Dos and Don'ts for the General Science & Ability Paper

Hi there — you've prepared well! Remember, knowing the content is one thing, but presenting it in the paper exactly as required is another. Here are a few key points to keep in mind:

1. For a 5-mark part, aim to write at least 2 and at most 3 sides of the answer sheet. Often, a question has two or three parts, and the marks are divided accordingly — so address each part fairly.

2. Manage your time wisely — you have about 35 minutes per full question, which comes down to around 8 minutes for each 5-mark part. Stick to this to avoid rushing later.

3. Make your answers look scientific, not just theoretical. Use flowcharts and diagrams wherever they add clarity.

4. Neatness matters — keep your handwriting clean, avoid cutting or overwriting.

5. Mind your spelling and grammar — while GSA doesn't deduct marks for these, your expression leaves an impression.

6. In the ability portion, explain analytical ability questions in words. For a 5-mark part, show all steps and provide clear explanations.

Good luck for CSS 2026 — you're going to ace it, insha Allah! 🌟

Date: JAN. 03. 26   **Day:** SATURDAY

MARVA SHAHZADI

SECTION - A

Q.NO 2:

(a) Describe structure of universe according to big bang theory.

ANSWER:

According to Big Bang Theory, the universe is not static it is dynamic, expanding structure that originated from a single point of infinite density at approximately 13.8 billion years ago.

STRUCTURE OF UNIVERSE ACCORDING TO BIG BANG THEORY:

The structure of the universe according to big bang theory is classified as follows:

1. LARGE-SCALE UNIFORMITY:

universe follows "universe follows" meaning it form.

"...ghost and also "isotropic" ...all directions ... no centre or edge to the cosmic structure.

2. THE COSMIC WEB:

Matter is not scattered randomly but is arranged in a "Cosmic Web" consisting of long thin filaments of galaxies and dark matter. These filaments surround immense, nearly empty regions called voids, creating sponge-like structural appearance across space.

3. HIERARCHICAL CLUSTERING:

Under the gravity influence, matter forms a hierarchical structure. Star groups into galaxies, which turn into clusters and these further assemble into superclusters.

4. EXPANDING SPACETIME:

A fundamental structure feature is that the fabric of space is constantly stretching. As defined by "Hubble's law", the distance between galaxy clusters increases over time meaning that universe structure becomes increasingly less dense as it ages.

5. DARK COMPOSITION:

The structure behaviour is dictated by 3 components:

1. Dark Energy: (~68%) which accelerates expansion

2. Dark Matter: (~2...) provides gravitational scaffolding for galaxies.

3. **Normal Matter : (~5%)**

which forms visible stars and planets we observe.

QNo 2 (b):

Define urinary system and explain the working of nephron.

URINARY SYSTEM:

The urinary system (also known as renal system) is a vital biological system that is responsible for filtering excess fluid, electrolytes and nitrogenous waste like urea, from the bloodstream to maintain homeostasis.

The system consists of two kidneys, two ureters, a urinary bladder and a urethra. Its primary function includes regulating blood pressure, maintaining PH balance, and controlling the concentration of salts in the body.

WORKING OF NEPHRON:

The nephron is microscopic functional unit of the kidney. Each kidney contains approximately one million nephrons that clean the blood through a three-step process.

1) ULTRA-FILTERATION:

(GLOMERULUS and BOWMAN'S CAPSULE)

Blood enters nephron under high pressure through a cluster of capillaries called the glomerulus. This pressure forces water and small solutes like glucose, salts and urea out of the blood and into the Bowman's capsule. The resulting fluid is called glomerular filtrate. Large molecules like blood cells and proteins remain in the bloodstream.

2. SELECTIVE REABSORPTION:

As filtrate travels through the renal tubule, the body "reclaims" useful substances. In the Proximal Convoluted Tubule, 100% of glucose and amino acids, along with most water and salts, are reabsorbed back into the surrounding capillaries. Loop of Henle specifically regulates the concentration of urine by absorbing more water and sodium.

3. TUBULAR SECRETION:

In the Distal Convoluted Tubule, the body performs a final "cleanup". Waste products still present in the blood, such as potassium ions, hydrogen ions, and certain drugs are actively secreted from capillaries into the tubule to be removed from the body.

4. URINE FORMATION AND COLLECTION:

The remaining fluid, now called urine consists of water, urea and excess salt. It moves into collecting Duct, where final water adjustment occurs based on the body's hydration needs from here, urine flows into ureters and down to the bladder for excretion.

QNo 2(c): What is un-balanced diet? How it affects the healthy living?

