

## Section -A

Q.no-3

(a)

Difference between plastics and elastics  
Explain.

### Plastics

1. Definition:

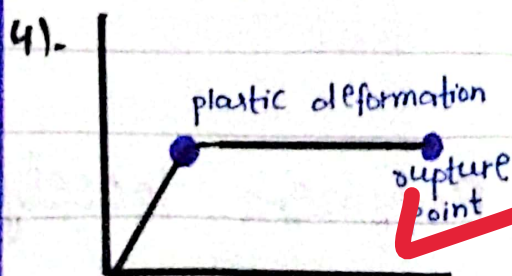
Plastics are material that can be re-shaped on heating.

2. Deformation:

It deforms permanently under force.

3. Not obey Hooke law:

Hooke's law is not applicable if material is deformed plastically.



Graphical representation

### Elastics

1. Definition:

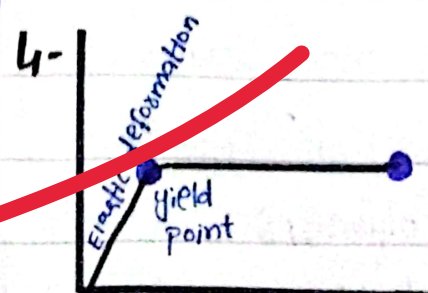
Elastics are material that has ability to return to its normal shape after being compressed.

2. Deformation:

It deforms temporarily under force.

3. Hooke's law:

Hooke's law of elasticity is applicable within elastic range.



Graphical representation

#### 4. Applications:

It has wide range of applications due to their ability to be moulded into various shapes:

Packaging, construction and medical devices.

#### 5. Examples:

Water bottles, bags, plastic caps, furniture.

#### 6. Types:

##### i. Thermoplastics:

They soften on heating and harden on cooling.

##### ii. Thermosetting plastic:

They can be moulded once and cannot be moulded again.

7. Polymers bind tightly in it.

#### 4. Applications:

They are used because of their ability to stretch and return to its original shape:

clothing (waistbands)

sports equipment

(tennis balls) and

medical use (bandages).

#### 5. Examples:

Rubber bands, balloons, Spandex

#### 6. Types

##### i. Braided

They are parallel ribs.

##### ii. Woven

They have horizontal, vertical ribs.

##### iii. Knitted

They stay flat on stretching

7. Polymers loosely bind in it.

(b)  
What is role of remote sensing and GIS in environmental science.

Discuss briefly.

Remote Sensing:-

**Definition:**

It is process of detecting and monitoring physical characteristics of an area by measuring its reflected and emitted radiation at a distance.

**Role of remote sensing in environmental science:**

Special cameras of remote sensing collect remotely sensed images, which help researchers "sense" things about Earth.

**1. Weather forecasting:**

Remote sensors transmit electromagnetic radiations in response to wind movement and atmospheric temperature and in this way forecast about weather.

**2. Natural Hazard analysis:**

During any natural hazard such as forest fire or

floods, remote sensors allow rangers to see area affected by fire or flood

Pakistan's first optical remote sensing satellite PRSS-1 launched in 2018 for natural disaster analysis.

3. Monitoring agriculture with remote sensing

observing colours and structures of leaves without physically touching them help farmers to assess their crops. Transmitted electromagnetic radiations provide assessment of crops leaves

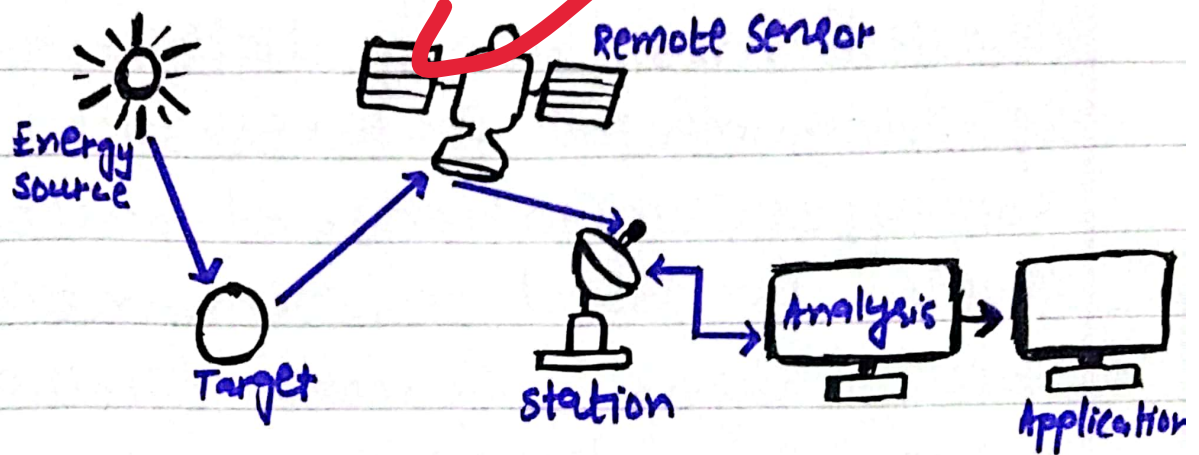
● Sindh got its first satellite remote sensing lab for crops in 2014.

