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General Science and Ability

Section I

ANSWER (2)

Part - A

Data is the new oil:

Yes, data is a transformative economic resource that, like oil, fuels industries and innovation. Yuval Noah Harari views data as both a powerful force for progress and a grave threat to humanity, primarily through his concept of "dataism". However data is far more dangerous and powerful than oil. Unlike oil, data is not a finite resource; it is endlessly reproducible and gives corporations and states the ability to "hack human beings" to manipulate emotions and predict decisions.

Justification

The phrase could be justified into three ways:

① Fuels the digital economy:

Just as oil was the primary resource of the industrial age, data is the engine of the information age. Tech giants like Alphabet (Google), Amazon, and Meta (Facebook) are not valuable for physical assets, but for their vast control and analysis of data, which in turn fuels their immense profits.

② Requires Refinement:

Like crude oil, raw data is messy and unusable in its natural state. Its value is realised only after it is "refined" through

algorithms, and analytics to produce actionable insights and predictions. This process is carried out by data scientists & engineers.

③ Creates new monopolies:

The control of oil created powerful monopolies in the 20th century. Similarly, the concentration of data in the hands of a few tech companies is creating new forms of monopolies and intense competition. This data dominance allows them to outcompete smaller players and grow their influence.

Three Examples:

① The hijacking of Democracy:

A digital dictatorship could use data and AI to make centralised decision-making far more efficient than distributed democratic processes. Unlike 20th-century tyrants who needed soldiers, future leaders could control populations by manipulating the flow of information through algorithm-based news feeds.

② The Potential for Data colonialism:

A nation's data including personal information, political views, and biometric data could be exploited by a foreign power with superior data processing capabilities.

③ The obsolescence of human decision-making:

As algorithms become better at analysing and processing data, human

suggests that humans may surrender decision-making to them out of convenience, making human choice less relevant. For example, there is a dating app which has all of your personal information including your biometrics and preferences (your likes and dislikes) and may find a perfect match for you using its data and analytical skills. It is more likely that you will its decision and would prefer its prediction over your personal choice and emotions.

PART (B)

Imagine dots on a ~~bl~~ balloon surface. When air is blown inside it, these dots move away from each other. It is because the surface area of them expanded. The same case is with universe; its galaxies are continuously moving far apart from each other.

A - Relative Recession:

According to Hubble's law distant galaxies appear to recede faster like dots farthest apart on the balloon separate more as it inflates.

B - No Centre on the Surface:

Observer anywhere in the universe may observe the same expansion. As there is no privilege in the 2-D shape analogy of any centre.

Part (1) Balanced Diet:

A diet that supplies all essential macronutrients (carbohydrates, proteins, fats), micronutrients (vitamins, minerals), water and adequate calories to meet physiological needs for growth, maintenance and activity.

Vitamins A, D, E - Deficiency Effects

① Vitamin-A deficiency:

night blindness, drying of cornea, increased susceptibility to diseases, severe deficiency could be visual damage.

② Vitamin-D deficiency:

impaired calcium absorption - rickets in children, bone deformation, bone pain, fractures, muscle weaknesses, can cause hypocalcaemia & secondary hyperparathyroidism.

③ Vitamin-E Deficiency:

less common - neurological and neuromuscular problems (ataxia etc.)
long term deficiency could be nervous - impaired nerve coordination.

Part (D)

GPS (Global Positioning System)

GPS is a system that tell us our exact location anywhere on Earth using satellites.

Working System

- ① There are about 30+ satellites moving around Earth all the time.
- ② Each satellite keeps sending signals with the exact time and its own position.
- ③ Your mobile phone or GPS device receives these signals.
- ④ It checks how long the signal took to reach it.
- ⑤ By knowing the time taken, it finds out how far it is from each satellite.
- ⑥ When it gets signals from at least 4 satellites, it can calculate your exact position (latitude, longitude, and height) using a method called trilateration.

