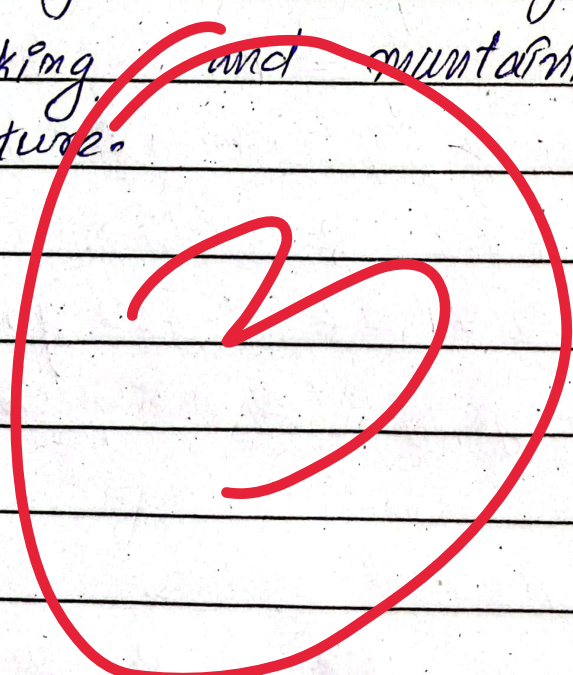
3. **Root Canal:** Contains the pulp extending into the root, facilitating blood and nerve supply

- **Gingavia (Gums):** Soft tissue surrounding and protecting the base of teeth.

- **Alveolar bone:** The jawbone that supports the roots of the teeth.

Layerd structure ensures teeth are durable and capable of performing their functions including chewing, speaking and maintaining facial structure.

Section: II

Questions 01: (a):

If sum of the ___ ___ ___ ___ ?

Given data:

$$x + y + z = 15 \longrightarrow (A)$$
$$y + z = 12 \longrightarrow (i)$$
$$y - z = 2 \longrightarrow (ii)$$

Solution:

Adding (i) and (ii)

$$y + z + (y - z) = 12 + 2$$
$$2y = 14$$
$$y = 7$$

Substituting $y = 7$ into (i)

$$7 + z = 12$$
$$z = 15$$

Substituting y and z in equation (A)

$$x + y + z = 15$$
$$x + 7 + 5 = 15$$
$$x = 3.$$

Ans = ?

Question:1: (b):

A man ordered pizzas of small ------ ?

Given data:

The ratio of slices in small, medium, Large, pizzas is given as: 2:3:4 &

Let:
- Number of slices in small pizza: $2x$
- Number of slices in medium pizza: $3x$
- Number of slices in a large pizza: $4x$

Solution:

- Step#1:

The ratio of slice in small, medium and large pizzas is given as $2:3:4$

Let:
- Number of slices in a small pizza: $2x$
- Number of slices in a medium pizza: $3x$
- Number of slices in a large pizza: $4x$

We know a total of 18 slices is required:

$$2x + 3x + 4x = 18$$
$$9x = 18 \implies x = 2.$$

Thus, the number of slices per pizza is:

- Small pizzas: $2x = 4$ slices
- Medium pizza: $3x = 6$ slices
- Large pizza: $4x = 8$ slices.

- Step#2:

Each slices weights 40 gm.

- Weight of small pizza: $4 \times 40 = 160$ gm
- Weight of medium pizza: $6 \times 40 = 240$ gm
- Weight of large pizza: $8 \times 40 = 320$ gm

Total weight of the pizzas:
$$160 + 240 + 320 = 720 \text{ gm.}$$

- Step#3:

The price of a small pizza is Rs. 320, and the slices are proportional.

Price per slice for a small pizza:

Price per slice = $\dfrac{\text{Price of small pizza}}{\text{Number of slices}}$ = $\dfrac{320}{4}$

= 80 Rs/slice.

Using the same rate per slice, the prices of the medium and large pizzas are:

Medium pizza: $6 \times 80 = 480$ Rs.
Large pizza: $8 \times 80 = 640$ Rs.

Total prices of the pizzas:

$320 + 480 + 640 = 1440$ Rs.

Final Answer:

- The total weight of the pizzas: 720gm
- Total price of the pizzas: Rs.1440.

Question: 1. (c):

Diameter of a circle ——?

Given data:

The diameter of the circle is given as $d = 6\ cm$.

Solution:

- Step # 1:

The radius r is half the diameter:

$$r = \frac{d}{2} = \frac{6}{2} = 3\ cm$$

- Step # 2:

The formula for the circumference of a circle is

$$C = 2\pi r$$

Substitute $r = 3$.

$$C = 2\pi(3) = 6\pi\ cm.$$

Using $\pi = 3.14$:

$$C = 6 \times 3.14 = 18.84 \text{ cm}.$$

— Step #3:

The formula for the ~~circle~~ area of a circle is:

$$A = \pi r^2$$

Substitude $r = 3$:

$$A = \pi(3)^2 = 9\pi \text{ cm}^2$$

Using $\pi = 3.14$:

$$A = 9(3.14) = 28.26 \text{ cm}^2$$

Final Answer:

- Circumference : 18.84 cm
- Area : 28.26 cm^2

Question #1: (d):

Identify the missing ___ ?