UN-BALANCED DIET:

An unbalanced diet is a nutritional state where intake of essential nutrients (carbohydrates, protiens, fats, vitamins and minerals) is either insufficient (under-nutrition) or excessive (over-nutrition). It deviates from a "balanced" ratio, failing to meet the body's physiological requirements for maintenance, growth and repair.

IMPACTS ON HEALTHY LIVING:

1. CHRONIC DISEASES (NCDs):

Over-consumption of saturated fats, sodium and refined sugars is a leading cause of global "obesity epidemic." As of 2026, this

remains primary driver for Type 2 Diabetes, and cardiovascular diseases.

2. Deficiency Syndromes:

Lack of micronutrients lead to specific clinical conditions such as Anemia (iron deficiency), Scurvy (vit C) and Rickets (vit D/calcium) which impair basic bodily functions.

3. Weakened Immunity:

Malnutrition supresses the immune system, increasing susceptibility to infectious diseases and slowing down recovery and tissue repair.

4. Stunted Development:

In children, an unbalanced diet leads to Protien Energy Malnutrition (PEM), causing irreversible physical stunting and cognitive impairment.

5. Psychological Health:

Research links poor nutrition (specifically high sugar low omega-3 intake) to increased rate of anxiety, depression and reduced mental focus.

CONCLUSION:

An unbalanced diet undermines the Human Development Index (HDI) by reducing life expectancy and workforce productivity, placing a severe economic burden on the national healthcare infrastructure.

Q.No 2(d):

Describe the structure and function, of cell wall, cell membrane, cytoplasm and mitochondria?

CELL WALL:

STRUCTURE:

A rigid semi-permeable outer layer found in plants (cellulose), fungi (chitin) and bacteria (peptidoglycan). It is absent in animal cells.

FUNCTIONS:

a. **Structural support:**

It provides mechanical strength and maintains specific shape of the cell.

b. **Protection:**

It acts as a barrier against mechanical stress and physical pathogens

c. **Turgor Pressure:**

It allows the cell to withstand high internal water pressure without bursting.

Cell Membrance :

Structure:

A "Fluid Mosaic" composed of phospholipid bilayer with embedded protieni, cholesterol and carbohydrates. It is thin, delicate and elastic.

Functions:

a. Selective Permeability:

Regulates the entry and exit of ions and molecules.

b. Cell Signaling:

Contains receptors for chemical messages (hармоnes) to communicate with others.

c. Compartmentalization.

Maintains a distinct internal environment different from the outside.

Cytoplasm:

Structure:

A jelly-like substance consisting of cytosol and various organelles suspended with it.

Functions:

a. Metabollic Hub:

The site of many vital chemical reactions such as glycolysis.

b. Molecular Transport:

Facilitates the movement of materials and nutrients across the cell via cytoplasmic streaming.

c. Organelle Support:

Provides a physical medium that keeps organelles in place and protects them from damage.

MITOCHONDRIA:
STRUCTURE:

A double-membrane organelle whose outer member is smooth while inner memberane is folded finger-like projections called "cristae" to increase surface area. It contains its own DNA and ribosomes.

FUNCTIONS:

a. Powerhouse of cell:

The primary site for Aerobic Respiration, where glucose is converted into energy in the form of ATP (Adenosine Triphosphate)

b. Apoptosis:

Plays a critical role in programmed cell death.

c. Calcium Storage:

Helps maintain the proper concentration of calcium ion within the cell's compartment.

Sno3. (a)

How global warming can be reversed?

ANSWER:

Reversing global warming means actively cooling the planet and reducing the atmospheric CO_2 concentration to pre-industrial level, it requires a multi-faceted, global, strategy beyond simple mitigation.

TECHNIQUES FOR REVERSING GLOBAL WARMING:

1. AGGRESSIVE EMISSION MITIGATION.

The fundamental step is immediately and drastically transitioning from fossil fuels to renewable energy sources (solar, wind, geothermal). This involves implementing rigorous carbon pricing mechanisms, improving energy efficiency in all sectors (transport, industry, residential) and halting deforestation to reach net-zero emissions globally.

2. CO$_2$ Removal (CDR) Technologies

Mitigation alone stabilizes emissions, but reversal requires removing legacy CO$_2$ from atmosphere. The techniques that could be used to achieve so are:

a. Nature-Based Solutions:

Reforestation and afforestation acts as natural carbon sinks. Improved agricultural practices like regenerative farming enhance soil carbon sequestration.

b. Technological Solutions:

Direct Air Capture and storage (DACS) technologies chemically filter CO$_2$ from the atmosphere and store it underground permanently. Other experimental methods like enhanced weathering accelerates natural rock processes that absorb CO$_2$.

