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 GSS 2026 — you're going to ace it, in sha Allah! 🌟

GSA MOCK DEC

SECTION: I

Q2: a) Differentiate blw star and planet briefly

describe the life cycle of a star from Nebula to Black hole.

STAR: Stars are massive, luminous balls of gas that are held together by their own gravity. They are primarily composed of hydrogen and helium and their core is extremely hot and dense. This heat and pressure trigger nuclear reactions, which release a tremendous amount of energy in the form of light and heat.

PLANET: Planets are large celestial bodies that orbit around stars.

DIFFERENCE BETWEEN STAR AND PLANET:-

STAR	PLANET
Stars generate their own light and heat through nuclear reaction in their cores.	Planets don't generate their own light; they reflect the light of their parent star.
Stars are typically tens to hundreds of	Planets are much smaller than

times more massive than planets.

stars with diameters ranging from a few ~~hund~~ thousand to tens of thousand kilometers.

"Life Cycle of Stars"

Stars, those twinkling lights we see in the sky, live incredibly long lives & go through amazing changes over time. It all starts in nebulae, which are giant clouds of gas and dust floating in space. Gravity pulls the particles in those clouds close together, squeezing them into a ball. As the ball gets tighter it heats up and a baby star called a protostar is born. When it gets hot enough, a process called nuclear fusion begins in the star's center, where hydrogen is turned into helium, creating energy. The star officially becomes a star.

Most stars spend the majority of their lives in the main sequence phase, where they shine steadily for billions of years - kind of like our Sun right now. But stars don't live forever. When they run out of hydrogen fuel, what happens next depends on how big they are.

- Small to medium stars: These stars, like our Sun, grow bigger and turn into red giants. They lose their outer layers, creating a beautiful shell of gas called a planetary nebulae. What's left behind is a small, hot core called a white dwarf, which cools down over time and eventually becomes a dark, cold black dwarf.

- Big stars: Massive stars take a much more exciting path. They grow into red supergiants

and explode in a huge blast called a supernova. After the explosion, what's left can either become a super-dense neutron star or shrink into a mysterious black hole.

STAGES OF STAR:

Stars go through several stages in their life cycle, depending on their size and mass.

*Planetary nebulae def-

1). NEBULAE (stellar nursery):

Stars begin in massive clouds of gas & dust called nebulae. Gravity pulls the particles together, forming dense clumps.

This is the "baby stage" of a star's life where it's just starting to form.

2. Protostar:-

As the gas & dust compresses, the clumps heat up and forms a protostar - a hot, glowing ball.

Fusion hasn't started yet but.

The star is "getting ready" to ignite.

3. Main sequence star:

Once nuclear fusion begins (hydrogen into turning into helium) the star becomes stable and shines brightly.

This is the longest stage of a star's life where it's stable and burning fuel. Our sun is a main sequence star.

- **BLACK HOLE:**

A black hole, one of the most mysterious objects in the universe, forms when a massive star collapses under its own gravity after running out of fuel. Black holes are so dense that their gravity traps everything, including light, within a boundary called the event horizon. They can range from stellar-mass black holes formed from dying stars to supermassive black holes, which sit at the heart of galaxies and are millions to billions of times the mass of our sun.

→ Stellarmass:- formed by dying stars.
→ Supermassive:- Found in the center of galaxies like the one in the Milkyway.

- **STARS:-** Stars are the massive balls of gases (mostly hydrogen & helium) that produce energy through nuclear fusion. They shine because they're constantly fusing hydrogen into helium, releasing tons of energy.

Stars come in different sizes, colors and types like:-

↳ Dwarf: small cooler stars.
↳ Giants: Big, bright & nearing the end of their life.
↳ Supernova: Exploding stars that leave behind stellar remnants.

(b) What are semiconductors? Explain the difference between n-type and p-type semiconductors and list two of their modern applications.

SEMICONDUCTORS.

semiconductors are material with electrical conductivity b/w that of conductors and insulators. Their conductivity can be modified by adding impurities or by applying external electric fields, making them essential for electronic devices.

DIFFERENCE B/W n-type and p-type:

-> **N-type**: n-type semiconductors are formed by doping a pure semiconductor with donor atoms that have more valence electrons than the semiconductor.

-> **P-type**: p-type semiconductors are formed by dopping with acceptor atoms that have fewer valence electrons than the semiconductor.

