

ECONOMY

Semiconductor Shortage

Recently, there has been an abrupt and cascading shortage of semiconductors worldwide.

Key Points

About Semiconductors:

- Semiconductors are materials which have a conductivity between conductors (generally metals) and nonconductors or insulators (such as most ceramics). Semiconductors can be pure elements, such as silicon or germanium, or compounds such as gallium arsenide or cadmium selenide. Conductivity is the measure of the ease at which an electric charge or heat can pass through a material.
- They are also known as integrated circuits or more commonly just chips, they may be the tiniest yet most exacting product ever manufactured on a global scale.
- It's an electric circuit with many components such as transistors and wiring formed on a semiconductor wafer. An electronic device comprising numerous of these components is called Integrated Circuit (IC), and can be found in electronic devices such as computers, smartphones, appliances, gaming hardware and medical equipment. These devices find widespread use in almost all industries, especially in the automobile industry.
- Electronic parts and components today account for 40% of the cost of a new internal combustion engine car, up from less than 20% two decades ago. Semiconductor Chips account for a bulk of this increase.

Reasons for the Shortage:

- **Work from Home due to Covid:** Lockdowns increased the growth in sales of laptops to the highest in a decade. Home networking gear, webcams and monitors were snapped up as office work moved out of the office, and laptops were in demand for a while as schools shut.
- **False Forecasts:** Automakers that cut back drastically early in the pandemic underestimated how quickly car sales would rebound. They rushed to re-up orders late in 2020, only to get turned away because chipmakers were stretched supplying computing and smartphone giants.
- **Stockpiling:** Computer makers began warning about tight supplies early in 2020. Then around the middle of that year, Huawei Technologies Co. — the Chinese smartphone maker that also dominates the global market for 5G networking gear — began building up inventory to ensure it could survive US sanctions that were set to cut it off from its primary suppliers. Other companies followed suit, hoping to grab share from Huawei, and China's chip imports climbed to almost USD 380 billion in 2020, up from about USD 330 billion the previous year.
- **Disasters:** Production plants in the US were affected by the cold and in Japan by wildfire.
- **Difficult Production:** Manufacturing advanced logic chips requires extraordinary precision, along with huge long-term bets in a field subject to rapid change. Plants cost billions of dollars to build and equip, and they have to run flat-out 24/7 to recoup the investment.

Impact:

- Countless industries have been affected as global demand for semiconductor chips continues to outstrip supply.
- Chip shortages are expected to wipe out USD 210 billion of sales for carmakers this year, with production of 7.7 million vehicles lost.
- The semiconductor shortage will severely disrupt the supply chain and will constrain the production of many electronic equipment types.
- The chip shortage directly impacts consumers as prices of everyday appliances and electronic goods — from TV to smartphones — have increased due to the global supply chain disruption.

Way Forward

- Emerging technologies, especially, Internet of Things, artificial intelligence, augmented and extended reality and blockchain are gaining prominence across industries. With these applications gaining traction across sectors, the need for specialised sensors, integrated circuits, improved memory, and enhanced processors is increasing.
- India is finalising plans to manufacture semiconductor chips in a big way, as a part of its 'Make in India' initiative. The nation is offering more than USD 1 billion in cash to each semiconductor company that sets up manufacturing units in the country.
 1. Chips made locally will be designated as "trusted sources" and can be used in products ranging from CCTV cameras to 5G equipment.
 2. In December 2021, India invited an "expression of interest" from chipmakers for setting up fabrication units in the country or for the acquisition of such manufacturing units.

- This is all being done to achieve self-sufficiency in the manufacturing of semiconductors, to ensure better control over data security and prevent countries in the world from being held to ransom by specific members of the existing semiconductor supply chain.
- It is clear that semiconductors are changing the game in our modern, fast-moving world. Therefore India should give semiconductors the status of "critical infrastructure" in most countries, in the near future.

INTERNATIONAL RELATION

Prohibition of Attacks against Nuclear Installations and Facilities: India-Pakistan

Recently, India and Pakistan have exchanged a list of their nuclear installations. The exchange was in accordance with the Article-II of Agreement on Prohibition of Attacks against Nuclear Installations and Facilities between Pakistan and India.

