

QUESTION: 03

ANSWER: (PART-A)

PROTEINS:

Proteins are macromolecules, made up of amino acids and linked by peptide bonds. They are essential for growth, repair, enzymatic activity and hormone production.

SOURCES OF PROTEIN:

Sources of proteins include fish, meat, eggs, dairy and nuts.

DIGESTION OF PROTEIN:

(i) Stomach:

Proteins are denatured by HCl. Pepsin, an enzyme activated by HCl, begins breaking proteins into smaller peptides.

(ii) Small Intestine:

Pancreatic enzymes like trypsin and chymotrypsin further breakdown peptides into smaller chains. Enzymes like peptidases in the intestinal lining reduce peptides to individual amino acids, which are absorbed into the blood stream.

CARBOHYDRATES:

Carbohydrates are organic compounds made up of carbon, hydrogen and oxygen. They are the primary source of energy for the body.

SOURCES OF CARBOHYDRATES:

Main sources of carbohydrates include grains, fruits, vegetables and sugars.

DIGESTION OF CARBOHYDRATES:

(i) Mouth:

Salivary amylase begins breaking down starch into maltose and dextrins.

(ii) Small Intestine:

Pancreatic amylase continues breaking down starch into maltose. Enzymes in the intestinal lining, convert disaccharides into monosaccharides. Monosaccharides are absorbed into the bloodstream via small intestine and transported to the liver for energy use.

(PART - B)

(1) ATMOSPHERIC PRESSURE:

Atmospheric pressure, also known as barometric pressure, is the force exerted by

1) The weight of the air in the atmosphere.

Measurement:

Atmospheric pressure is typically measured in units of millibars (mb) or pascals (Pa).

Variations:

Atmospheric pressure varies with altitude, temperature and weather pattern.

Importance:

Atmospheric pressure plays a crucial role in weather forecasting, aviation and engineering.

(2) ATMOSPHERIC TEMPERATURE:

Atmospheric temperature is the measure of the heat energy in the air.

Measurement:

Atmospheric temperature is usually measured in units of degree Celsius ($^{\circ}\text{C}$) or Fahrenheit ($^{\circ}\text{F}$).

Variations:

Atmospheric temperature varies with latitude, altitude and time of the day.

Importance:

Atmospheric temperature affects weather patterns, climate and living organisms.

(3) ATMOSPHERIC HUMIDITY:

Atmospheric humidity is the measure of amount of water vapour present in the air.

Measurement:

It is typically measured in units of relative humidity (RH), which is the percentage of water vapour in the air compared to the maximum amount the air can hold.

Variation:

Atmospheric humidity varies with temperature, altitude and weather patterns.

Importance:

Atmospheric humidity affects weather patterns, climate and living organisms. It also plays a crucial role in the formation of clouds, precipitation and fogs.

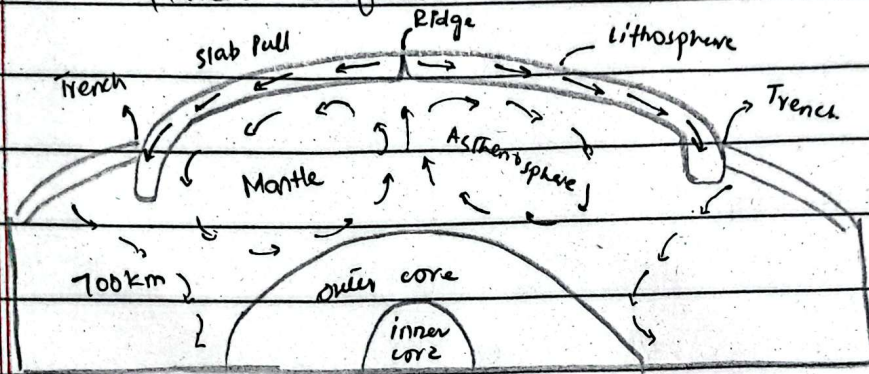
(PART - C)

EARTHQUAKE:

Earthquake is the sudden release of energy in the form of seismic waves, that creates vibrations in the earth crust as a result of abrupt movement of tectonic plates.