3. Policy And International Coorperation:

Achieving reversal requires robust global governance beyond the "Paris Agreement". This

involve massive investment in green infrastructure, technology transfer to developing nations, and legally binding targets to negative emissions to achieve atmospheric CO_2 emissions reduction.

Q.No 3 (b).

Define ceramics. Give properties and applications of ceramics.

CERAMICS:

Ceramics are inorganic, non-metallic materials typically composed of metal or metalloid oxide, nitrides, borides or carbides. They are formed by heating a powder raw material to high temperature (sintering) to create a rigid structure. They are distinguished from metals and polymers by their crystalline or semi-crystalline structure and lack of free-electrons.

PROPERTIES OF CERAMICS:

1. High Hardness and Strength:

They are generally harder than metals and hardly resistant to wear.

- High Melting Point:
  Extremely resistant to heat and chemical erosion.
3. Electrically Insulating:
  Most ceramics are dielectrics, as they do not conduct electricity well.
4. Chemical Stability:
  High resistant to corrosion from acids, bases and oxidation.
5. Brittle:
  A key weakness is low ductility and fracture toughness; they break easily under tension or impact.

APPLICATIONS:

1. As Structural Materials:
  They are used in making bricks, tiles, cement for construction.
2. Electronic:
  They are used in electronics, like insulator, capacitors and substrates.
3. Biomedical:
  They are used in dental implants, artificial hip joints etc.
4. Aerospace/Industrial:
  They serve as heat shields for spacecraft, furnace lining (refractories) and cutting tools.

Q.No.3. (c):

Explain the working of optic fibres and mobile phone.

WORKING OF OPTIC FIBRE:

The working of optic fibre is described as below:

PRINCIPLE:

They rely on Total Internal Reflection (TIR). Light signals entering the fibre strike the boundary between the inner core (higher refractive index) HRI and outer cladding (LRI) at an angle that causes the light to reflect entirely inwards, continuing along the length of fibre without escaping.
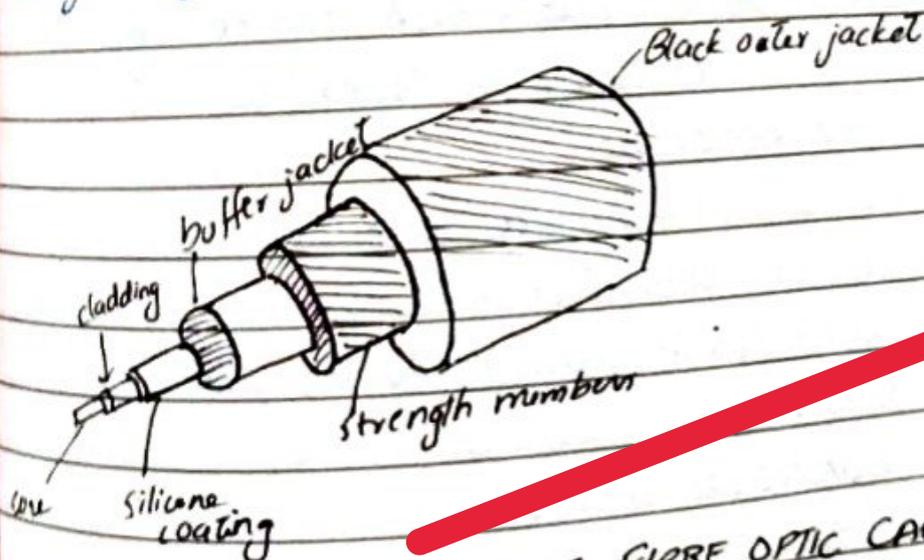
Fig 3.1. PARTS OF FIBRE OPTIC CABLE

- Black outer jacket
- buffer jacket
- cladding
- core
- Silicone coating
- strength members

PROCESS:

An electrical signal is converted into a pulse of light (via a laser/LED) at source. This light travels down hair-thin glass fibre at nearly the speed of light, carrying massive amounts of data efficiently over vast distances with minimal signal loss. At the destination, a receiver (photo detector) converts the light pulse back into an electrical signal.

WORKING OF A MOBILE PHONE:

Mobile Phones are complex radio transceivers operating with a cellular network.

a. CELLULAR NETWORK:

The geographic area is divided into "cells", each served by a base station (cell tower).

b. TRANSMISSION:

When a user speaks, the voice is converted into digital signals, (data/radio waves) by the phone's transmitter.

c. CONNECTIVITY:

These waves are picked by the nearest cell tower. the tower routes the signal via complex to receiver's carrier network.

