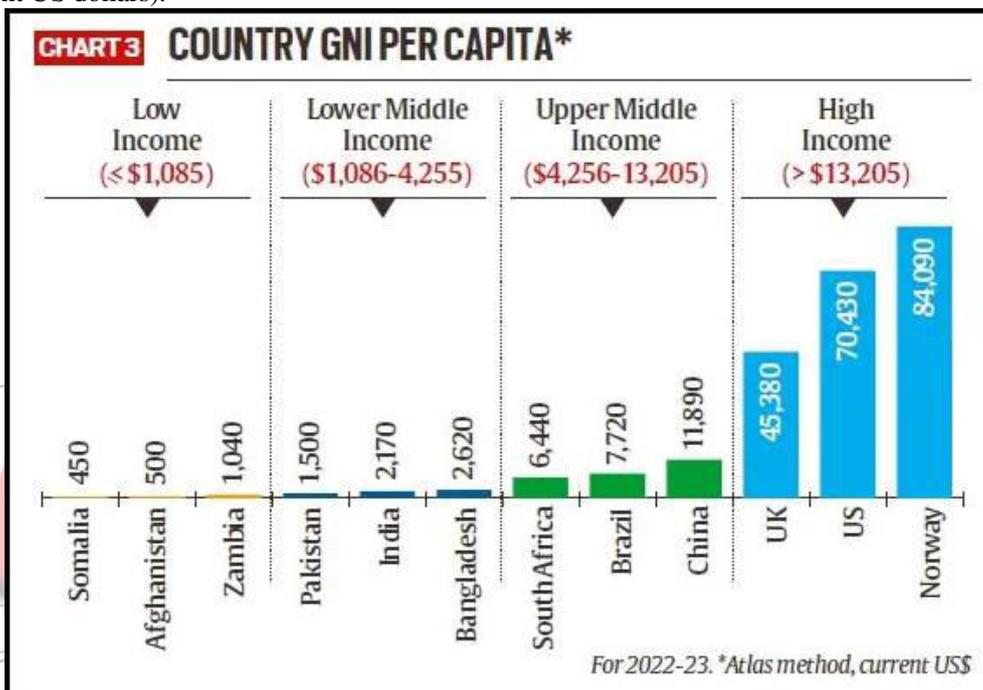
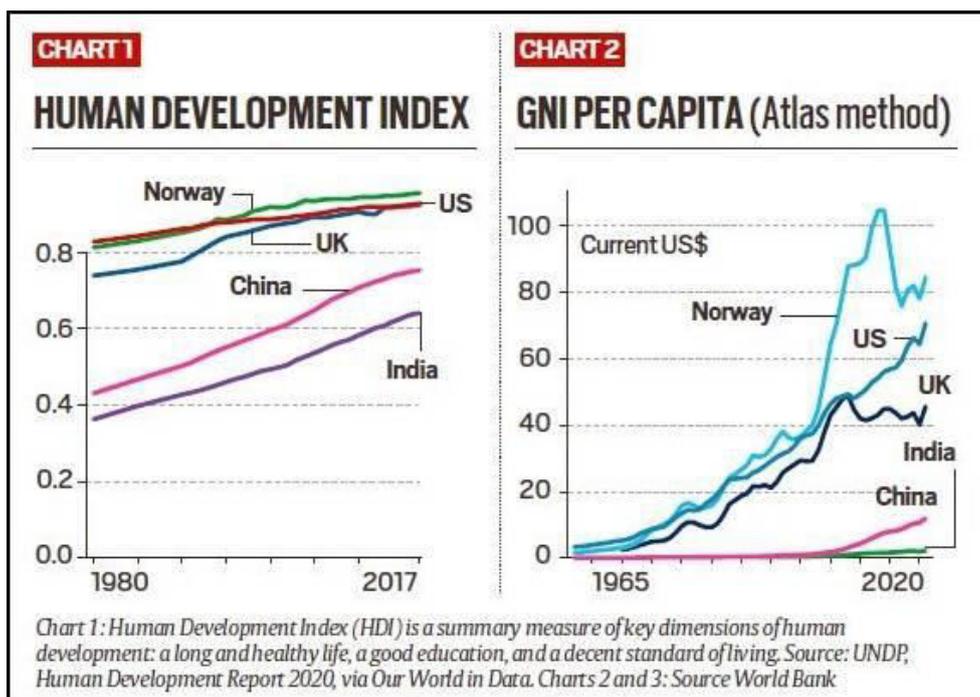