DIAGRAM:

Mantle convection takes place in earth's mantle, which is the creeping movement of earth's solid silicate mantle, as convection currents carries heat from the interior to the planet's surface.



(PART-D)

RADAR:

Radar is an object detection system, which uses radio waves to determine the position, distance, height, angle or the velocity of object.

BASIC COMPONENTS:

Transmitter → Sends out radio waves

Antenna → Direct the radio waves and receives the reflected signals.

Receiver → Amplifies and processes the reflected signals.

Display → Shows the location and speed of

of the reflected objects.

WORKING PRINCIPLE:

(i) Transmission:

The transmitter sends out radio waves, which are directed by the antenna.

(ii) Reflection:

When the radio waves hit an object they bounce back and return to the antenna.

(iii) Reception:

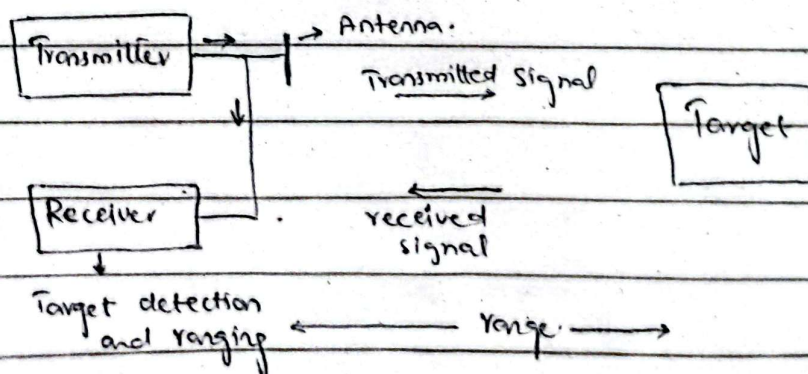
The receiver amplifies and processes the reflected signals.

(iv) Processing:

The processed signals are then used to calculate the distance, speed, and direction of the detected object.

(v) Display:

The calculated information is then displayed on the screen, showing the location and speed of the detected object.



QUESTION: 04

ANSWER: (PART - A)

SOLAR SYSTEM:

The Solar System consists of the Sun and all the objects that orbit around it, including the planets, dwarf planets, asteroids, comets and other small bodies.

COMPONENTS OF SOLAR SYSTEM:

- (i) Sun → Centre of solar system
- (ii) Planets → (Mercury, Venus, Earth, Mars...)
- (iii) Dwarf Planets → (Pluto, Ceres, Eris...)
- (iv) Asteroids → small rocky objects.
- (v) Comets → Icy bodies
- (vi) Kuiper Belt → a region of icy bodies and other celestial bodies beyond Neptune's orbit.
- (vii) Oort Cloud → A distant, spherical shell of icy bodies surrounding the solar system.

CHARACTERISTICS:

- (i) The Solar System is about 15 billion km in diameter.
- (ii) The Solar System is estimated to be 4.6 billion years old.
- (iii) Planets and other objects follow elliptical orbits around the Sun.

(PART- B)

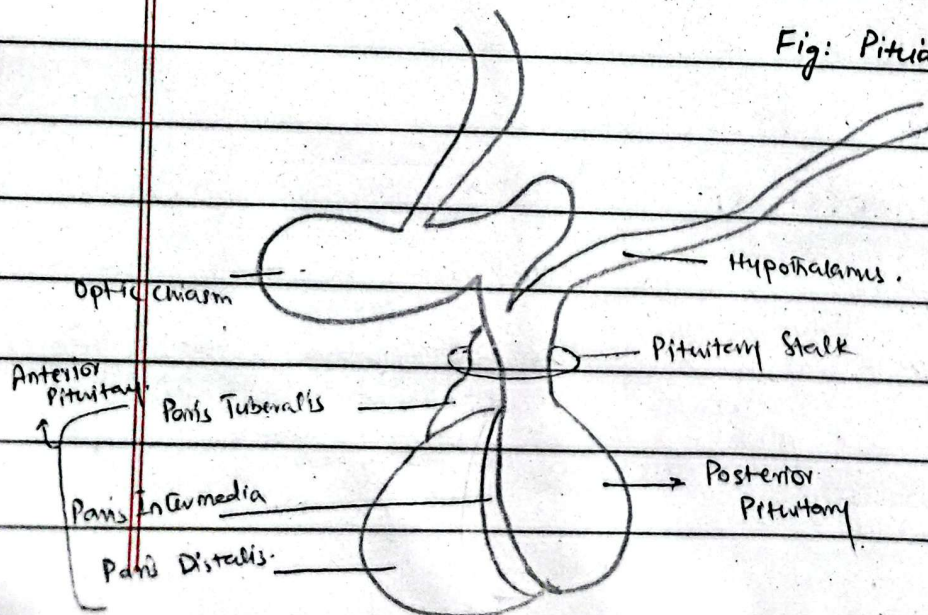
PITUITARY GLAND:

The pituitary gland is often referred to as the "Master Gland" because of its crucial role in regulating various bodily functions.

IMPORTANCE OF PITUITARY GLAND:

- (i) The pituitary gland produces and regulates hormones that control growth, metabolism, and reproductive processes.
- (ii) The pituitary gland regulates thyroid function by producing Thyroid-Stimulating Hormone (TSH).
- (iii) It regulates adrenal function by producing Adrenocorticotrophic Hormone (ACTH).
- (iv) It also regulates reproductive processes including puberty, menstruation and fertility.
- (v) It helps regulate metabolism including glucose and lipid metabolism.

Fig: Pituitary Gland.



(PART- C)

**RANDOM ACCESS MEMORY (RAM) AND
READ-ONLY MEMORY (ROM); DEFINITIONS:**

RAM:

Ram is a type of memory that temporarily stores data and applications while a computer is running.

ROM:

Rom is a type of memory that permanently store data and instructions that are essential for the computer's basic needs.

VOLATILITY:

RAM:

Ram is volatile, meaning, its contents are lost when the computer is powered off.

ROM:

Rom is non-volatile, meaning its contents are not lost when the computer is powered off.

ACCESS:

RAM:

Ram allows data to be read and written quickly and efficiently.

ROM:

ROM allows data to be read and not written.

USAGE:**RAM:**

RAM is used to store data that the CPU uses to perform tasks.

ROM:

ROM is used to store firmware, such as computer BIOS (Basic Input/output system).

NIBBLE:

A nibble is a unit of digital information that consists of 4 digits (bits).

USB (Universal Serial Bus):

USB is a standard interface for connecting peripherals, such as keyboards, mice and flash drive to computer.

MOTHERBOARD:

A motherboard is the main circuit board of the computer that connects and supports all the hardware components i.e CPU, RAM and peripherals.

(PART-4)

COP-29 TARGETS:

The 1.5°C target, set by COP-29, aims to limit global warming to 1.5°C above pre-industrial levels. Exceeding this limit could lead to catastrophic climate change impacts.

KEY CHALLENGES:

- (i) Insufficient emission reductions
- (ii) Reliance on fossil fuels
- (iii) Global emissions continue to rise.

KEY AREAS TO FOCUS ON:

- (i) Increasing ambition.
- (ii) Implementing policies
- (iii) Providing support to developing countries
- (iv) Enhancing international cooperation.

— (SECTION: B) —

QUESTION: 07

ANSWER: (PART-A)

SOLUTION:

Let the 7 consecutive numbers be ...

$$x, x+1, x+2, x+3, x+4, x+5, x+6$$

The average of these numbers is 20, so

$$\Rightarrow \frac{x + x+1 + x+2 + x+3 + x+4 + x+5 + x+6}{7} = 20$$

$$\Rightarrow \frac{7x + 21}{7} = 20$$

$$\Rightarrow 7x + 21 = 140$$

$$\Rightarrow 7x = 119$$

$$\Rightarrow \boxed{x = 17} \rightarrow \text{eq ①}$$

Now, we have the first number, so we can find the largest number, so

$$x + 6 \Rightarrow \text{eq ②}$$

Putting eq ① in eq ②

$$17 + 6 \Rightarrow \boxed{23}$$

RESULT:

The largest of 7 consecutive numbers is 23.