RECEPTION:

d. They receiving natural localles the destination phone's nearest tower and transmits the radio waves to it. The receiving phone's receivers then converts the radio waves back into audible sound.

Q No 3 (d).

Define the following and give examples.

FOOD ADDITIVES:

Substances intentionally added to food to preserve flavour or enhance its appearance, texture, or nutritional value. These are generally safe for consumption when used with regulatory limits.

Examples:

1. Ascorbic Acid (Vitamin C) acts as antioxidant in juices to prevent spoilage

2. Monosodium Glutamate (MSG) enhances flavour.

FOOD PRESERVATIVES:

Specific chemical additives used to prevent the growth of bacteria, yeasts, molds, and other micro-organisms to maintain freshness and extend shelf-life. They prevent food spoilage and control health hazards.

Examples:
1. Sodium Benzoate: used in soft drinks and pickles;
2. Nitrates/Nitrites: used in processed meats inhibit botulism - causing bacteria.

FOOD CONTAMINATION:

The accidental a unintentional introduction of harmful substances (biological {bacteria, viruses }, chemical (agents) a physical (hair)) into food during production, processing, storage a cooking. This occurs without intent to deceive.

Examples:
1. Salmonella: bacteria getting chicken during processing
2. Pesticide Residue: remaining on unwashed vegetables.

Food Adulteration:

The deliberate act of debasing the quality of food by adding inferior substances or removing vital components. This is typically done for economic gain and is illegal because it poses health risks a decieves the consumer.

Example:
- Adding chalk powder to flour
- mixing brick powder into chilli powder or watering down milk.

(SECTION-B)

Qno 6:

A. Pointing to a women, Ahsan said, "Her grand-daughter is the only daughter of my brother." How is the woman related to Ahsan?

SOLUTION:

Her Grandmother daughter woman's

only daughter of → grandmother my daughter.

my brother → neice

brother is son of women

woman → grandmother →

of neice of man/son

so

Woman is __mother__ of Absan

B. The ratio between the length and the breadth of rectangular park is 3:2. If a man cycling along the boundary of the park at speed of 12 km/hr completes one round in 8 mins, then the area of park in (sq.m) is?

GIVEN THAT:
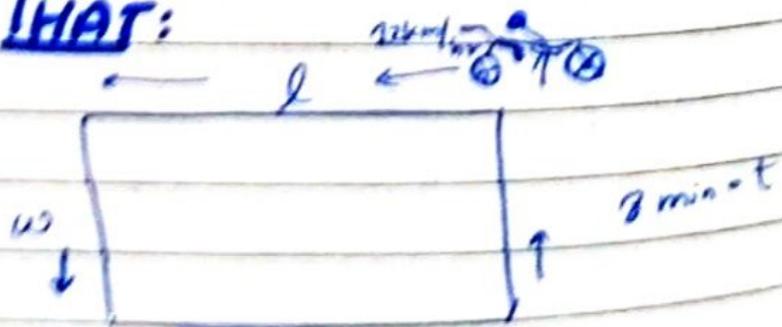
$$l : w = 3:2$$

$$Area = ?$$

Speed = 12 km/hr

$$= \frac{12 \times 1000}{3600} \text{ ms}^{-1}$$

$$V = 10/3 \text{ ms}^{-1}$$

Time = 8 min $= 8 \times 60 = 480$ sec

Distance = $\dfrac{\text{Speed}}{\text{time}}$ $= \dfrac{10/3}{480} = 1600$ m

Perimeter of Park = 1600 m

L : W $3 : 2$

L = $3x$ W = $2x$

Perimeter = $2(L + W) = 1600$ m

$$2(3x + 2x) = 1600$$

$$5x = 800$$

$$x = 800/ = \boxed{160}$$

L = $3x = 3(160) = 480$ m

W = $2x = 2(160) = 320$ m

A = $L \times W = 480 \times 320 = \boxed{153600 \text{ sq m}}$

C. In a 2-digit number, if it is known that its unit's digit exceeds its ten's digit by 2 and that the product of the given no. and sum of its digit is equal to 144, then no is?