**ECONOMIC DEVELOPEMENT**

- ❖ **India as a ‘developed’ country: where we are, and the challenges ahead**
- ❖ **CONTEXT:** In his Independence Day address, Prime Minister asked Indians to embrace the “Panch Pran” — five vows — by 2047 when the country celebrates 100 years of independence. The first vow, he said, is for India to become a developed country in the next 25 years. It was a “big resolution”.
- ❖ **What is a “developed” country?**
  - Different global bodies and agencies classify countries differently. The ‘World Economic Situation and Prospects’ of the United Nations classifies countries into three broad categories: developed economies, economies in transition, and developing economies. The idea is “to reflect basic economic country conditions”, and the categories “are not strictly aligned with the regional classifications”. So, it isn’t as though all European countries are “developed”, and all Asian ones are “developing”.
  - To categorise countries by economic conditions, the United Nations uses the World Bank’s categorisation (chart 3, with selected countries), based on Gross National Income (GNI) per capita (in current US dollars).



- But the UN’s nomenclature of “developed” and “developing” is being used less and less, and is often contested.
- Former US President Donald Trump had criticised the categorisation of China as a “developing” country, which allowed it to enjoy some benefits in the World Trade Organization. If China is a “developing” country, then the US should also be “made” one.
- ❖ **But why is the United Nations classification contested?**
  - It can be argued that the UN classification is not very accurate and, as such, has limited analytical value. Only the top three — the US, the UK and Norway — fall in the developed country category. There are 31 developed countries according to the UN in all. All the rest — except 17 “economies in transition” — are designated as “developing” countries, even though in terms of proportion, China’s per capita income is closer to Norway’s than Somalia’s. China’s per capita income is 26 times that of Somalia’s while Norway’s is just about seven times that of China’s.
  - Then there are countries — such as Ukraine, with a per capita GNI of \$4,120 (a third of China’s) — that are designated as “economies in transition”.
- ❖ **Where does India stand?**
  - India is currently far behind both the so-called developed countries, as well as some developing countries. Often, the discourse is on the absolute level of GDP (gross domestic product). On that metric, India is one of the biggest economies of the world — even though the US and China remain far ahead.



- However, to be classified as a “developed” country, the average income of a country’s people matters more. And on per capita income, India is behind even Bangladesh. China’s per capita income is 5.5 times that of India, and the UK’s is almost 33 times.
- The disparities in per capita income often show up in the overall quality of life in different countries. A way to map this is to look at the scores of India and other countries on the Human Development Index (HDI), a composite index where the final value is reached by looking at three factors: the health and longevity of citizens, the quality of education they receive, and their standard of life.
- India has made a secular improvement on HDI metrics. For instance, the life expectancy at birth (one of the sub-metrics of HDI) in India has gone from around 40 years in 1947 to around 70 years now. India has also taken giant strides in education enrolment at all three levels — primary, secondary, and tertiary.
- ❖ **What is the distance left to cover?**
- When compared to the developed countries or China, India has a fair distance to cover. A 2018 diagnostic report on India by the World Bank said: “Even though India is the world’s third-largest economy in purchasing power parity (PPP) terms, most Indians are still relatively poor compared to people in other middle income or rich countries. Ten per cent of Indians, at most, have consumption levels above the commonly used threshold of \$10 (PPP) per day expenditures for the global middle class.”
- Also, “Other metrics, such as the food share of consumption, suggest that even rich households in India would have to see a substantial expansion of their total consumption to reach levels of poor households in rich countries.”
- ❖ **How much can India achieve by 2047?**
- One way to make this assessment is to look at how long other countries took to get there. For instance, in per capita income terms, Norway was at India’s current level 56 years ago — in the year 1966.
- Comparing India to China is more useful. China reached that mark in 2007. Theoretically then, if India were to grow as fast as China did between 2007 and 2022, then, broadly speaking, it will take India another 15 years to be where China is now. But then, China’s current per capita income was achieved by the developed countries several decades earlier — the UK in 1987, the US and Norway in 1979.
- India’s current HDI score (0.64) is much lower than what any of the developed countries had even in 1980. China reached the 0.64 level in 2004, and took another 13 year to reach the 0.75 level — that, incidentally, is the level at which the UK was in 1980.
- The World Bank’s 2018 report had made a mention of what India could achieve by 2047.
- “By 2047 — the centenary of its independence — at least half its citizens could join the ranks of the global middle class. By most definitions this will mean that households have access to better education