(PART - B)

SOLUTION:

Let's break down the statement.

(i) C is A's father's nephew, which means C is A's cousin.

(ii) D is A's cousin

Since both C and D are A's cousins, and D is not

C's brother, that means, D and C are cousins.

RESULT:

D and C are cousins.

(PART-C)

SOLUTION:

(v) 4, —, 144, 400, 900, 1764

It can be written as

$$(2)^2, \text{ —, } (12)^2, (20)^2, (30)^2, (42)^2$$

The pattern of the squares increases by

4, 6, 8, 10, 12, so if we add (4) to

the square root of the first number, we will

get the missing number.

$$(2)^2, (6)^2, (12)^2, (20)^2, (30)^2, (42)^2$$

which can be written as.

$$4, 36, 144, 400, 900, 1764$$

Result:

The missing number is 36.

(iv) 13, 24, 46, 90, 178, _____

Lets examine the difference between consecutive numbers.

$$\begin{array}{cccccc}
 13, & 24, & 46, & 90, & 178, & \text{---} \\
 \underbrace{\quad} & \underbrace{\quad} & \underbrace{\quad} & \underbrace{\quad} & \underbrace{\quad} & \\
 11 & 22 & 44 & 88 & (176) &
 \end{array}$$

The number are doubling, so we'll add 176 to the last number, we'll get the missing number.

$$13, 24, 46, 90, 178, 354$$

Result:

So the missing number is 354.

(iii) 11, 17, 39, 85, _____

Lets examine the difference.

$$\begin{array}{cccccc}
 11, & 17, & 39, & 85, & \text{---} & \\
 \underbrace{\quad} & \underbrace{\quad} & \underbrace{\quad} & \underbrace{\quad} & & \\
 6 & 22 & 46 & (78) & & \\
 \underbrace{\quad} & \underbrace{\quad} & \underbrace{\quad} & & & \\
 16 & 24 & (32) & & &
 \end{array}$$

We'll add (78) to (85) so, we'll get the missing number.

$$11, 17, 39, 85, 163$$

Result:

So the missing number is 163.

(ii) 1, 2, 10, 37, 101, —

Let's examine the differences.

1, 2, 10, 37, 101, —
1 8 27 64

The differences seem to be increasing in
Pattern. $(1)^2, (2)^2, (3)^2, (4)^2,$

⇒ 1, 2, 10, 37, 101, —
 $(1)^2 \quad (2)^2 \quad (3)^2 \quad (4)^2 \quad (5)^2$

We'll add $((5)^2 \rightarrow (25))$ to (101) to get
the missing number.

1, 2, 10, 37, 101, 226

Result:

So the missing number is 226.

QUESTION: 08

ANSWER: (PART-B)

(i) SONCCUOISTENT → CONSCIENTIOUS

(ii) EIVENPRADST → PRESERVATION

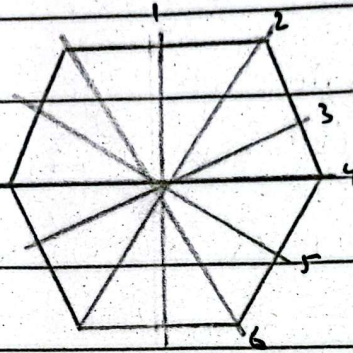
(iii) UORSIULDC → RIDICULOUS

(iv) UNSPRESE → SURPRISE

(v) NMILADPC → COMPLAIN

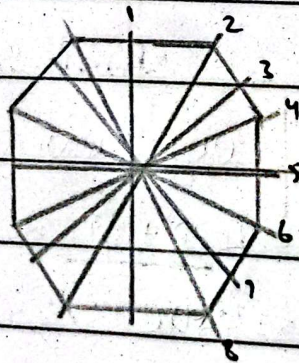
HEXAGON:

A regular hexagon has 6 lines of symmetry, 3 diagonal lines and 3 lines through opposite vertices.



OCTAGON:

A regular octagon has 8 lines of symmetry, 4 diagonal lines and 4 through opposite vertices.



CIRCLE:

A circle has infinite lines of symmetry as it remains unchanged under rotation about its centre.