$\mathcal{S}$OLUTION :-

2 digit number

unit digit $+ 2 =$ ten's digit

$x + 2 = yx$

$(x + y) \times xy = 144$

sum of digits $x + 2 + x \Rightarrow \boxed{2x + 2} = A$

given number $=$ unit   Tens

$= x + 2 \qquad x$

$= 10x + (x + 2)$

$= \boxed{11x + 2} = B$

Product of A and B $= 144$

$(2x + 2) \times (11x + 2) = 144$

$13x + 4 = 144$

$13x = 140$

$x = 140/3$

$22x^2 + 4x + 22x + 4 = 144$

$22x^2 + 26x - 140 = 0$

$2(11x^2 + 13x - 70) = 0$

$11x^2 + 13x - 70 = 0$

$11x^2 + 35x - 22x - 70 = 0$

$x(11x + 35) - 2(11x + 35) = 0$

$(11x + 35)(x - 2) = 0$

$11x + 35 = 0 \qquad , \qquad x - 2 = 0$

$x = -35/11 \qquad\qquad x = 2$

negative
value
discarded

Number =

$x = 2$ units to

$x+2 =$ units

Number = $\boxed{24}$

check: $A \times B = 144$

$(2x + 2)(11x) = 144$

$(2(2)+2)(11(2)+2) = 144$

$(4+2)(24) = 144$

$144 = 144$

D. The L.C.M of 2 numbers is 48.
The numbers are in ratio of 2:3
Then sum of number is?

SOLUTION:

L.C.M of a and b = $\boxed{48}$

$x : y = 2 : 3$

$x+y = ?$

let numbers be $2x$ and $3x$

HCF of $2x$ and $3x$ is $\boxed{x}$

$\to$ Products of 2 number = LCM × HCF

$(2x \times 3x) = 48 \times x$

$6x^2 = 48x$

$6x = 48$

$\boxed{x = 8}$

Number 1 = $2x$ = = 16
Number 2 = $3x$ = = 24

sum of N1 and N2 = 16 + 24
= 40

Q No 7 (A)

If 40% of a number is equal to 2/3 of another number. What is ratio of first number to second number?

Given

$$40\% \ (x) = \frac{2}{3}(y)$$

$$\frac{40}{100}x = \frac{2}{3}y$$

$$\frac{2}{5}x = \frac{2}{3}y$$

$$\frac{x}{y} : \frac{2/3}{2/5}$$

$$\frac{x}{y} : \frac{2}{3} \times \frac{5}{2}$$

$$\frac{x}{y} : \frac{5}{3}$$

so

ratio of $x:y = \boxed{5 : 3}$

Q7 (B) On selling 17 balls at Rs 720, there is loss equal to cost price of 5 balls. The cost price of a ball?

SOLUTION:

Let cost price CP of ball = x

$$17x = 720$$

$$loss = CP \text{ of } 5x$$

$$Loss = \text{Total Cost Price} - \text{Total Selling Price}$$

$$5x = 17x - 720$$

$$17x - 5x - 720 =$$

$$12x - 720 = 0$$

$$x = 720/12$$

$$\boxed{x = 60}$$

Cost price of one ball = $\boxed{60}$

Q7(C): A man is 24 years older than his son. In 2 years, the age of

Q7(c): A man is 2½ years older than his son. In 2 years, his age will be twice the age of his son. The present age of his son

let present age of father = x

let present age of son = y

$$x = 2y + y \quad -①$$

$$x + 2 = 2(y + 2)$$

$$x + 2 = 2y + 4$$

$$x + 2 - 4 - 2y = 0$$

$$x - 2 - 2y = 0$$

$$x = 2 + 2y$$

$$\boxed{x = 2(1 + y)}$$

put $x = 2(1+y)$ in ①

$$2(1+y) = 24 + y$$
$$2 + 2y = 24 + y$$
$$2 + 2y - y - 24 = 0$$
$$2 + y - 24 = 0$$
$$y - 22 = 0$$

$$\boxed{y = 22}$$ $\boxed{y = 22} \Rightarrow$ son's present age

$$x = 24 + y$$
$$x = 24 + 22$$

$$\boxed{x = 46}$$

Q7(D): Rashid and Kamran

are working on an assignment. Rashida takes 6 hrs to type 32 pages on computer, while kamran takes 5 hrs to type 40 pgs. How much time will they take, working together on two different computers to type an assignment of 110 pages.

takes 5 hrs to type 40 pgs. How much time will they take, working together on two different computers to type an assignment of 110 pages.

Rachda's time = 6 hrs   Rate = $\frac{32}{6}$

Prin Type pages = 32   = 16/3 pg/hr

Kamran's time = 5 hs   Rate = 40/5

  Type pages = 40 pgs   = 8 pg/hr

Combined rate = $\frac{16+8}{3}$ $\frac{16+24}{3} = \frac{40}{3}$ pg/hr

For 110 pages = $\frac{110}{40/3}$ = $\frac{330}{40}$ = 8.25 $\frac{pg \, hr}{pg}$

0.25 × 60 = 15 minutes $= 8.25 \, hr$

8 hr and 15 mins