Date:

General Science and Ability

Question no. 2

a. Structure of the Universe according to Big Bang Theory

According to Big Bang theory the universe originated approximately 13.8 Billion years ago from an infinitely hot and dense point called singularity. Its structure has evolved through several phases.

(i) Cosmic Inflation

An initial phase of extremely rapid, exponential expansion that occurred in a fraction of a second.

(ii) Expansion and cooling

Following inflation, the universe continued to expand and cool, allowing energy to transform into subatomic particles and eventually atoms.

(iii) Large scale structure

Over billions of years, gravity pulled matter to form stars, galaxies and

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. GSA doesn't deduct marks for these, your expression leaves an impression.
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! 🌟

Date: _____

glaxy clusters. On a large scale, the universe is uniform (homogeneous and isotropic) characterized by a web like structure of glaxy filaments and voids.

(iv) Accelerated expansion

Recent observations indicated the universe is continuesly expanding at an accelerating rate, drive by a mysterious rate of force known as dark energy.

Date: _____

6. I. Urinary system and working of Nephron

The urinary system or renal system is responsible for filtering blood, removing waste products (like urea), and maintaining fluid and electrolytes balance. It consists of two kidneys, two ureters, a bladder and a urethesa.

II. Working of the Nephron

The Nephron is the functional unit of the kidney, and its working involves three main processes

III. Glomerular filteration

Blood enters the glomerulus (a cluster of capillaries) under high pressure. Small molecules like water, glucose, and waste are squeezed into the Bowman's Capsule while large particles of protiens and blood cells remain in the bowman's capsule.

Date: _____

IV. Tubular reabsorption:

As the filtrate moves through the renal tubule, essential nutrients like glucose, amino acid, and most of the water are reabsorbed back into the blood.

V. Tubular Secretion:

The blood vessels surrounding the tubule actively secrete additional wastes into the filtrate to be removed as urine.

c. Unbalanced diet and its effects on healthy living

An unbalanced diet is one that does not provide the proper proportion of essential nutrients, like carbohydrates protiens, fats, vitamins, and minerals. They are required for the body's needs.

Date: _____

Effects of unbalance diet on healthy living

I. Nutritional deficiencies

It leads to specific disease like scurvy (lack of vitamin C), anemia (lack of vitamins), brittle bones (lack of calcium).

II Chronic diseases

It increases the risk of non-communicable diseases including obesity type 2 diabetes, hypertension, and cardiovascular diseases.

III. Physical and mental health

Can cause persistent lack of energy, irritability, poor concentration, and digestive issues like constipation or "lazy bowel syndrome."

Date: _____

d. Structure and components of cell components functions

Cell wall:

It is the outer layer of a cell. It has rigid outer layer found in plants (cellulose), fungi (chiti) and bacteria.

Primary function:

Provide structural support, protection and maintain cell shape.

Cell membrane

Cell membrane is a semi-permeable lipid bilayer with embeded protiens. It has a fluid mosaic model, that contain bilayer of protiens moving from one side to another.

Primary function:

It controls the entry and exist of substances and protects

Date: _____

the internal cell integrity.

Cytoplasm

It is a jelly-like substance mostly water, containing organelles and the cytoskeleton.

Primary function:

Its primary function is to site for most metabolic chemical reactions and support/suspends organelles.

Mitochondria:

Double membrane organelles with an inner folded membrane called Cristae.

Primary function:

The powerhouse of the cell produces energy in the form of ATP via cellular respiration.

Date: _____

Q3. I. Reversing global warming

While some impacts of global warming are long-lasting, global warming can be mitigated or stopped through several strategies.

II. Reaching net zero.

Drastically cutting greenhouse gas emissions by transitioning from fossil fuels to renewable energy (solar, wind hydro, etc)

III. Carbon removal

Actively removing CO_2 from the atmosphere through reforestation, afforestation, and technological solutions like Direct Air Capture (DAC).

IV. Sustainable agriculture and diet

Reducing food waste and shifting towards plant-based diets, which produce fewer emissions than livestock farming.