4. For water bodies analysis:

Remote sensing enhances monitoring of surface water bodies, glaciers, and groundwater levels, contributing to water resource management.

## 5-Management of Natural Resources

Natural resources are valuable and prone to theft. The remote sensor satellite records all ongoing activities within site, which greatly helps to minimize cases related to misuse and theft.



(Remote Sensing Process)

## GIS (Geographic Information System)

Definition:

It is a computer system that analyze and display geographically referenced information

Role of geographic information system in environmental sciences:

GIS is powerful tool for environmental data analysis

and planning. Following are uses of GIS in environmental sciences with tool "QGIS" especially designed GIS for environmental analysis

### i. Maps of Environmental features:

It is utilized to create detailed maps showing distribution of environmental features such as soil types, vegetation and pollution levels to provide environmental data analysis with more familiar views of landscapes.

Food and Agriculture Organization (FAO) of UN is planning to develop GIS for agriculture mapping in Pakistan.

### ii. Hazards view:

It provides a quick, comparative view of hazards, risks and areas to be safeguarded.

In 2022 floods in Pakistan, GIS tracked flood prone areas and timely told about evacuations to protect people.

### iii - Environmental models:

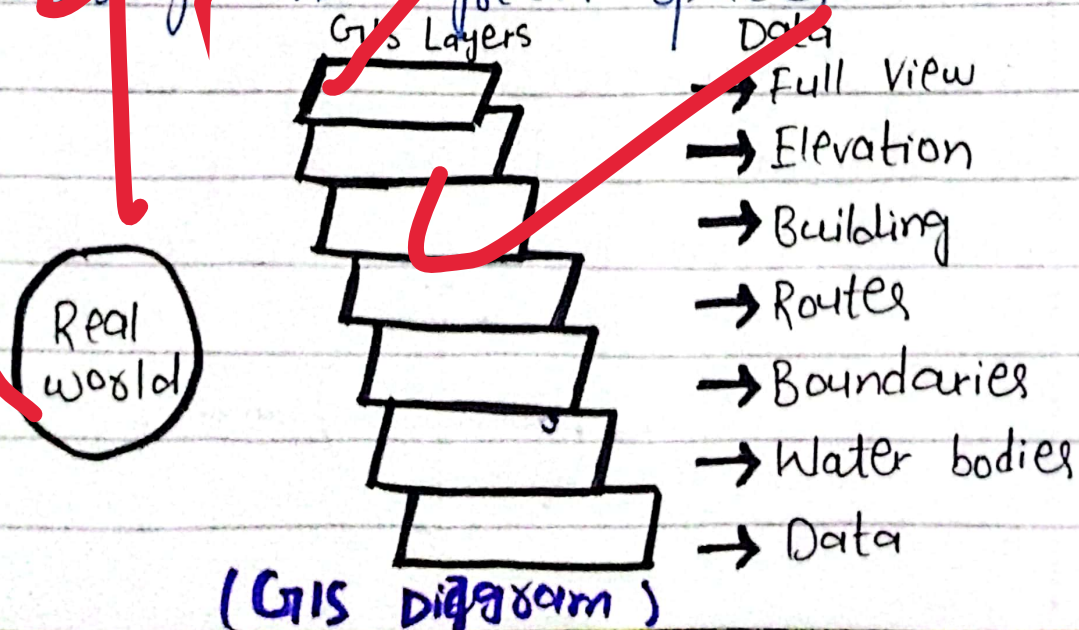
It support activities in environmental assessments and can be used to create environmental models.

### iv - Biodiversity hotspots:

It is used to identify critical habitats and biodiversity hotspots. It is used to plan conservation strategies and track effectiveness of conservation efforts. It helps in management of grasslands, wildlife management, forest management and rare specie protection.