and health care, clean water, improved sanitation, reliable electricity, a safe environment, affordable housing, and enough discretionary income to spend on leisure pursuits.

- But it also laid out a precondition for this to happen: “Fulfilling these aspirations requires income well above the extreme poverty line, as well as vastly improved public service delivery.” To see this in perspective, note that at the last count, as of 2013, India had 218 million people living in extreme poverty — which made India home to the most number of poor people in the world.

### **ENVIRONMENT**

❖ **What is causing Arctic warming?**

- ❖ **The story so far:** On August 11, Finnish Meteorological Institute researchers published their study in the *Communications Earth & Environment* journal, concluding that the Arctic is heating four times faster than the rest of the planet. The warming is more concentrated in the Eurasian part of the Arctic, where the Barents Sea north of Russia and Norway is warming at an alarming rate — seven times faster than the global average. Other studies in 2021 (the American Geophysical Union) and in 2022 (*Geophysical Research Letters*) indicate that the Arctic amplification is four times the global rate. While earlier studies have proved that the Arctic is warming two or three times faster, recent studies show that the region is fast changing and that the best of climate models may not be able to capture the rate of changes and predict it accurately.

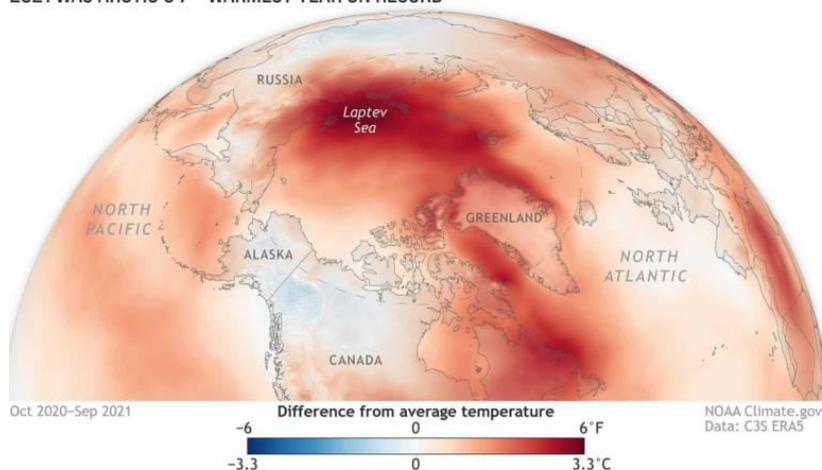
❖ **What is Arctic amplification? What causes it?**

- Global warming, the long-term heating of the earth’s surface, hastened due to anthropogenic forces or human activities since pre-industrial times and has increased the planet’s average temperature by 1.1 degrees Celsius.
- While changes are witnessed across the planet, any change in the surface air temperature and the net radiation balance tend to produce larger changes at the north and south poles. This phenomenon is known as polar amplification; these changes are more pronounced at the northern latitudes and are known as the Arctic amplification.
- Among the many global warming-driven causes for this amplification, the ice-albedo feedback, lapse rate feedback, water vapour feedback and ocean heat transport are the primary causes.
- Sea ice and snow have high albedo (measure of reflectivity of the surface), implying that they are capable of reflecting most of the solar radiation as opposed to water and land. In the Arctic’s case, global warming is resulting in diminishing sea ice. As the sea ice melts, the Arctic Ocean will be more capable of absorbing solar radiation, thereby driving the amplification. The lapse rate or the rate at which the temperature drops with elevation decreases with warming. Studies show that the ice-albedo feedback and the lapse rate feedback are responsible for 40% and 15% of polar amplification respectively.