Date: _____

6. I. Ceramics — an overview

Ceramics are inorganic, non-metallic solid typically formed by heating raw material (like clay and minerals) at high temperatures, a process called firing.

II. Properties of ceramics

(i) High hardness and brittleness:

They are very hard but shatter easily under impact.

(ii) Refractoriness:

Capable of withstanding extremely high temperatures without melting.

(iii) Inertness:

Highly resistant to corrosion, acids, and chemical attacks.

(iv) Insulation:

Generally excellent thermal and electronic insulators.

Date: _____

III. Applications of Ceramics

(i) Structural application

One can make bricks, tiles, and cement for construction purpose.

(ii) Advanced technical qualities

Space shuttles heat shields, dental implants and high performance cutting tools.

(iii) Uses in electronics

Insulators for power lines and capacitors in electronics devices.

c. I. Working of optic fibers and mobile phones

(i) Optic fibers

Optic fibers are thin strands of high quality glass or plastic used to transmit data as pulses of light

Date: _____

over long distances.

(ii) Fundamental principle

They work based on Total internal Reflection (TIR). When light enters the fiber at a specific angle (the critical ~~angle~~angle), it bounces off the boundry between the core and the cladding of escaping

(iii) Key components: Core

The central part core of the fiber through which light travels and it has a highes refractive index.

Cladding

An outer layer that sorrounds the core with a lower refractive index to enable TIR

Coating jacket

Protective layess that sheild the fiber from physical damag and moisteure

Date: _____

Process of Optic fibers

A transmitter convert digital data into light pulses. These pulses travel through the core by repeatedly reflecting off the cladding. At the receiving end, a photodetector converts the light back into electrical signals for the device.

II. Working of mobile phones

A mobile phone functions as a sophisticated two way radio, communicating via a network of cells.

(i) Transmission to base station

Phone transmits these radio waves to the nearest Base Transceiver Station (BTS) or cell towers.

(ii) Switching and routing

The tower sends the signals to a Mobile Switching Center (MSC)

Date: _____

The MSC identifies the recipient's location and routes the call to the appropriate tower in their cell.

(iii) **Reception:**

The destination tower transmits radio waves to the recipient's phone. The recipient's phone receives these waves and converts them back into the original sound or data.

(iv) **Handovers:**

As one move between cells, the system automatically switches one's connection to a tower with a stronger signal without dropping the call.

Date: _____

d. I. Food additives

(i) Definition: Substances intentionally added to food for technical or sensory purposes. such as to improve safety, increase shelf life, or modify taste, texture and appearance. They are not typically consumed as a food by themselves.

(ii) Monosodium Glutamate (MSG)

A flavour enhancer [illegible] intensify savory taste in soups and snacks.

(iii) Lecithin

An emulsifies that prevents ingredients like oil and water from separating in chocolate or dressings.

II. Food preservatives

(i) Definition:

A specific catagory of food additives used to prevent or delay spoilage caused by microorganisms or chemical changes like oxidation. They extend the shelf life and maintain

Date: _____

the safety of the product.

(ii) Sodium Benzoate

Widely used in acidic foods like carbonated drinks, pickles, and sauces to inhibit microbial growth

(iii) Sodium chloride (Salt)

A natural preservative that draws out moisture (osmosis), making it difficult for bacteria to survive in moist foods like beaf jerky.

(iv) Calcium Propionate

Often added to bread and baked goods to prevent the growth of mold.

III. Food adulteration

(i) Definition:

The intentional act of debasing the quality of food by adding inferior or harmful substances, or removing valuable ingredients, typically for economic gain or profit.

Date: _____

(iii) Diluting milk with water:

Adding water to increase the total volume of milk for sale.

(iii) Brick powder in Chili powder:

Mixing crushed red brick brick powder into spices to increase weight and enhance color.

(iv) Metanil Yellow in turmeric:

Using a non-permitted, toxic dye to give turmeric a bright yellow appearance.