### v - Spatial patterns for green spaces:

It aids in sustainable urban development for agriculture zoning and green spaces.



(c)

What are Kepler laws related to motion of planets:

Kepler's laws of planetary motion are three scientific laws, describing motion of planets around sun

1. Kepler's first law: It is law of orbits. It is stated as;

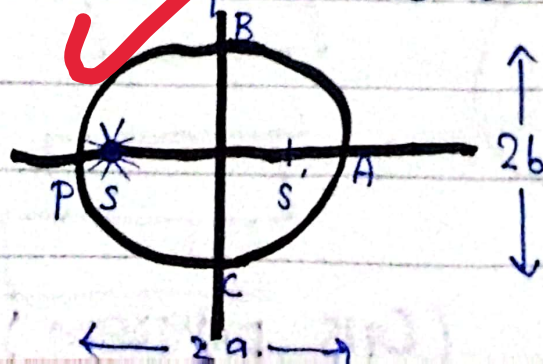
"All the planets revolve around the sun in elliptical orbits having sun at one of foci."

Perihelion: It is point at which planet is close to sun. It is about 147 million Km from sun.

Aphelion: It is point at which planet is farthest from sun.

It is 152 million kilometres from sun.

It is characteristic of ellipse that sum of distances of any planet from two foci is constant.





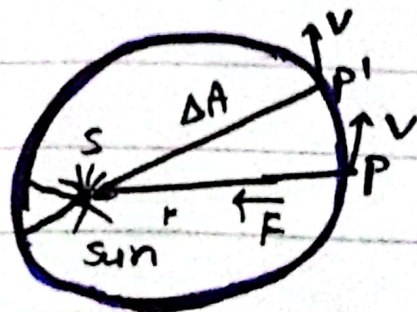
## 2 - Kepler's second law - Law of equal areas

It is stated as;

"The radius vector drawn from sun to planet sweeps out equal areas in equal intervals of time."

As orbit is not circular, the planet's kinetic energy is not constant in path. It has more kinetic energy near perihelion and less kinetic energy near aphelion. It implies more speed at perihelion and less speed ( $v_{min}$ ) at aphelion. If  $r$  is distance of planet from sun at perihelion ( $r_{min}$ ) and at aphelion ( $r_{max}$ ), then;

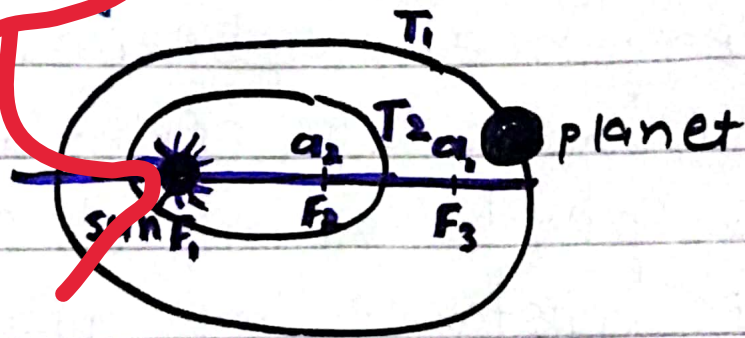
$$r_{min} + r_{max} = 2a \quad (\text{length of major axis of an ellipse})$$



iii - Kepler's 3rd law - The law of periods : It is stated as;

" The period for a planet to orbit sun increases rapidly with radius of its orbits."

So, Mercury the innermost planet takes only 88 days to orbit the sun. The Earth takes 365 days. While Saturn takes 0,759 days to do the same.



$$T^2 \propto r^3$$

$$\left( \frac{T_1}{T_2} \right)^2 = \left( \frac{r_1}{r_2} \right)^3$$

$r$  = radius

$T$  = Time period

(d)  
What is difference between preservatives and antioxidants?  
Discuss Briefly

### Preservatives

Substances added to products like food, pharmaceuticals, and cosmetics to prevent spoilage and extend shelf life by inhibiting growth of microorganisms such as bacteria, molds.

#### 2) Mechanism:

They create hostile environment for microorganisms, lower pH and reduce water activity.

#### 3) Examples:

Sodium benzoate, Sorbic acid, sulfites

### Antioxidants

They prevent or slow down oxidation which produce free radicals leading to chain reactions that spoil products by causing rancidity, loss of flavor and degradation.