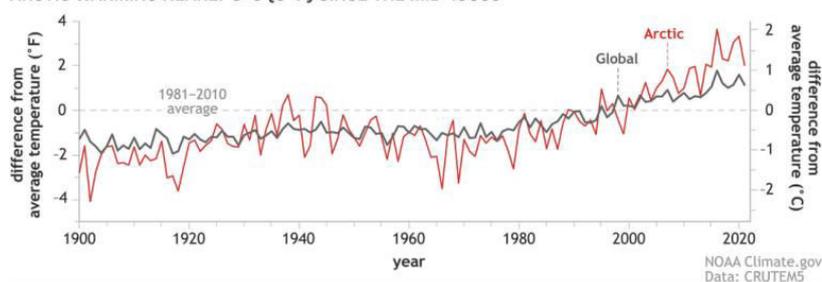
❖ **What do the previous studies say?**

- The extent of Arctic amplification is debated, as studies show various rates of amplification against the global rate.
- Studies have shown that the Arctic was warming at twice the global rate prior to the beginning of the 21st century. With revised figures, the Inter-governmental Panel on Climate Change released a ‘Special Report on the Ocean and Cryosphere in a Changing Climate’ in 2019, which said that the “Arctic surface air temperature has likely increased by more than double the global average over the last two decades.”
- In May 2021, the Arctic Monitoring and Assessment Programme (AMAP) warned that the Arctic has warmed three times quicker than the planet, and the chance of the sea ice completely disappearing in summers is 10 times greater, if the planet is warmer by two degree Celsius above the pre-industrial levels. The report also said that the average annual temperature in the region increased by 3.1 degrees Celsius compared to the 1 degree Celsius for the planet.
- However, recent studies have shown that the mean Arctic amplification saw steep changes in 1986 and 1999, when the ratio reached 4.0, implying four times faster heating than the rest of the planet.

2021 WAS ARCTIC'S 7<sup>th</sup>-WARMEST YEAR ON RECORD



ARCTIC WARMING NEARLY 3°C (5°F) SINCE THE MID-1960s



❖ **What are the consequences of Arctic warming?**

- The causes and consequences of Arctic amplification are cyclical — what might be a cause can be a consequence too.
- The Greenland ice sheet is melting at an alarming rate, and the rate of accumulation of sea ice has been remarkably low since 2000, marked by young and thinner ice replacing the old and thicker ice sheets.
- The Greenland ice sheet saw a sharp spike in the rate and extent of melting between July 15-17 2022. The unusual summer temperatures resulted in a melt of 6 billion tonnes of ice sheet per day, amounting to a total of 18 billion tonnes in a span of three days, enough to cover West Virginia in a foot of water.
- Greenlandic ice sheet holds the second largest amount of ice, after Antarctica, and therefore it is crucial for maintaining the sea level. In 2019, this was the single biggest cause for the rise in the sea level, about 1.5 metres. If the sheet melts completely, the sea level would rise by seven metres, capable of subsuming island countries and major coastal cities.
- The warming of the Arctic Ocean and the seas in the region, the acidification of water, changes in the salinity levels, are impacting the biodiversity, including the marine species and the dependent species. The warming is also increasing the incidence of rainfall which is affecting the availability and accessibility of lichens to the reindeer. The Arctic amplification is causing widespread starvation and death among the Arctic fauna.
- The permafrost in the Arctic is thawing and in turn releasing carbon and methane which are among the major greenhouse gases responsible for global warming.
- The thaw and the melt will also release the long-dormant bacteria and viruses that were trapped in the permafrost and can potentially give rise to diseases. The best-known example of this is the permafrost thaw leading to an anthrax outbreak in Siberia in 2016, where nearly 2,00,000 reindeer succumbed.

❖ **What is the impact on India?**

- In recent years, scientists have pondered over the impact the changing Arctic can have on the monsoons in the subcontinent. The link between the two is growing in importance due to the extreme weather events the country faces, and the heavy reliance on rainfall for water and food security.
- A study titled 'A possible relation between Arctic sea ice and late season Indian Summer Monsoon Rainfall extremes' published in 2021 by a group of Indian and Norwegian scientists found that the

reduced sea ice in the Barents-Kara sea region can lead to extreme rainfall events in the latter half of the monsoons — in September and October.