The two countries also exchanged lists of prisoners held in each other's prisons under the provisions of the Agreement on Consular Access signed in May 2008. Under this pact, the two countries should exchange comprehensive lists on 1st January and 1st July every year.

Key Points

Prohibition of Attacks against Nuclear Installations and Facilities:

- **About:**
 1. According to this agreement, both countries have to inform each other of the nuclear facilities.
 2. The agreement was signed in 1988 and ratified in 1991.
 3. This was the 31st consecutive exchange of the list between the two neighboring countries.
- **Coverage:**
 1. Nuclear power and research reactors, fuel fabrication, uranium enrichment, isotopes separation and reprocessing facilities, as well as any other installations with fresh or irradiated nuclear fuel and materials in any form and establishments storing significant quantities of radioactive materials, are all included under the umbrella term "nuclear installations and facilities".

Significance of the Agreement:

- The need for the agreement had been felt against the backdrop of Israel's 1981 bombing of Iraq's Osirak reactor near Baghdad. The strike, carried out by Israeli fighter jets over hostile airspace, had set Iraq's nuclear weapons programme significantly.
- The agreement had also come at a time of deep anxiety for Pakistan. Islamabad had been rattled by the memory of the 1972 defeat which dismembered the country, and military developments in India, such as Operation Brasstacks in 1987, which was a wargame exercise to prepare for deep strike offensive capabilities. Pakistan had at the time responded by putting its nuclear installations and assets on 'high alert'.

Current Issues in India-Pakistan Relations

Cross Border Terrorism:

- Terrorism emanating from territories under Pakistan's control remains a core concern in bilateral relations.
- India has consistently stressed the need for Pakistan to take credible, irreversible and verifiable action to end cross border terrorism against India.

Indus Water Treaty:

- Every now and then, there is an uproar in India for abrogating the Indus Water Treaty as a response to Pakistan's cross-border terrorism and tenacity.
- It is a treaty brokered by the World Bank, which administers how the waters of the Indus and its tributaries that flow in both the countries will be utilised.

Siachen Glacier:

- Siachen is regarded as the world's highest, deadliest and costliest battlefield.
- Decades of military operations have damaged the glacier and the surrounding environment.
- But due to the complex nature of Indo-Pak relations and the distrust between the two countries, there has been no decision on the matter yet.

Sir Creek:

- It is a 96 km long strip of water disputed between India and Pakistan in the Rann of Kutch marshlands.
- The dispute lies in the interpretation of the maritime boundary line between Kutch and Sindh.
- Pakistan claims the line to follow the eastern shore of the estuary while India claims a centerline (differing interpretations of paragraphs 9 and 10 of the Bombay Government Resolution of 1914 signed between the then Government of Sindh and Rao Maharaj of Kutch).

Reorganization of Jammu & Kashmir:

- It also created a crisis in Kashmir-centric Pakistan as at one go, the large territory of Ladakh was disassociated from the Kashmir dispute. Pakistan's frustration showed in its desperate attempts to push terrorism and failed effort to gather international support against this move by India.

Way Forward

- The two countries agreed to the strict observance of all agreements, understandings and ceasefire along the LoC (Line of Control) and all other sectors with effect in February 2021.
- But unless there is a mutual desire, political will and the two sides must have courage to take decisive difficult decisions, there is no hope for the countries future engagement.
- Pakistan's never ending struggle to prove itself equal to or better than India has never let the relations get normal between the two countries.
- The lack of true democracy and the successive toothless civilian governments have proved that bilateral engagement with the civilian government would be rendered fruitless by the machinations of the Pak military.

2.China's New Border Law

China's new law on land borders came into effect from 1st January, 2022. It comes at a time when border standoff in eastern Ladakh remains unresolved and several places in Arunachal Pradesh have been renamed recently by China as part of its claim on the Indian state.

