

THE SEARCH FOR DARK MATTER

SYLLABUS: GS PAPER-III (AWARENESS IN SPACE)

CONTEXT: Astronomical observations suggest that a significant part of the universe is made up of dark matter which interacts with the rest of the universe only through the gravitational pull.

WHAT IS DARK MATTER?

- Dark matter, though never detected, is believed to be present in the entire universe.
- It is presumed that primordial black holes, those that were formed in the early age of the universe, are a source of dark matter. It was proposed by Professor Stephen Hawking.
- It is believed that combined with dark energy, it makes up more than 95% of the universe.
- Its gravitational force prevents stars in our Milky Way from flying apart.
- However, attempts to detect such dark matter particles using underground experiments, or accelerator experiments including the world's largest accelerator, the Large Hadron Collider (LHC), have failed so far.
- Dark matter is made up of **particles that do not have a charge- which means they do not interact through electromagnetic interactions.**
- Dark matter is composed of particles that do not absorb, reflect, or emit light, so they cannot be detected by observing electromagnetic radiation.

DARK MATTER PRESENCE IN THE UNIVERSE

- **Laws of gravity expect us to see stars closer to the center of galaxies rotating faster than the stars on the edge.**
- However, in most galaxies, the stars closer to the center and the stars at the edge of the galaxies take the same time to make one revolution.
- This implied that something invisible and enveloping the galaxies was giving an extra push to the outer stars, speeding them up.
- This entity has remained as one of the unresolved puzzles in cosmology since the 1930s. It was named 'Dark Matter.'
- The material is considered to be a 'matter' since it has gravitational attraction and it is 'dark' because it does not seem to interact with light (or any part of the electromagnetic spectrum).

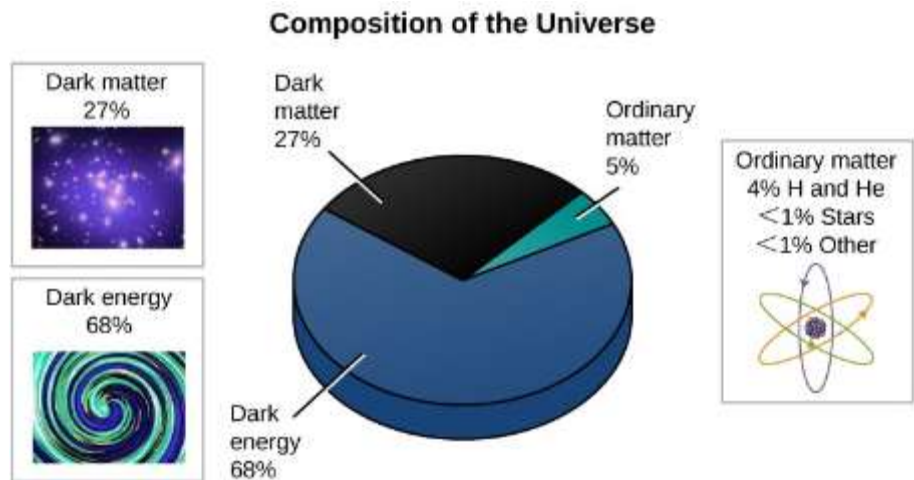
DARK MATTER AND DARK ENERGY

- While dark matter attracts and holds galaxies together, dark energy repels and causes the expansion of our universe.

- Despite both components being invisible, a lot more is known about dark matter, since its existence was suggested as early as the 1920s, while dark energy was not discovered until 1998.

ABOUT DARK ENERGY

- The Big Bang occurred nearly 15 billion years ago and expanded.
- Earlier, astronomers believed that eventually the expansion of the Universe will slow down because of gravity and it will recollapse.



- However, data from the Hubble Telescope suggested that the Universe's expansion is accelerating.
- The astronomers theorize that the faster expansion rate is due to a mysterious, dark force or energy that is pulling galaxies apart.
- The term 'dark' is used to denote the unknown.
- The following diagram reveals changes in the rate of expansion since the universe's birth 15 billion years ago.

NEW GUIDELINES TO CURB UNFAIR TRADE PRACTICES

SYLLABUS: GS PAPER-II (GOVERNMENT POLICIES AND INTERVENTIONS)

CONTEXT: The Central Consumer Protection Authority (CCPA) issued guidelines to prevent unfair trade practices, and to protect the interest of consumers regarding the levy of service charge in hotels and restaurants.

Under the guidelines, consumers can lodge complaints against hotels and restaurants by calling the number 1915.