Fiber Optic

- Fiber optic is a thin glass wire that carries data as light signals.
- It is faster and cleaner than metal cables.
- Used in internet, telecommunications, and medical cameras.

2D and 3D location

① 2-D location:

- Shows only longitude and latitude (like on a flat map).
- Needs signal from 3 satellites.

② 3-D locations:

- Shows latitude, longitude, and height (altitude).
- Needs signals from 4 satellites.

ANSWER NO (05)

Part (A)

Causes of Population Explosion in Pakistan

- ① High Birth rate: People are more interested in large families and more children.
- ② Low Literacy: Especially among women which reduced family planning.
- ③ Poverty: People usually see their children as means of economic support.
- ④ Religious and social attitudes: Many believe that family planning is against religion.
- ⑤ Limited access to healthcare: In rural areas, health facilities are less than more to births.
- ⑥ Decline in death rate: The health facilities increases which reduces deaths.
- ⑦ Urban migration: People are migrating to cities without any proper planning which is causing population density.

Control Measures:

- ① Education and awareness:
Educate women and enhance campaigns on media regarding family planning.
- ② Access to contraception:
Easy and free access to birth control methods.
- ③ Economic uplift:
The country's economic growth can reduce dependence on large families.
- ④ Delay in marriage:
Later marriages can be a source of less number of children.
- ⑤ Health reforms:
more focus on reproductive rights can enhance women's health & birth control.
- ⑥ Religious Guidance:
Religious scholars must engage common public regarding family planning.
- ⑦ Government Policy:
small incentives for small families and strict enforcement national population plan.

Part - B

Remote Sensing:

Remote sensing means collecting information about the Earth's surface from a distance - usually through satellites or aircrafts - using sensors that detect light, heat, and other radiation.

For example:

- ① Satellite images showing forest cover, floods or droughts.
- ② Aerial photos for mapping and disaster assessment.

Role of GIS (Geographic Information System) in Environmental Science:

- ① Mapping: shows land use, vegetation, water bodies and urban areas.
- ② Monitoring: Tracks pollution, deforestation, and climate change over time.
- ③ Disaster management: Helps plan responses to floods, earthquakes and cyclones.
- ④ Resource management: Supports planning for agriculture, forestry, and water conservation.
- ⑤ Urban Planning: Guides sustainable city growth and zoning policies.
- ⑥ Data Analysis: Combines maps and data layers to study relationships between environment and human activities.

Part (c)

The Atmosphere is the blanket of Earth:

The atmosphere acts like a protective layer or blanket surrounding the Earth.

Justification :

- ① Protection from harmful rays:
Blocks UV (ultraviolet rays) coming from sun to earth.
- ② Temperature control:
It has greenhouse gases that traps or absorbs gases and heat, thus making it warm.
- ③ Oxygen supply:
Provides oxygen to humans and animals while CO_2 for plants.
- ④ Weather formation:
It has rainfall, winds and clouds that are essential for agriculture etc.
- ⑤ Burns meteors:
It destroys small meteors before reaching to earth.
- ⑥ Sound and communication:
It provides a space for sound and radio waves to travel.

Therefore, we can say it, like a blanket, the atmosphere, protects warmth, and maintains life on Earth.

part (D)

Definitions :

A) Hydrometer :

An instrument used to measure the density or specific gravity of liquids - for example, checking purity of milk or battery acid.

B) Epicenter:

The point on Earth's surface directly above the focus (origin) of an earthquake.

2) Eye wall of cyclone:

The ring of dense clouds and strongest winds surrounding the calm center (eye) of a cyclone; this is where the storm is most intense.

o) Deep Focus:

Refers to an earthquake whose origin (focus) is deeper than 300 km below Earth's surface - usually less destructive on the surface.

E) Light Year:

The distance that travels by light in one year; about 9.46 trillion kms. It is used to measure distances between stars and galaxies.