- The changes in the atmospheric circulation due to diminishing sea ice combined with the warm temperatures in the Arabian Sea contribute to enhanced moisture and drive extreme rainfall events.
- In 2014, India deployed IndARC, India's first moored-underwater observatory in the Kongsfjorden fjord, Svalbard, to monitor the impact of the changes in the Arctic Ocean on the tropical processes such as the monsoons.
- According to the World Meteorological Organization's report, 'State of Global Climate in 2021', sea level along the Indian coast is rising faster than the global average rate. One of the primary reasons for this rise is the melting of sea ice in the Polar Regions, especially the Arctic.
- The Arctic amplification furthers the idea that "what happens in the Arctic does not remain in the Arctic" and can substantially affect tropical processes far south.

### PRELIMS

#### 1. National Action for Mechanised Sanitation Ecosystem (NAMASTE)

- Namaste is a Central Sector Scheme of the Ministry of Social Justice and Empowerment (MoSJE) as a joint initiative of the MoSJE and the Ministry of Housing and Urban Affairs (MoHUA).
- NAMASTE envisages safety and dignity of sanitation workers in urban India by creating an enabling ecosystem that recognizes sanitation workers as one of the key contributors in operations and maintenance of sanitation infrastructure thereby providing sustainable livelihood and enhancing their occupational safety through capacity building and improved access to safety gear and machines.
- Ensure safety and dignity of sanitation workers in urban India and providing sustainable livelihood and enhancing their occupational safety through capacity building and improved access to safety gear and machines.
- NAMASTE would also aim at providing access to alternative livelihoods support and entitlements to reduce the vulnerabilities of sanitation workers and enable them to access self-employment and skilled wage employment opportunities and break the inter generationality in sanitation work.
- In addition, NAMASTE would bring about a behavior change amongst citizens towards sanitation workers and enhance demand for safe sanitation services.
- NAMASTE aims to achieve the following outcomes:
  - Zero fatalities in sanitation work in India
  - All sanitation work is performed by skilled workers
  - No sanitation workers come in direct contact with human faecal matter
  - Sanitation workers are collectivized into SHGs and are empowered to run sanitation enterprises
  - All Sewer and Septic tank sanitation workers (SSWs) have access to alternative livelihoods
  - Strengthened supervisory and monitoring systems at national, state and ULB levels to ensure enforcement and monitoring of safe sanitation work
  - Increased awareness amongst sanitation services seekers (individuals and institutions) to seek services from registered and skilled sanitation workers
- Five hundred cities (converging with AMRUT cities) will be taken up under this phase of NAMASTE. The category of cities that will be eligible are given below:
  - All Cities and Towns with a population of over one lakh with notified Municipalities, including Cantonment Boards (Civilian areas),
  - All Capital Cities/Towns of States/ Union Territories (UTs), not covered in 4(i),
  - Ten Cities from hill states, islands and tourist destinations (not more than one from each State).
- The Scheme has been approved with an outlay of Rs. 360 crore for four years from 2022-23 to 2025-26.

#### 2. STEVE Phenomenon

- ❖ **CONTEXT: The cosmic phenomenon known as "Strong Thermal Emission Velocity Enhancement (STEVE) made a surprise appearance after a huge solar storm hit Earth.**
- ❖ **About**
  - STEVE first appeared in the sky in 2017 and has been appearing often since. There is evidence to support the claim that the phenomenon has been visible in the sky since 1705
  - It is a rare, mysterious, glowing purple arc that runs east to west and occurs closer to the equator.

❖ **How does it occur?**

- The phenomenon is believed to be caused by a 25 km wide ribbon of hot plasma moving at a speed of 6 km/s (compared to 10 m/s outside the ribbon) at an altitude of 450 km
- It has been observed in New Zealand, Canada, Alaska and the United Kingdom during a specific time of the year - between October to February which lead NASA scientists to believe that its occurrence is related to seasons.