ABOUT CENTRAL CONSUMER PROTECTION AUTHORITY (CCPA)

- CCPA is a regulatory body established in 2020 based on the provisions of the Consumer Protection Act, 2019.
- CCPA works under the administrative control of the Ministry of Consumer Affairs.

OBJECTIVES OF CCPA

- To promote, protect and enforce the rights of consumers as a class.

- To conduct investigations into violation of consumer rights and institute complaints/prosecution.
- To order the recall of unsafe goods and services, discontinuation of unfair trade practices and misleading advertisements.
- To impose penalties on manufacturers/endorsers/publishers of misleading advertisements.

ABOUT THE GUIDELINES

The CCPA has issued five major guidelines regarding the levy of service charge by restaurants and hotels, which has for long been a contentious issue and has periodically triggered complaints from consumers.

The guidelines say:

- No hotel or restaurant shall add service charge automatically or by default to the bill;
- Service charge shall not be collected from consumers by any other name;
- No hotel or restaurant shall force a consumer to pay service charge and shall clearly inform the consumer that service charge is voluntary, optional, and at the consumer's discretion;
- No restriction on entry or provision of services based on collection of service charge shall be imposed on consumers; and
- Service charge shall not be collected by adding it along with the food bill and levying GST on the total amount.

WHAT CAN BE DONE IN CASE OF VIOLATION OF THE GUIDELINES?

The consumer has four options at various levels of escalation in case she spots the levy of service charge in her bill.

- First, she can make a request to the hotel or restaurant to remove the service charge from her bill.
- Second, she can lodge a complaint on the National Consumer Helpline (NCH), which works as an alternative dispute redressal mechanism at the pre-litigation level. The complaint can be lodged by making a call on the number 1915, or on the NCH mobile app.
- Third, the consumer can complain to the Consumer Commission, or through the edaakhil portal, <http://www.edaakhil.nic.in>.
- Fourth, she can submit a complaint to the District Collector of the concerned district for investigation and subsequent proceedings by the CCPA. A consumer can complain directly to the CCPA by sending an e-mail to com-ccpa@nic.in.

PRELIMS FACTS

NATIONAL INTERNET EXCHANGE OF INDIA (NIXI)

- NIXI has established two new Internet Exchange Points (IXP) in West Bengal under **Digital India Vision**.
- **IXP** is a **physical network access point** through which primary network providers connect their networks and exchange traffic.
- NIXI is a not-for-profit organization (under section 8 of the Companies Act 2013), established in 2003.
- It acts as a **neutral meeting point for the ISPs** (Internet Service Providers) to facilitate the exchange of domestic internet traffic between peering ISP members. It also functions as:
 - a. **In registry** (India's Country Code Top Level Domain)
 - b. **Indian Registry for Internet Names and Numbers**-allocating and registering **Internet Protocol Addresses (IPv4 and IPv6)**.

DIGITAL NOMAD VISA (DNV)

- To deal with economic impacts of Covid-19, **Indonesia has announced DNV for travelers**, to attract more foreign tourists.
- DNV would allow **remote workers to stay tax-free**.
- **Digital Nomads** are people who **work remotely while traveling to various places and spending their earned income in the country they are traveling to**.
- They embrace a **local-independent, technology-enabled lifestyle** that allows them to travel and work remotely, anywhere in the internet-connected world.

POP-FAME

- US scientists have developed a **fuel named POP-FAME from bacteria**.
- POP-FAME (**polycyclopropanated fatty acid methyl ester**) is a new fuel molecule made up of seven sets of cyclopropane rings.
- **Cyclopropane is naturally produced by bacteria in a family called Streptomyces**.
- It has a three-carbon ring with each carbon atom combining with two other elements, mostly hydrogen.
- POP-FAME is found to have **energy density over 50 megajoules** as compared to 32 MJ for petrol and 35 MJ for RP-1 (a kerosene-based rocket fuel), making it an ideal rocket fuel.

KHEJRI TREE

- Proposed installation of solar power plants in Rajasthan has led to a major confrontation with Bishnoi activists, who have strongly protested the felling of Khejri trees.
- **Khejri tree plays a key role in maintaining the ecosystem of Thar region because of its ability to survive in dry weather**.

- It also helps in sustaining the soil's nutrient value and ensuring a good yield of desert crops as well as food plants.
- **Usage:** Source of fodder and firewood. Its fruit is used to make the popular dish 'sangri.'

RED PANDAS

- **Padmaja Naidu Himalayan Zoological Park (West Bengal)** has started a programme to release 20 red pandas in about five years to the forests.
- Red Pandas are shy, solitary, and arboreal (spending life on trees) animals that are considered **an indicator species for ecological change.**
- They feed mainly on bamboo.