#### 2) Mechanism:

They donate electrons to neutralize free radicals, chelate metal ions

#### 3) Examples:

Vitamin E, citric acid  
Butylated hydroxyanisole

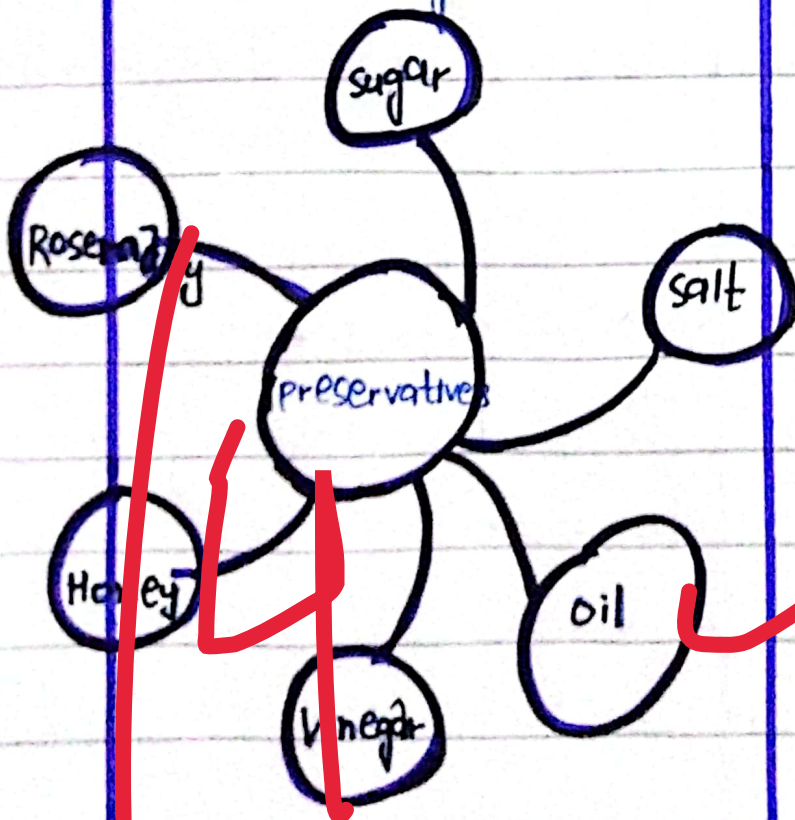
## Preservatives

### 4. Uses:

They are used in food, pharmaceuticals, cosmetics and personal care products.

### 5. Natural Sources

They are also present naturally such as salt, oil, vinegar and sugar.



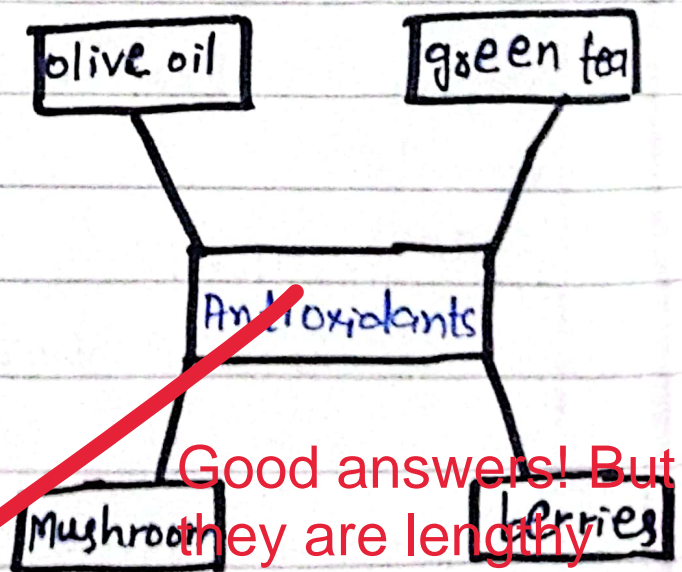
## Antioxidants

### 4. Uses:

They are used in oils, food, cereals, natural extracts etc.

### 5. Natural Sources

They are naturally present in olive oil, mushrooms, green tea and berries.



Good answers! But they are lengthy and will affect your time management. So shorten them a bit

## Section B

Q. no - 6

(A)

If sum of four numbers is 105.  
When 3 is added to a number, twice of another number, five times of third number and fourth number becomes equal to each other.  
What are these numbers in ascending order.

Let ; A, B, C, and D are four numbers. **Given data :**

Thus, according to given conditions,

$$A + B + C + D = 105 \rightarrow (i)$$

Also

$$A + 3 = 2B = 5C = D$$

**To find :**

Four numbers in ascending order = ?