❖ **How is it different from Aurora Borealis?**

- Disturbances in the Earth's magnetosphere due to solar wind cause Auroras.
- These disturbances occur because of enhancements in the speed of the solar wind from coronal holes and coronal mass ejections.
- While the skylights, STEVE and the Auroras might seem similar, they are nothing alike.
- To begin with, the STEVE phenomenon is closer to the equator than the Auroras.
- STEVE is different from the usual aurora, but it is made of light and it is driven by the auroral system.

**3. Findings of the Hayabusa-2 probe**

❖ **CONTEXT:** In an article published in the journal Nature Astronomy on Monday (August 15), scientists from Japan suggest that water and organic materials might have been brought to our planet from the outer edges of the solar system. The scientists made the hypothesis after analysing samples from the asteroid Ryugu, collected by the Japan Aerospace Exploration Agency's (JAXA) Hayabusa-2 probe, which had brought 5.4 grams of rocks and dust from the asteroid to Earth in December 2020.

❖ **What was the Hayabusa-2 mission?**

- The Hayabusa-2 mission was launched in December 2014 when the spacecraft was sent on a six-year voyage to study the asteroid Ryugu. According to a report by Deutsche Welle from 2020, the spacecraft, which was approximately the size of a refrigerator, traveled more than 5 billion kilometers during its journey.
- The spacecraft arrived at the asteroid in mid-2018 after which it deployed two rovers and a small lander onto the surface. In 2019, the spacecraft fired an impactor into the asteroid's surface to create an artificial crater with a diameter of a little more than 10 metres, which allowed it to collect the samples.
- In December 2020, Hayabusa-2 delivered a small capsule that contained the rock and dust samples when it was 220,000 km from the Earth's atmosphere, which safely landed in the South Australian outback.
- Hayabusa-2's predecessor, the Hayabusa mission, brought back samples from the asteroid Itokawa in 2010.

❖ **What were the findings of the study?**

- Since the capsule landed on Earth, scientists have been studying the invaluable material — weighing merely a few grams, but approximately 4.6 billion years old — in order to explore the foundations of the solar system. Their analyses of the samples have helped us explore the origins of life on our planet.
- In June, a group of scientists found that the materials contained amino acids, and suggested that these building blocks of life might have formed in space.
- The current study published recently, states that “Volatile and organic-rich C-type asteroids may have been one of the main sources of Earth's water,” which is essential for the emergence of life. While the delivery of volatiles (water and organics) to Earth has been a subject of debate amongst scientists, the materials found in the “Ryugu particles, identified in this study, probably represent one important source of volatiles.”
- The study claimed that the organic material collected probably originated from the fringes of the Solar System, but was “unlikely to be the only source of volatiles delivered to the early Earth”.
- While the composition of particles collected from Ryugu closely matches water on Earth, the study notes there were slight differences, leading scientists to hypothesise that our planet's water might have also originated from places other than asteroids.

**❖ What is an asteroid?**

- Asteroids are rocky objects that orbit the Sun, much smaller than planets. They are also called minor planets. According to NASA, there are 994,383 known asteroids, the remnants from the formation of the solar system over 4.6 billion years ago.
- Asteroids are divided into three classes. First are those found in the main asteroid belt between Mars and Jupiter, which is estimated to contain somewhere between 1.1-1.9 million asteroids.
- The second group is that of trojans, which are asteroids that share an orbit with a larger planet. NASA reports the presence of Jupiter, Neptune and Mars trojans. In 2011, they reported an Earth trojan as well.
- The third classification is Near-Earth Asteroids (NEA), which have orbits that pass close to the Earth. Those that cross the Earth's orbit are called Earth-crossers. More than 10,000 such asteroids are known, out of which over 1,400 are classified as potentially hazardous asteroids (PHAs).
- Ryugu is also classified as a PHA and was discovered in 1999 and was given the name by the Minor Planet Center in 2015. It is 300 million kilometres from Earth and it took Hayabusa-2 over 42 months to reach it.