Key Points

About:

- 1. Delimitation and Survey of Land Borders:** The new law lays down that the People's Republic of China (PRC) shall set up boundary markers on all its land borders to clearly mark the border.
- 2. Management and Defence of Border Areas:**
 - The People's Liberation Army (PLA) and Chinese People's Armed Police Force are assigned with the responsibility of maintaining security along the border.
 - ✓ This responsibility includes cooperating with local authorities in combating illegal border crossings.
 - ✓ The law prohibits any party from indulging in any activity in the border area which would "endanger national security or affect China's friendly relations with neighbouring countries".
 - ✓ Even citizens and local organisations are mandated to protect and defend the border infrastructure.
 - ✓ Finally, the law provides for the border to be sealed in the event of a war, armed conflict, incidents which threaten the security of border residents such as biological and chemical accidents, natural disasters, and public health incidents.
- 3. International Cooperation:**
 - On the topic of its border-sharing countries, the law lays down that the relations with these countries is to be based on principles of "equality and mutual benefit".
 - Further, the law provides for provisions for formation of joint committees, both civil and military, with the said countries to negotiate land border management and resolve border-related issues.
 - The law also stipulates that PRC should abide by the treaties on land borders that it has signed with the respective countries and all border issues are to be settled through negotiations.

Concerns:

- **Formalise the Chinese Military's Transgressions:** The broader aim of the land border law is to give legal cover and formalise the Chinese military's transgressions across the LAC (Line of Actual Control) in 2020.
- **Fresh Impetus to Civilian Agencies:**
 1. The law calls for increased settlement of the civilian population and improved infrastructure along the border area. China has previously used the strategy of moving its "civil" population along the contested part of the LAC on the basis of which it claims rightful ownership.
 2. The new law might increase such instances and create further problems between the two countries.
- **Limiting the Water Flow:**
 1. There is also the possibility of limiting the water flow in the Brahmaputra or Yarlung Zangbo river which flows from China into India as the law calls for "measures to protect the stability of cross-border rivers and lakes".
 2. China might cite this provision in case of hydropower projects which may cause ecological disaster in India and call it a lawful action on its part.

China's Border Disputes:

- China has a 22,100-kilometer land border with 14 countries.
- It has resolved the boundary disputes with 12 neighbours.
- India and Bhutan are the two countries with which China is yet to finalise the border agreements.
- China and Bhutan signed an MOU firming up a three-step roadmap for expediting the boundary negotiations.
- India-China border disputes cover 3,488-km along the Line of Actual Control, China-Bhutan dispute covers about 400 km.



Way Forward

The naming of 15 places in Arunachal Pradesh as its own territory by China came as India and China remain engaged at both diplomatic and military levels to complete the stalled disengagement process along the LAC.

Restoring relations, as well as the status quo along the borders, will require mutual sensitivity and an adherence to past agreements that helped keep the peace, rather than needless provocations that expand an already long list of differences.

SCIENCE & TECHNOLOGY

Solid-State Batteries

Car manufacturer Volkswagen plans to have production running for solid-state batteries by 2025 via the partnership with QuantumScape. QuantumScape's solid-state battery — lithium metal with a solid electrolyte separating the two electrodes — is seen as an exceptionally bright prospect in an increasingly crowded space.

Key Points

About:

- A solid-state battery has higher energy density than a Lithium-ion battery that uses liquid electrolyte solution. It doesn't have a risk of explosion or fire, so there is no need to have components for safety, thus saving more space. Then we have more space to put more active materials which increase battery capacity in the battery.
- A solid-state battery can increase energy density per unit area since only a small number of batteries are needed. For that reason, a solid-state battery is perfect to make an Electric Vehicle (EV) battery system of module and pack, which needs high capacity.
- The energy density of lithium-ion cells used in today's mobile phones and electric vehicles is nearly four times higher than that of older-generation nickel-cadmium batteries.
- Despite improvements in technology over the last decade, issues such as long charging times and weak energy density persist. While lithium-ion batteries are seen as sufficiently efficient for phones and laptops, they still lack the range that would make EVs a viable alternative to internal combustion engines.

