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, in sha Allah! 🌟

General Science & Ability
Part – II Section – I

Q. 2

(a) Star Vs Planet

• Star: A self-luminous body producing energy by nuclear fusion (mostly $H \rightarrow He$) of its core emits its own light.

• Planet: A non-luminous (reflecting) body orbiting a star, too small to sustain fusion and cleared its orbit of other debris.

Life cycle of a star (Nebula → Black Hole) – Brief sequence

1. Nebula (molecular cloud):
Dense region of gas & dust collapses under gravity.

2. Protostar:
Gravity causes these clouds to collapse, forming a protostar, which is hot, dense core.

3. Main Sequence:
When core temperature is sufficient, hydrogen fusion starts and a star remains in a stable main sequence.

4. Red Giant / Supergiant :

After hydrogen is exhausted in the core, core contracts and outer layers expand ; star becomes red giant (Low - intermediate mass) or supergiant (high mass).

5. End stage depends on mass

Low mass : The outer layers are eventually ejected, forming a planetary nebula and the core becomes a white dwarf. The white dwarf cools over a long time, becoming a black dwarf.

High mass :

The core collapses triggering a supernova explosion. The remnant can be a neutron star or if the star is massive enough, a black hole.

(b)

Semiconductor:

It is a material whose electrical conductivity lies between a conductor and an insulator. Conductivity increases with temperature and doping. Examples include silicon (Si), germanium (Ge).

n-type:

These are doped with donor atoms (e.g., phosphorus in Si) that provide extra electrons. Electrons are majority carriers, and conductivity occurs due to electrons.

p-type:

These are doped with acceptor atoms (e.g., boron in Si) that create holes (positive charge carriers). Holes are majority carriers.

Two modern applications:

(i) Transistors (MOSFETs) in microprocessors.

(ii) Photovoltaic cells (solar panels) and diodes (LEDs).

(c)

Global warming

Long-term rise in average global surface temperatures caused mainly by increased concentrations of greenhouse gases in the atmosphere from human activities (fossil fuel burning, deforestation).

Greenhouse effect mechanism

1. Solar radiation reaches earth and the surface of the earth absorbs sunlight and warms.

2. Earth emits longwave (infrared) radiation back toward space.

3. Greenhouse gases (GHG) in the atmosphere absorb and re-radiate some of this infrared energy, traping heat and warming the lower atmosphere and surface.

Three major greenhouse gases:

Carbon dioxide (CO_2), methane (CH_4), Nitrous Oxide (N_2O).

(d) Tsunami - triggers and impacts

- **Tsunami:**

A series of ocean waves with extremely long wavelength and period, generated by a large, sudden displacement of the seafloor or water column.

Natural triggers:

Undersea earthquakes, submarine landslides, volcanic eruptions, and meteorite impacts are the processes that trigger a tsunami.

Potential coastal impacts:

Massive inundation, strong currents and erosion, destruction of infrastructure and homes, loss of life, saltwater intrusion into freshwater systems, and long-term disruption of coastal ecosystems and economy.

Q.4

(a) Rock cycle and rock types

• Rock cycle :

Processes (melting, cooling, weathering, erosion, deposition, compaction, heat and pressure) convert rocks between igneous, sedimentary, and metamorphic types over geologic time.

• Igneous :

Formed from solidification of molten magma / lava. Examples include granite, (intrusive), basalt (extrusive).

• Sedimentary :

These are formed by deposition, compaction and cementation of sediments (from weathering), or chemical precipitation. Examples include sandstone (clastic), limestone (chemical / biochemical).

• Metamorphic :

These are formed by transformation of pre-existing rock under heat and pressure (without melting). Examples include schist, gneiss, marble (from limestone).

(b) Acid rain

Chemical formation

- $SO_2 + OH / O_2 \rightarrow$ sulfuric acid species, ultimately forms H_2SO_4 in atmosphere. NO_x (NO, NO_2) oxidized, forms HNO_3 (nitric acid). Reactions in presence of water droplets produce acidic rain (low pH).

Harmful effects

lowers pH of water bodies and harms aquatic life (fish kills, reduced biodiversity), damages vegetation (leaf/needle damage, reduced photosynthesis), corrodes buildings/statues (especially carbonate stone) and soils nutrient depletion.

(c) Role of Remote Sensing and GIS

Remote sensing

Acquisition of information about Earth from satellites / aircraft, provides land-use maps, vegetation indices, thermal imaging, flood extent etc.

GIS

Integrates, analyzes and visualizes geospatial data (layers) for decision-making.

In environmental monitoring / disaster management

Remote sensing and GIS are used for early detection of hazards (fires, floods, landslides), hazard mapping, evacuation route planning, damage assessment, real-time monitoring and resource allocation.

(d) Solid Waste Management and hazards of improper disposal

Concept

Solid Waste Management is the collection, transport, treatment, recycling, and disposal of solid waste in ways that protect public health and environment.

Environmental hazards of improper disposal:

Groundwater contamination (leachate), air pollution (open burning), vector-borne diseases (rats, flies, mosquitoes), soil contamination, unpleasant odors, aesthetic degradation, greenhouse gas emissions (methane from decomposition), and risk of fires-