MODERN APPLICATIONS OF SEMICONDUCTORS

1. **Transistors in smartphones**: It is used in integrated circuits for amplification and switching, enabling complex processing in compact devices like smartphones.

2. **SOLAR CELLS** : convert sunlight into electricity using semiconductor p-n junctions that generated electron-hole pairs when exposed to light.

(c) Define Global warming. Explain the mechanism of the Greenhouse Effect and list three major greenhouse gases

GLOBAL WARMING:

" " refers to the long-term increase in Earth's average surface temperature due to human activities, primarily the emission of greenhouse gases that trap heat in the atmosphere.

GREEN HOUSE EFFECT:

The greenhouse effect is a natural process that warms the Earth's surface. The mechanism involves:-

1. Sunlight passes through the atmosphere and heats the Earth's surface.

2. The earths emits infrared radiation back toward space.

3. Greenhouse gases in the atmosphere absorb and re-emit some of this infrared radiation, trapping heat and raising the planet's atmosphere.

Three major greenhouse gases are:-

1. Carbon dioxide (CO_2):- released by burning fossil fuels and deforestation.

2. Methane: (CH_4). emitted from agriculture, landfills and natural gas systems.

3. Nitrous oxide (N_2O). produced by agricultural and industrial activities.

(d) What Tsunami? Ex- ..... coastal area.

TSUNAMI:- Tsunami is a series of large ocean waves caused by the displacement of a significant volume of water, usually as a result of a sudden disturbance on the ocean floor or nearby land.

NATURAL PROCESSES THAT TRIGGER A TSUNAMI:-

1. Underwater earthquakes: When tectonic plates move past each other beneath the ocean, they can cause the seafloor to uplift, displacing water and generating tsunami waves. Earthquakes with a 7.0 magnitude or higher are more likely to trigger tsunamis.

2. Landslides: Submarine landslides can push large amount of water, creating Tsunami waves. These landslides can be triggered by earthquakes, volcanic activity or erosion.

Q8:-

(a) MITOCHONDRIA:

STRUCTURE: Mitochondria are double membrane organelles found in the cytoplasm of animal cells. Their structure includes an outer & inner membrane folded into cristae, and a matrix inside the inner membrane. The function of mitochondria is to generate ATP through oxidative phosphorylation, making them the primary energy producers of the cell. Because they supply most cellular energy in form of ATP, mitochondria are commonly referred to as the "powerhouse" of the cell.

RIBOSOME STRUCTURE:

Ribosomes are small non-membrane-bound complexes made of ribosomal RNA and proteins. They exist either free in the cytosol or attached to the endoplasmic reticulum. The function of ribosomes is to synthesize proteins by translating messenger (RNA) into polypeptide chains. Free ribosomes produce used inside the cell, while bound ribosomes synthesize proteins that are secreted or inserted into membranes.

(b) ENZYMES: Enzymes are biological catalysts, typically proteins that accelerate chemical reactions in living organisms without being consumed in the process.

a) Lock And Key Model:-
The lock and key model of enzyme action describes the enzyme-substrate interactions as analogous to a lock and its specific key. In this model, the enzyme has a particular 3 dimensional shape-like its only one specific substrate (the "key") when the substrate fits into the active site, the enzyme facilitates the conversion of the substrate into product.

b) Two factors that affect enzyme activity are:-
1. Temperature:- Change in temperature can alter enzyme conformation and affect reaction rates.

2. pH Variations in pH can modify the ionization of amino acids side chains in the active site, influencing substrate binding and catalysis.

(c)
RENEWABLE ENERGY: Renewable energy resources are naturally replenished on a human timescale and are generally inexhaustible.
Example:- solar, wind, hydro, biomass

Non-Renewable Energy: These resources exist in finite quantities and are depleted much faster than they can be naturally regenerated. Fossil fuels and nuclear fuels fall into this category.

Potential of Wind Energy As A sustainable source for the future

Wind energy is a renewable resource that converts kinetic energy from moving air into electricity using wind turbines.

- Abundance and Renewability:-
Wind is naturally replenished and available in many regions, making it a virtually unlimited resource.

- Environment- Impact-
Wind power generates electricity with zero direct emissions during operation, reducing greenhouse-gas footprints compared with fossil fuels.

- Technological Development-
Advances in turbine design have improved efficiency and reduced costs, enabling larger-scale deployment and better integration with grids.