Given data:

(i) 13, 24, 46, 90, 178, ___.

(ii) 5, 6, 9, 14, 12, ___.

Solution:

(1) Sequence: 13, 24, 46, 90, 178, ___.

· To identify the pattern:

(i) Observe the difference between consecutive terms:

$24 - 13 = \underline{11}$, $46 - 24 = 22$, $90 - 46 = 44$,

$178 - 90 = 88$.

(ii) The differences (11, 22, 44, 88) form a geometric progession, doubling each time.

(iii) The next difference will be:

$$88 \times 2 = 176.$$

(iv) Add the difference to the last term:

$$178 + 176 = 354.$$

Answer: 354.

(ii) Sequence: 5, 6, 9, 14, 21, ——.

To identify the pattern:

(1) Observe the differences between consecutive odd numbers.

$$6 - 5 = 1, \quad 9 - 6 = 3, \quad 14 - 9 = 5,$$
$$21 - 14 = 7.$$

(ii) The differences (1, 3, 5, 7) are consecutive odd numbers.

(iii) The next difference will be:

$$7 + 2 = 9.$$

(iv) Add this difference to the last Term:

$$21 + 9 = 30$$

Answer : 30.

Question : 2 : (a) :

Distinguish ---?

I.Q (Intelligence Quotient)	E.Q (Emotional Quotient)
Definition:	
Measures cognitive abilities like logic, reasoning, and problem-solving.	Assesses emotional intelligence such as recognizing and managing emotions.
Focus:	
Analytical, logical, and intellectual capabilities	Emotional awareness, empathy, and interpersonal skills.

Components:

Includes memory, pr- | Includes self-awar-
oblem-solving and | eness, empathy and
verbal reasoning. | interpersonal skills.

Evaluations:

Tested through stan- | Assessed through
dardized I.Q. tests | emotional intelligence
(e.g; Mensa tests). | tests or situational
| evaluations.

Applications:

Helps in academic | Important for buildi-
success and technical | ng relationships, tea-
problem-solving. | mwork, and leader-
| ship.

Development:

Largely innate but | Develops over time
can be moderately | through experiences
improved through | and conscious
learning and practice. | effort.

Importance:

| Crucial for logical and analytical tasks. | Vital for manging emotions and achieving social and professional success. |

Both I.Q. and E.Q are essential for overall success, with I.Q supporting intellectual pursuits and E.Q enhancing social and emotional well-being.

Question: 2 : (b):

What is the ---?

Solution:

To find Aman's present age, let his current age be x.

– Step#1:

• After 20 years, Aman's age will be $x + 20$.

- 10 years back, Aman's age was

    $x - 10$.

- According to the problem:

    $x + 20 = 10(x - 10)$.

→ Step #2:

Simplify the equation:

$x + 20 = 10x - 100$

Rearrange terms:

$20 + 100 = 10x - x$.

$120 = 9x$

Solve for x:

$x = \dfrac{120}{9} = 13.33$.

- Step #3:

Aman's present age is approximately 13 years and 4 months.

Question: 2: (c):

Peter can ---?

Solution:

-Step#1:

• Peter can mow the lawn in 40 minutes, so his rate is:

$$\text{Rate of peter} = \frac{1}{40} \text{ lawn/minute.}$$

• John can mow the lawn in 60 minutes, so his rate is:

$$\text{Rate of John} = \frac{1}{60} \text{ lawn/minute.}$$

Togeather, their combined rate is:

$$\text{combined rate} = \frac{1}{40} + \frac{1}{60}$$

- step #2:

To add the rates, find the least common denominator (LCD):

$$\frac{1}{40} + \frac{1}{60} = \frac{3}{120} + \frac{2}{120} = \frac{5}{120}$$

Simplify:

$$\text{Combined rate} = \frac{1}{24} \text{ lawn/minute.}$$

-Step#3:

The time taken for them to mow the lawn together is the reciprocal of the combined rate:

$$\text{Time} = \frac{1}{1/24} = 24 \text{ minutes.}$$

Answer:

It will take 24 minutes for peter and John to mow the lawn together.

Question: 2: (d):

A person multiplyed ——— ?

Solution:

To calculate the percentage error, let the correct multiplier be $5/3$ and the incorrect multiplier be $3/5$. Assume the original number is x.

- Step #1:
• Correct result:
$$\text{correct value} = x \times \frac{5}{3} = \frac{5x}{3}.$$

• Incorrect result:
$$\text{Incorrect value} = x \times \frac{3}{5} = \frac{3x}{5}.$$

- Step #2:
The difference between the correct and incorrect results is:
$$\text{Error} = \frac{5x}{3} - \frac{3x}{5}.$$

To simplify, find the least common denominator (LCD):
$$\text{Error} = \frac{25x}{15} - \frac{9x}{15} = \frac{16x}{15}.$$

- Step#3:

The percentage error is given by:

Percentage error $= \left(\dfrac{Error}{Correct\,value}\right) \times 100.$

Substitute the values:

Percentage error $= \left(\dfrac{16\pi/15}{5\pi/3}\right) \times 100 = \left(\dfrac{16 \times 3}{15 \times 5}\right) \times 100$

Simplify:

Percentage error $= \dfrac{48}{75} \times 100 = 64\%$

Final Answer:

The percentage error in the

calculation is 64%.