

General Science and Ability

Mock Exam

Q NO: 3

a) Big-Bang Theory and Origin of Universe

Big-Bang Theory

- About 3.8 million years ago, the entire universe existed as a singularity, an extremely small and dense point.
- A sudden massive explosion occurs, causing space, matter, energy, time to form.
- After some time, the universe began to expand and cool down, and matter condenses to form simple particles, then atoms and later our stars and galaxies.

How it explains Origin and Evolution

- Initially subatomic particles are there like electron and quarks.
- Then protons and neutrons formed which then combine to form hydrogen and helium atoms.
- Gravity pulled these atoms together to form stars and galaxies.
- Universe continues to expand which support this theory.

Role of Dark Matter and Dark Energy

Dark Matter (27%)

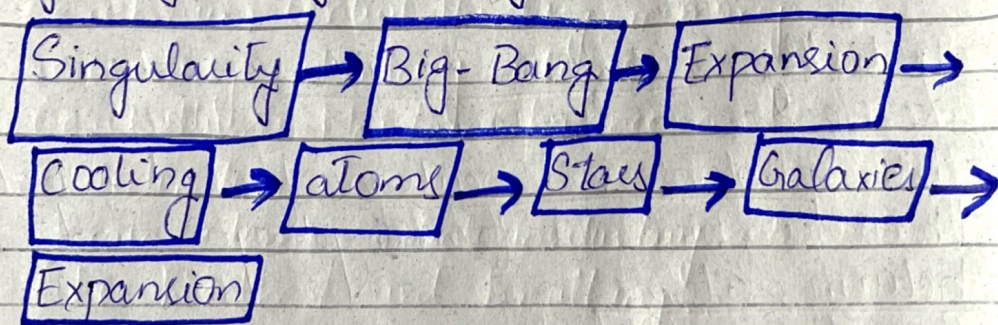
- Invisible matter that does not emit light
- Provides gravitational pull that hold galaxies together

Dark Energy (68%)

- A mysterious force that causes the universe's expansion to accelerate.

Evidence for Big-Bang Theory

- 1- Cosmic Microwave Background (CMB):
Radiations left from the Big-Bang, detected as faint microwaves everywhere in the universe.
- 2- Redshift of Galaxies (Hubble's Law):
Galaxies are moving away from us so that the universe is expanding.
- 3- Abundance of Light elements: H and He elements are most common as predicted by Big-Bang nucleosynthesis.



b) Galaxies and Milky Way

Galaxy: A galaxy is a large system of stars planets, gas and dust held together by gravity.

Classification of Galaxies

1. Elliptical Galaxies: Round or oval shaped, mostly old stars
2. Spiral Galaxies: Flat disc with spiral arms (Milky way type)
3. Irregular Galaxies: No regular shape

Milky Way Structure:

- Our galaxy is spiral shaped -
 - Main parts:
 - Bulge: Dense cluster of stars in the center
 - Disk: Spiral arms where stars and planets (including our solar system) is located.
 - Halo: Outer region with globular clusters and dark-matter.
- Our solar system is located on Orion arm.

Galaxy Formation and Evolution

- Formed from large gas clouds collapsing under gravity.
- Grown by mergers with other galaxies and continuous star formation.

C) Remote Sensing:

Definition: It is a process of collecting data about Earth without physical contact, using sensors, or satellites or air craft.

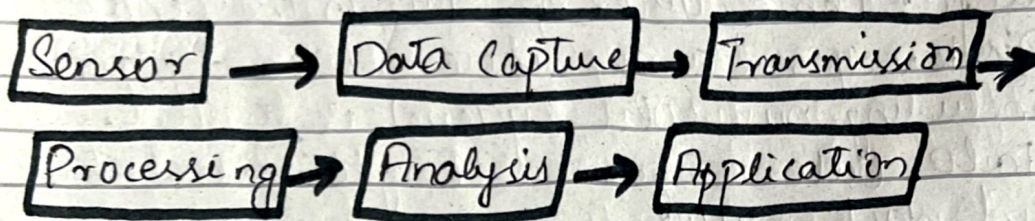
Types of Remote Sensing :-

- 1) Satellite Imaging: Used for weather forecasting, land observation.

2. Aerial Photography: Captures images from planes or drones
3. Radar and LIDAR: Measures elevation, terrain mapping.

Use of Remote Sensing

- 1) Environmental Monitoring: Detects deforestation, melting glaciers and land use changes
- 2) Disaster Management: Help monitor, earthquakes, cyclones, floods and plan relief operations.



d) Main Functions of Brain

- Cerebrum: Control thinking, memory, reasoning, voluntary actions.
- Cerebellum: Maintains balance and co-ordination
- Brain-stem: Controls involuntary actions like heartbeat and breathing.

How Regions Work Together

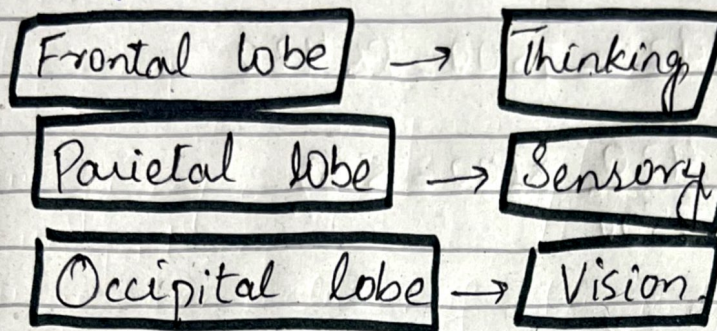
- Brain regions are connected by neurons and neurotransmitters
- Messages are transmitted through the nervous system for co-ordinated action

Factors Affecting Brain

Sleep: Improves memory, mental health

Nutrition: provides glucose and essential nutrients for brain.

Stress: Produces cortisol, which can damage memory or focus.



~~Q NO. 5~~ . (Section II)

Q NO: 5

a) Let the 3 consecutive prime no. be $p_1 < p_2 < p_3$

Their sum is 187

$$p_1 + p_2 + p_3 = 187$$

Try near prime $\frac{187}{3} \approx 62.3$.

Check 59, 61, 67

$59 + 61 + 67 = 187 \rightarrow$ All are prime and consecutive.

Answer: $59 + 61 + 67$

d)

No. of dozen = 20 $\Rightarrow$ eggs = $20 \times 12 = 240$

Cost price per dozen = 375 $\Rightarrow$

Total cost = $20 \times 375 = \text{Rs. } 7,500$

Selling price per egg = Rs. 33

So,

total selling price = $240 \times 33 = \text{Rs. } 7920$

Profit = $7920 - 7500 = \text{Rs. } 420$

Percentage

$$\% \text{ Profit} = \frac{420}{7500} \times 100 = 5.6\%$$

Answer = 5.6%