(d) **DENGUE FEVER:**

Dengue fever is a viral illness caused by the dengue virus which belongs to the Flaviviridae family. The primary vector responsible for its transmission is the female Aedes aegypti mosquito, and to a lesser extent, Aedes albopictus.

SYMPTOMS:

1. Sudden high fever (often reaching 104°F or 40°C).
2. Severe headache, particularly behind the eyes.
3. Joint and muscle pain.
4. Rash, which may appear 3-4 days after fever onset.

PREVENTIVE MEASURES:

1. Use mosquito repellents containing DEET, picaridin or oil of lemon eucalyptus on exposed skin.
2. Vector control:- Eliminate mosquito breeding sites by removing stagnant water from containers, tires and other potential habitats.

SECTION - II

Q8(a):-
Ans:- Code LAKE.
Encode "Lake" using the +3 shift rule.
Apply the +3 shift to each letter of 'Lake'.
- L(12) → O(15)
  A(1) → D(4)
  K(11) → N(14)
  E(5) → H(8)

The coded word for 'LAKE' is 'ODNH'.

(b):-
Ans: The woman is the man's daughter.
Explanation:- The man of my sister's husband is the man's nephew. The statement says this nephew is the father of woman's son. Meaning the woman's son's father is the man's nephew. This makes the woman the man's daughter.

(c):-
Ans:-
(i) Sequence : 4, 12, 6, 18, 9, 27 - .
The pattern alternates b/w x by 3 & ÷ by 2.
1. 4 times 3 = 12
2. 12 div 2 = 6
3. 6 times 3 = 18
4. 18 div 2 = 9
5. 9 times 3 = 27
6. 27 div 2 = 13.5
Next number in the sequence is 13.5.

sequence: 1, 2, 6, 24, 120, —.

The pattern is obtained by multiplying the previous term by consecutive integers.

1. $1 \times 1 = 1\$$
2. $2 \times 2 = 6\$$
3. $6 \times 4 = 24\$$
4. $24 \times 5 = 120\$$
5. $120 \times 6 = 720\$$

Next number in seaquence is 720.

(d)

P is shorter than Q but taller than R.
This implies $R < P < Q$.

S is shorter than T but taller than Q.
This implies $Q < S < T$.

The shortest person is 150 cm and the tallest is 180cm.

Combining the inequalities.

$$R < P < Q < S < T.$$

Thus, the order of height is:-

$$R < P < Q < S < T.$$

Range = height of T - height of R

T = 180cm (tallest)

R = 150 (shortest).

$180 - 150 = 30$.

The 3rd tallest person Q. and the maximum possible range of their height is 30cm.

Q7:(a):-

Ans:- In a survey of 100 people we know
- 65 people watch cricket.
- 40 " " hockey.
- 20 " " neither cricket nor hockey.

The no of people who watch atleast one of hockey & cricket is $100 - 20 = 80$.

Acc to exclusion-inclusion principle,

$n(\text{cricket} \cup \text{hockey}) = n(\text{cricket}) + n(\text{hockey})$.

$n(\text{cricket} \cup \text{hockey}) = 80$

$n(\text{cricket}) = 65$

$n(\text{hockey}) = 40$.

Thus $80 = 65 + 40 - n(\text{Cricket} \cap \text{hockey})$

$n(\text{Cricket} \cap \text{hockey}) = 65 + 40 - 80$

Ans. $= 25$.

(b)

Ansr $P = 2(\text{length} + \text{width})$.

Perimeter is 72 meters.

$2(w + 4w) = 72$.

$2(2w + 4) = 72$

$4w + 8 = 72$.

$4w = 72 - 8$

$4w = 64$.

$w = 16$.

$16 + 4 = 20$ meters

$V = L \times W \times \text{depth}$

$= 20 \times 16 \times 2.5$

Ans $= 800$ cubic meter.

(c.)

Ans. relative speed = 60km - 40km = 100km

Time = Distance / speed = 400km / 100km = 4hr

meeting time = 8:00am + 4hr = 12:00pm

Ans = 12:00pm

(d).

$F + S = 75$

father → son.

$F - 10 = 4(S - 10)$

$F - 10 = 4S - 40$

$F = 4S - 30$.

$(4S - 30) + S = 75$

$5S - 30 = 75$

$5S = 105$

$S = 21$

$F = 4(21) - 30$

$= 84 - 30$

Ans $= 54$ years.