**❖ Why do scientists study asteroids?**

- Since asteroids are one of the oldest celestial bodies in the Solar System, scientists study them to look for information about the formation and history of planets and the sun.
- Another reason for tracking them is to look for asteroids that could possibly crash into Earth, leading to potentially hazardous consequences.
- NASA's OSIRIS-REX mission had collected samples from the asteroid Bennu in October 2020, which will be brought to Earth in 2023. Scientists are interested in studying asteroids such as Bennu, because it hasn't undergone drastic changes since its formation over billions of years ago and therefore it contains chemicals and rocks dating back to the birth of the solar system. It is also relatively close to the Earth.

**ANSWER WRITING**

**Q. "The Comptroller and Auditor General (CAG) has a very vital role to play." Explain how this is reflected in the method and terms of his appointment as well as the range of powers he can exercise. (2018)**

CAG acts as the guardian of public purse and controls the entire gamut of financial administration. Article 148 envisages the post of CAG with a tenure of six years. He is appointed by President and can be removed on the grounds of proved misbehavior or incapacity - on the basis of a resolution passed by a special majority by both the houses of parliament.

Moreover, CAG's salary and allowances are charged upon Consolidated Fund of India, ensuring immunity from Vote of Parliament. Thus, there are strong inbuilt safeguards available to ensure autonomy for the CAG to effectively discharge its role.

**Role of CAG**

- Conducts legal, regulatory and propriety audit.
- Audits expenditure from Contingency Fund, Public Account, Consolidated Fund of India and the states.
- Submits audit reports to President and Governor for legislative scrutiny.
- Audits the receipts and expenditure of Government companies and entities substantially financed from the Central or State revenues.
- Acts as a guide to Public Accounts Committee of Parliament ensuring transparency in financial administration.
- Its role as the highest auditing authority is intrinsically linked to the efficacy of government policies by keeping a watch on financial aspect of Good Governance, thereby preserving the democratic ethos.

**MCQs**

1. NAMASTE scheme recently seen in news is associated with which of the followings?
  - a) Self Help Groups
  - b) Daily wage laborers in unorganized sector
  - c) **Sanitation workers**
  - d) Beggars
2. OSIRIS-REX mission is associated with which of the following?
  - a) Sun

- b) Mars  
c) **Near Earth Asteroid**  
d) Exoplanetary mission
3. Asteroid Bennu often mentioned in news belongs to which of the following?  
a) **Near Earth Asteroid**  
b) Main asteroid belt between Mars and Jupiter  
c) Mars Trojans  
d) Neptune Trojans
4. Consider the following statements  
1. Iodic acid ( $\text{HIO}_3$ ) can act as a driver of aerosol particle formation in the Arctic which is responsible for Arctic Amplification.  
2. The thaw and the melt which is caused by Arctic Amplification can potentially give rise to diseases.  
Choose the correct statement/s using the codes given below  
a) 1 only  
b) 2 only  
c) **Both 1 and 2**  
d) Neither 1 nor 2
5. Hayabusa 2 mission is associated with which of the following?  
a) **Asteroid Ryugu**  
b) Asteroid Bennu  
c) Asteroid Itokawa  
d) Both a and c
6. STEVE phenomena often mentioned in news can be associated with which of the following?  
a) Orographic rain  
b) Bioluminescence  
c) Upper atmospheric wind circulation  
d) **Atmospheric optical phenomenon**
7. Terms like 'Tilapia' and 'Hermon' often mentioned in news can be related to which of the following?  
a) Reptiles  
b) **Food fish**  
c) Ornamental tree  
d) Invasive vine species
8. Consider the following statements with reference to recent data on pollution of global cities  
1.  $\text{NO}_2$  has a shorter lifetime compared with  $\text{PM}_{2.5}$   
2. Delhi and Kolkata were ranked first and second in the list of top 10 most polluted cities when  $\text{PM}_{2.5}$  levels were compared  
3. No Indian city appeared in the list of top 20 polluted cities when  $\text{NO}_2$  levels were compared  
Choose the correct statement using the codes given below  
a) 1 only  
b) 2 and 3 only  
c) 1 and 2 only  
d) **All of the above**
9. Vostok (East) 2022 exercises will NOT see the participation of which of the following countries?  
a) India  
b) Mongolia  
c) **USA**  
d) China
10. Israel does not share border with which of the following?  
a) Mediterranean Sea  
b) Dead Sea  
c) **Baltic Sea**  
d) All of the above