Lithium-ion Batteries

- **About:**

1. It uses an intercalated (Intercalation is the reversible inclusion or insertion of a molecule into materials with layered structures) lithium compound as one electrode material, compared to the metallic lithium used in a non-rechargeable lithium battery.
2. The battery consists of electrolyte, which allows for ionic movement, and the two electrodes are the constituent components of a lithium-ion battery cell.
3. Lithium ions move from the negative electrode to the positive electrode during discharge and back when charging.
- **Lithium-ion Battery Applications:**
 1. Electronic gadgets, Tele-communication, Aerospace, Industrial applications.
 2. Lithium-ion battery technology has made it the favourite power source for electric and hybrid electric vehicles.
- **Disadvantages of Li-ion Batteries:**
 1. Long charging times.
 2. One major problem is that lithium metal is extremely reactive. Safety issues as instances of batteries catching fires have been there.
 3. Expensive to manufacture.
 4. While the Li-ion batteries are seen as sufficiently efficient for applications such as phones and laptops, in case of EVs, these cells still lack the range that would make them a viable alternative to internal combustion engines.
- **Advantages Over Li-ion:**
 1. **Higher Cell Energy Density:** The advantages of the solid-state battery technology include higher cell energy density (by eliminating the carbon anode), lower charge time (by eliminating the need to have lithium diffuse into the carbon particles in conventional lithium-ion cells), ability to undertake more charging cycles and thereby a longer life, and improved safety.
 2. **Cost Effective:** Lower cost could be a game-changer, given that at 30% of the total cost, battery expenses are a key driver of the vehicle costs. QuantumScape claims it is targeting to lower battery cost by 15-20% relative to the cost of lithium-ion batteries in several years.

Other Potential Alternatives to Solid-state Batteries:

- **Graphene Batteries:** Graphene batteries may be an important alternative to lithium-ion batteries, with the latter having limitations due to the frequency with which lithium requires charging. Graphene is a newly stabilised and isolated material.
- **Fluoride Batteries:** Fluoride Batteries have the potential to last eight times longer than lithium batteries.
- **Sand Battery:** This alternative type of lithium-ion battery uses silicon to achieve three times better performance than current graphite Li-ion batteries. The battery is still lithium-ion like the one found in a smartphone, but it uses silicon instead of graphite in the anodes.
- **Ammonia-powered Batteries:** Ammonia-powered batteries may not be coming any time soon, but the chemical commonly known as a household cleaner is still an alternative to lithium in the way it can power fuel cells in vehicles and other equipment. If scientists can figure out a way to produce ammonia without creating the greenhouse gas emissions that result right now, they can ship it anywhere in the world to be converted into hydrogen to power those fuel cells.
- **Lithium-Sulphur Batteries:** Researchers in Australia say they have developed the world's most powerful rechargeable battery using lithium-sulphur, said to perform four times better than the strongest batteries currently available.
- **Vertically Aligned Carbon Nanotube Electrode:** These are good candidates for lithium-ion battery electrodes which require high rate capability and capacity.

PRELIMS FACT

Jal Jivan Mission

Recently, the Ministry of Jal Shakti has approved Drinking Water Supply schemes of Rs. 15,381.72 Crore for Madhya Pradesh under Jal Jeevan Mission (JJM). JJM aims to ensure assured tap water supply or 'Har Ghar Jal' to all rural households by 2024.

Key Points

About:

- Launched in 2019, it envisages supply of 55 litres of water per person per day to every rural household through Functional Household Tap Connections (FHTC) by 2024.
- JJM looks to create a jan andolan for water, thereby making it everyone's priority.
- It comes under Jal Shakti Ministry.

Aims:

- The mission ensures functionality of existing water supply systems and water connections, water quality monitoring and testing as well as sustainable agriculture.
- It also ensures conjunctive use of conserved water; drinking water source augmentation, drinking water supply system, grey water treatment and its reuse.

Features:

- JJM focuses on integrated demand and supply-side management of water at the local level.
- Creation of local infrastructure for source sustainability measures as mandatory elements, like rainwater harvesting, groundwater recharge and management of household wastewater for reuse, is undertaken in convergence with other government programmes/schemes.
- The Mission is based on a community approach to water and includes extensive Information, Education and Communication as a key component of the mission.

Implementation:

- Paani Samitis plan, implement, manage, operate and maintain village water supply systems. These consist of 10-15 members, with at least 50% women members and other members from Self-Help Groups, Accredited Social and Health Workers, Anganwadi teachers, etc.
- The committees prepare a one-time village action plan, merging all available village resources. The plan is approved in a Gram Sabha before implementation.

Funding Pattern:

- The fund sharing pattern between the Centre and states is 90:10 for Himalayan and North-Eastern States, 50:50 for other states, and 100% for Union Territories.