**Solution :**

$$A + 3 = 2B \rightarrow ii$$

$$A = 2B - 3$$

$$5C = 2B \rightarrow iii$$

$$C = \frac{2B}{5}$$

$$D = 2B \rightarrow iv$$

putting values of A, c and D in eq. i;

$$(2B-3) + B + \frac{2B}{5} + 2B = 105$$

$$5B - 3 + \frac{2B}{5} = 105$$

$$(5B + \frac{2B}{5}) - 3 = 105$$

$$\frac{25B + 2B}{5} = 105 + 3$$

$$\frac{27B}{5} = 108$$

$$27B = 108 \times 5$$

$$27B = 540$$

$$B = \frac{540}{27}$$

$$B = 20$$

Put value of B in eq (iv)

$$D = 2(20)$$

$$D = 40$$

Put value of B in eq (ii)

$$A + 3 = 2B$$

$$A + 3 = 2(20)$$

$$A + 3 = 40$$

$$A = 40 - 3 = 37$$

Put value of B in eq. iii

$$C = \frac{2B}{5} = \frac{2(20)}{5} = \frac{40}{5} = 8$$

Thus, Numbers in ascending order;

8, 20, 31, 40

C, B, A, D

(B)

Find correct word from jumbled spellings.

First explain the logic in statement forms and then apply it

1 - LOVONAC

VOLCANO

2 - UCTREUTRS

STRUCTURE

3 - NNTHORER

NORTHERN

4 - YNTIAUMH

HUMANITY

5 - CIH PROSTATAAC

CATASTROPHIC

(C)

Find missing Numbers in series given below:

i - 121, 11, 81, 9, ?, 7

121  $\xrightarrow{11^2}$  11  $\xrightarrow{9^2}$  81  $\xrightarrow{7^2}$  9  $\xrightarrow{49}$  7

ii - 100, 50, 25, ?, 6.25

100  $\xrightarrow{\div 2}$  50  $\xrightarrow{\div 2}$  25  $\xrightarrow{\div 2}$  12.5  $\xrightarrow{\div 2}$  6.25

Every upcoming number is half of previous number

(iii) 4, 9, 64, 125, 1296, ?

$$\begin{array}{cccccc} (2)^2 & , & (3)^2 & (4)^3 & (5)^3 & (6)^4 & (7)^4 \\ \downarrow & & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 4 & & 9 & 64 & 125 & 1296 & 2401 \end{array}$$

The first two numbers are squares of 2 and 3, the next two are cubes of 4 and 5, and next two are power of four of numbers 6 and 7.

iv. 2, 5, 12, 24, 48, ?

$$2 \times 2 = 4 + 1 = 5$$

$$4 \times 2 = 8 + 4 = 12$$

$$8 \times 2 = 16 + 8 = 24$$

$$16 \times 2 = 32 + 16 = 48$$

$$32 \times 2 = 64 + 32 = 96$$

v. 44, 22, 66, 33, 132, ?

$$\begin{array}{cccccc} \div 2 & & \div 2 & & \div 2 & \\ \overbrace{44}^{\div 2} & , & \overbrace{22}^{\div 2} & , & \overbrace{66}^{\div 2} & , & \overbrace{33}^{\div 2} & , & \overbrace{132}^{\div 2} & , & \overbrace{66}^{\div 2} \end{array}$$

Rough

$$\begin{array}{r} \downarrow \\ 49 \\ \underline{7} \\ 343 \\ \underline{7} \\ 2401 \\ \underline{2} \\ 16807 \\ \underline{7 \times 7 \times 7} \end{array}$$

$\times 7$

$$\begin{array}{r} 49 \\ \underline{7} \\ 343 \\ \underline{7} \\ 2401 \\ \underline{2} \\ 16807 \end{array}$$

$$2+2$$

$$=4+1$$

$$=5$$

$$5+5=10$$

$$+2=12$$

$$12+12$$

$$=24$$

$$24+24$$

$$=48$$

88



$$2T = 14$$

$$T = \frac{14}{2} = 7$$

Put value of T in eq ii;

$$U + 7 = 12$$

$$U = 12 - 7$$

$$U = 5$$

Put value of U & T in eq i

$$7 + 5 + H = 15$$

$$12 + H = 15$$

$$H = 15 - 12$$

$$H = 3$$

$$T = 7, H = 3, U = 5$$

As; unit, tens, hundreds

So;

(573)