IV. Food Contamination

(i) Definition:

The accidental or unintentional presence of unwanted substances in food that make it unsafe for consumption. Contamination can be biological, chemical or physical, and can occur at any stage from farm to fork.

Date: _____

(ii) **Biological:**

Presence of pathogens like Salmonella or E.coli in undercooked poultry or unwashed vegetables

(iii) **Physical:**

Foreign objects such as hair, glass shards, or metal fragments falling into food during processing.

(iv) **Chemical:**

Pesticide residue on fruits that were not properly washed, or cleaning agents accidentally left on food preparation surfaces.

Date: _____

Q6. a. The woman is Ahsan's aunt

(i) Ahsan's brother's only daughter is Ahsan's neice

(ii) This neice is the woman's granddaughter.

(iii) Therefore, the woman must be the mother of Ahsan's parents making her Ahsan's grandmother. However in typical family relationship, if the woman has a ~~grandfather~~ granddaughter who is Ahsan's neice. It is also plausible she is the aunt of Ahsan, and her own daughter (Ahsan's cousin) has a daughter (the neice). The most direct interpretation usually leads to the woman being the grandmother.

b.

Area of the park = 158,600 sq m

Speed = 12 km/hr

= 200 m/min

Time = 8 min

Date: _____

Distance = Speed x time

$= 200\frac{m}{min} \times 8\ min$

Distance = 1600m

Perimeter = 2(length x breadth)

$= 2(3x + 2x) = 10x$

Distance(perimeter) = speed x time

$10x = 1600m$

$x = 160\ m$

Length = $3x = 480\ m$

breadth = $2x = 320\ m$

Area = Length x Breadth

$= 480\ m \times 320\ m$

Area = 153600 m^2

480
x 320
000
960x
1440xx
153600

c. The number is 24

Let the ten's digit be (x) and the unit's digit be (y)

$y = x + 2$

$(x+2) + 10x = 10x + y$

Date: _____

$10x+y = 11x+2$

Sum of digit $= x+y = (x)+x+2$

$= 2x+2$

Product of the number and sum of digits $= (11x+2)(2x+2) = 144$

$22x^2+26x+4 = 144$

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

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

solving the quadratic equation gives

$\boxed{x=2}$

if $x=2$ then $y=2+2=4$

the number is 24

Check:

$24 \times (2+4) = 24 \times 6 = 144$

d. The sum of the number is 40

Let the number be $2x$ and $3x$

L.C.M of $2x$ and $3x = 6x$

Given L.C.M $= 48$

$6x = 48$, $x = 8$

$2x = 2 \times 8$

$= 16$

Date: _____

$3x = 3 \times 8 = 24$

The sum of the numbers is 40

$24 + 16 = 40$

Q7. a. Let the first number $= x$

Let the second number $= y$

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

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

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

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

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

b. Let the costprice of a ball $= x$

Costprice of 17 balls $= 17x$

Selling price (SP) of 17 balls $= 720$

Loss $= 5x$

Loss = Total Costprice − Total SP

$5x = 17x - 720$

$12x = 720$

$\boxed{x = 60}$

Date: _____

c. Let the son's present age be = x

Man's age = x + 24

Son's age = x + 2

Man's age in 2 years = x + 24 + 2 = x + 26

According to the condition

$x + 26 = 2(x + 2)$

$x + 26 = 2x + 4$

$\boxed{x = 22}$

Add given asked solution formula and answer

2.

Rashid's rate = $\frac{32}{6} = \frac{16}{3}$ pages/hr

Kamran's rate = $\frac{40}{5} = 8$ pages/hr

Combined rate

$\frac{16}{3} + 8 = \frac{16 + 24}{3} = \frac{40}{3}$ pages/hr

To find the time for 110 pages

$\text{Time} = \frac{\text{total pages}}{\text{Combined rate}} = \frac{110}{40/3} = \frac{110 \times 3}{40}$

$= \frac{33}{4} = 8.25$ hours