Progress So Far:

- When the mission was launched, only 17% (32.3 million) of the country's rural households had a tap water supply.
- Today, 7.80 Crore (41.14%) households have tap water supply. Goa, Telangana, Andaman & Nicobar Islands and Puducherry have achieved 100% household connection in rural areas and have become 'Har Ghar Jal'. To complement the Jal Jeevan Mission (Rural), Jal Jeevan Mission (Urban) was announced in the Budget 2021-22.

2. Padhe Bharat Campaign

Recently, the Ministry of Education has launched a 100 days reading campaign 'Padhe Bharat' (1st January to 10th April 2022). 21st February, which is celebrated as International Mother Tongue Day, has also been integrated with this campaign in a view to promote the local language and culture of our society.

Key Points

About:

- The Campaign is in alignment with the National Education Policy (NEP) 2020, which emphasises on promotion of joyful reading culture for children by ensuring availability of age appropriate reading books for children in local/mother tongue/regional/tribal Language.
 1. The NEP 2020 aims at making "India a global knowledge superpower".
 2. The NEP is only the third major revamp of the framework of education in India since independence. The two earlier education policies were brought in 1968 and 1986.
- It will focus on children studying in Balvatika to Grade 8.
- This campaign has also been aligned with the vision and goals of the Foundational Literacy and Numeracy Mission.
- It aims to have the participation of all stakeholders at the national and state level including children, teachers, parents, community, educational administrators etc.

International Mother Tongue Day:

- UNESCO declared 21st February as International Mother Language Day in 1999 and the World has been celebrating the same since 2000. The day also commemorates a long struggle by Bangladesh to protect its mother language Bangla.
- The resolution to mark 21st February as the International Mother Language Day was suggested by Rafiqul Islam, a Bangladeshi living in Canada. He proposed the said date to commemorate the 1952 killings in Dhaka during the Bangla Language Movement.
- The initiative is aimed at preserving and promoting mother languages. The aim is to protect the diverse culture and intellectual heritage of different regions of the world.

DAILY ANSWER WRITING PRACTICE

Qns. Online Dispute resolution (ODR) is a promising Alternative Dispute Resolution mechanism and promotes innovate ways to address legal disputes. Analyse. (250 words)

Ans:

Introduction

Alternative Dispute Resolution has become an integral part of the justice system in the current times since it involves rapid settlements and results in outcomes that are often favorable to both parties. Online dispute resolution is a further extension of the same, and the only differentiation is that it involves the utilization or assistance of technology to resolve the disputes.

Retired justice AK Sikri-led committee on the action plan for online dispute resolution, set up by the NITI Aayog, has suggested in its report that the government builds up requisite infrastructure and sufficiently enhances capacity if it intends to mainstream ODR and make it broad-based in India.

Body**Advantages of online dispute resolution to the Indian judiciary:**

- The key advantages of establishment of Electronic Courts in India is bringing in a justice serving mechanism that is transparent, efficient, affordable, time saving, protects the interests of witnesses, reduces the backlog of pending cases and most importantly reduces the number of unscrupulous activities.
- Entire information related to a particular case would be available online. It would be available to the attorneys, parties and the general public through the help of internet.
- Registered attorneys can file their case document directly from their home or office. They do not have to worry about postage, traffic congestion or messenger services. They can create a docket sheet and update it immediately, when the documents are filed.
- With the help of internet, the documents of a case can be accessed easily from anywhere at anytime.
- E-courts would help in the computerization of work flow management in courts. Thus, it would help to create a better court and case management. Video conferencing facilities would be installed in every court complex. Evidence of eyewitness, who are unable to attend the court can be recorded through this method.
- The information would not be misplaced as all the information regarding the case would be carefully recorded and stored. Data keeping would include maintaining the records of e-file minute entries, bail orders, warrants etc.
- In many cases, the witnesses are not able to come to the court and make their statement as the other party is too strong and scares them of the consequences. e-Courts can help in dealing with such cases.