Section - II

ANSWER NO: 06

Part (A)

Apple : Berry : Cherry : Date = 3 : 6 : 2 : 5

Apple = $3x$, B = $6x$, C = $2x$, D = $5x$.

$$5x = 3x + 35$$

$$2x = 35$$

$$x = 17.5$$

$$x = 17.5$$

$$\text{Berry} = 6x$$

$$B = 6 \times 17.5$$

$$B = 105 \text{ Berry Candies}$$

Part (B)

① Discount :

$$D = 200 \times \frac{25}{100}$$

$$D = \frac{200 \times 25}{100} = \frac{5000}{100}$$

$$\text{discount} = 50.$$

② Sale Price :

$$S = 200 - 50$$

$$\text{Sale Price} = 150.$$

(3) Tax :

$$\text{Tax} = 150 \times \frac{6}{100}$$

$$T = \frac{150 \times 6}{100} = \frac{900}{100}$$

$$\text{Tax} = 9.$$

(4) Total Paid :

$$T.P = 150 + 9$$

$$[\text{Total Paid} = \$159]$$

Part (c)

Time :

$$\text{Time} = \frac{\text{distance}}{\text{speed}}$$

$$T = \frac{36}{18} = 2 \text{ hours.}$$

$$\text{Starting Time} = 1:00 \text{ pm.}$$

$$\text{Time Taken} = 2 \text{ hours.}$$

$$1:00 + 2 \text{ hrs} = 3:00 \text{ pm.}$$

[The bicycles reaches at 3pm]

Part (d)

① Statistics.

② Algebra.

Answer No: 08

Part (A)

a) Hypotenuse:

$$\begin{aligned} &= \sqrt{7^2 + 24^2} \\ &= \sqrt{49 + 576} \\ &= \sqrt{625} \\ &= 25 \end{aligned}$$

b) One loop:

$$7 + 24 + 25 = 56 \text{ km.}$$

c) Total distance:

$$\begin{aligned} &= 56 + 10 + 5 \\ &= 71 \text{ km.} \end{aligned}$$

d) distance from the start:

$$\begin{aligned} &= \sqrt{10^2 + 5^2} \\ &= \sqrt{125} \\ &= 5\sqrt{5} \text{ km} \approx 11.18 \text{ km.} \end{aligned}$$

e) Answer:

$$\begin{aligned} \text{Total walked} &= 71 \text{ km.} \\ \text{Distance from the start} &= 11.18 \text{ km (} 5\sqrt{5} \text{ km).} \end{aligned}$$

Part (B)

1) Express in terms of F:

$$\begin{aligned} E &= F, D = 2F, C = 4D = 8F, B = 3C = 24F, \\ A &= \frac{1}{2} B = 12F. \end{aligned}$$

b) Sum

$$12F + 24F + 8F + 2F + F + F = 48F$$

c) $48F = 9000$

$$F = \frac{9000}{48}$$

$$F = 187.5$$

d) Amounts.

1) $12F = 12 \times 187.5 = \text{Rs } 2250$

2) $24F = 24 \times 187.5 = \text{Rs } 4500$

3) $8F = 8 \times 187.5 = \text{Rs } 1500$

4) $2F = 2 \times 187.5 = \text{Rs } 375$

5) $F = \text{Rs } 187.50$

6) $F = \text{Rs } 187.50$

Part (c)

Rectangular box = $8 \times 6 \times 4$.

① Total Surface Area :

$$\begin{aligned} & 2(lw + lh + wh) \\ &= 2(8 \cdot 6 + 8 \cdot 4 + 6 \cdot 4) \\ &= 2(48 + 32 + 24) \\ &= 2(104) \\ &= 208 \text{ m}^2 \end{aligned}$$

② Volume :

$$8 \times 6 \times 4 = 192 \text{ m}^3$$

Part (d)

① Total Before Anna :

$$4 \times 72 + 4 \times 50 = 288 + 200 = 488 \text{ kg}$$

② After Anna there are 9 people, total consumption

$$9 \times 67 = 603 \text{ kg}$$

③ Anna Ate :

$$603 - 488 = 115 \text{ kg}$$