Limitations of online dispute resolution in judiciary:

- E-courts in India is an endless and complicating process. The process of e-filing a document is a difficult process. All the evidence cannot be produced in a digital format.
- Lack of techno legal expertise is the main reason for the poor status of e-courts in India. With the absence of techno legal expertise, electronic courts cannot be established in India. The country requires more techno legal e-court centers so that the project of e-court can achieve success.
- The project of e-court involves a lot of expenditure. It involves the use of a lot of computers and infrastructures. In the long run, e-courts may face the issue of lack of funds.
- Hackers are getting stronger with every passing day. The possibility of e-Courts getting hacked in such a case cannot be denied.

Measures needed:

- It is critical to draw up a well-defined and pre-decided framework as it can help in laying a concrete roadmap and direction to the e-courts scheme of India.
- To achieve this, the government must establish an effective task force consisting of judges, technologists, court administrators, skill developers and system analysts to draw up a blueprint for institutionalizing online access to justice.
- Such a task force must be charged with the responsibility of establishing hardware, software and IT systems for courts; examining application of artificial intelligence benefiting from the data base generated through e-courts projects; establishing appropriate e-filing systems and procedures.
- Creating skill training and recognition for paralegals to understand and to help advocates and others to access the system to file their cases and add to their pleadings and documents as the case moves along.
- Once the blueprint is ready, the High Courts across the country may refer the same to the Rule Committee of the High Court to frame appropriate rules to operationalise the e-court system.
- One aspect that needs to be focused on is the deployment of a robust security system that provides secure access to case information for appropriate parties. The security of e-courts infrastructure and system is of paramount importance.

- Also, user friendly e-courts mechanism, which is simple and easily accessible by the common public will encourage litigants to use such facilities in India.
- The government must also make dedicated efforts in the training of personnel to maintain all the e-data.
- Also, conducting training sessions to familiarize the Judges with the e-courts framework and procedure can give a huge impetus to the successful running of e-courts.

Way forward

- An important balance has to be struck between protecting the rights and interests of its users while ensuring that over-regulation does not stifle innovation.
- The need of the hour is to strengthen the existing legislative framework for ADR and introduce ODR-related amendments.
- This can take the form of an umbrella legislation for mediation, introduction of a data protection law, digitisation of legal processes like notarisation, and requiring mandatory pre-litigation mediation for pre-determined classes of cases.
- Introducing guidelines or principles that, though presently voluntary, should be adopted in letter and spirit by ODR service providers.
- The policy plan recommends that these service providers, which include technology platforms, ODR service centres and neutrals adopt design and ethical principles.
- To ensure that capacity considerations are adequately met, ODR should be rolled out in a phased manner with lessons from each of these phases informing future steps.

Conclusion

Government should take targeted initiatives like setting up legal tech hubs and tax incentives for the private sector to enable faster adoption of ODR. ODR exists at the cusp of these developments and is set to re-structure dispute resolution not just in India but in other nations that are looking at India for inspiration.

DAILY QUIZ

Q1. Consider the following statements about International Monetary Fund (IMF):

1. It was originally created in 1945 as part of the Bretton Woods agreement.
2. It promotes international financial stability and monetary cooperation.

Which of the statements given above is/are correct?

- a. 1 only
- b. 2 only
- c. Both 1 and 2
- d. Neither 1 nor 2

Q2. The State of the World's Land and Water Resources for Food and Agriculture is a flagship publication of which of the following?

- a. WEF
- b. IUCN
- c. WWF
- d. FAO

Q3. The term 'Intended Nationally Determined Contributions' is sometimes seen in the news in the context of

- a. pledges made by the European countries to rehabilitate refugees from the war-affected Middle East
- b. **plan of action outlined by the countries of the world to combat climate change**
- c. capital contributed by the member countries in the establishment of Asian Infrastructure Investment Bank
- d. plan of action outlined by the countries of the world regarding Sustainable Development Goals

Q4. What is the purpose of 'NEOWISE project'?

- a. To detect neutrinos
- b. To detect gravitational waves
- c. To study and identify an exoplanets
- d. **To study and identify the near-Earth objects**

Q5. "Monitoring System for Tigers – Intensive Protection and Ecological Status", a mobile monitoring system for forest guards, has been launched by:

- a. Global Tiger Forum (GTF)
- b. Global Tiger Initiative (GTI) program
- c. Global Tiger Initiative Council (GTIC)
- d. **National Tiger Conservation Authority (NTCA)**