## SCIENCE AND TECHNOLOGYDEVELOPMENTS AND THEIR APPLICATIONS

❖ **Will artificial intelligence lead to job displacements?**

➢ **CONTEXT: AI is the digital distillation of a technological revolution that is facilitating the long-overdue evolution of the human mind. AI, as fear-inducing as anything disruptive and new is, can galvanise , turbo-charge, and trigger new avenues of intelligence in human minds. These new avenues can enable us to understand and attack society's greatest challenges today. while also understanding ourselves and the universe we call home.**

➢ **AGI and ANI**

- What a layman does not know is that AI can traditionally be divided into AGI and ANI. Theorists and AI experts call this Artificial General Intelligence (AGI) and Artificial Narrow Intelligence (ANI).
  - ✓ AGI is designed to be capable of performing a wide variety of intellectual tasks, while ANI is designed to perform a single or a narrow set of related tasks.

- AGI is designed to be flexible and adaptable, capable of handling new tasks and situations without human intervention. This which is often referred to as 'unsupervised learning' which means that the AI system can learn from data without being explicitly programmed to do so.
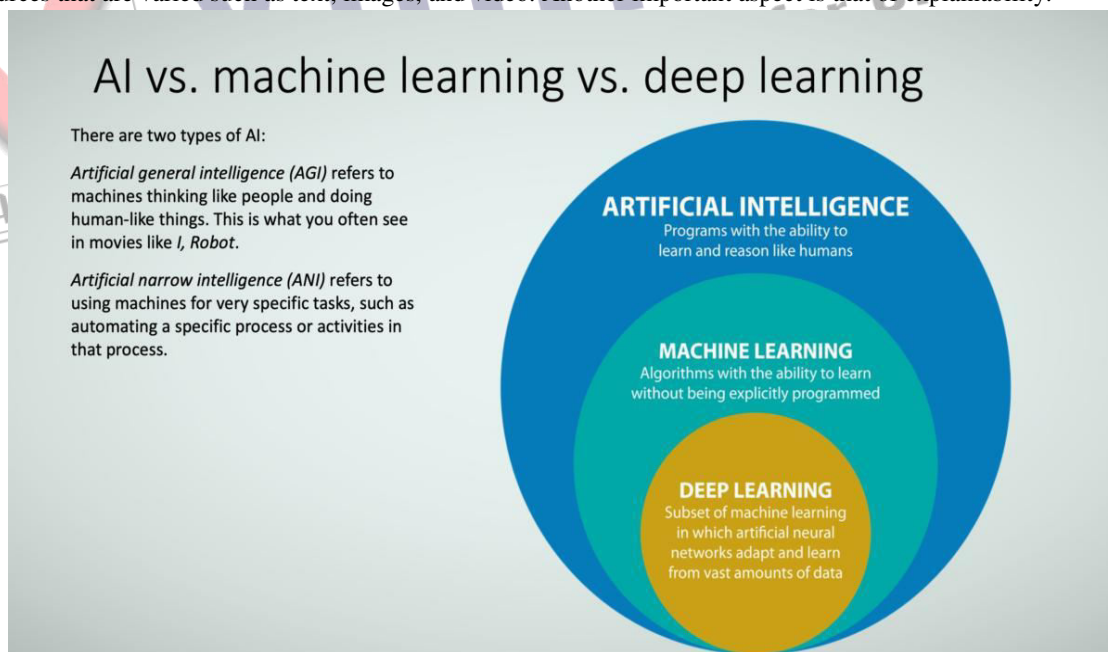
- The difference between AGI and ANI lies in their scope of intelligence and their ability to generalise knowledge across different contexts. AGI is primarily driven by a variety of technical aspects that bear deeper discussion. One such aspect is the sophistication of AGI's cognitive architecture — the development of a system that includes perception, attention, memory, language, and reasoning.

- AGI is envisioned as having the ability to perform any intellectual task that a human can do, and to apply knowledge learned in one context to new, unfamiliar situations.
  - ✓ AGI is what you would consider the antagonist in pop-culture movies and lore where computers 'take over' civilisation and enslave humans. The fear emanates from the very real possibility that an AGI system continues to learn and make decisions that even its creators, I.e., us, cannot possibly predict. This lack of 'control' is what leads to the overarching fear of AI.

- ANI, by contrast, is designed to perform a specific task or set of tasks and is not capable of generalising knowledge or skills to new situations outside of its programmed domain. hence, it remains eminently controllable even if we do not fully understand the mechanics of how it gets so good at the task it is programmed for.

- Another one is knowledge representation which has to be flexible, robust, and scalable. It will have to use sources that are varied such as text, images, and video. Another important aspect is that of explainability.
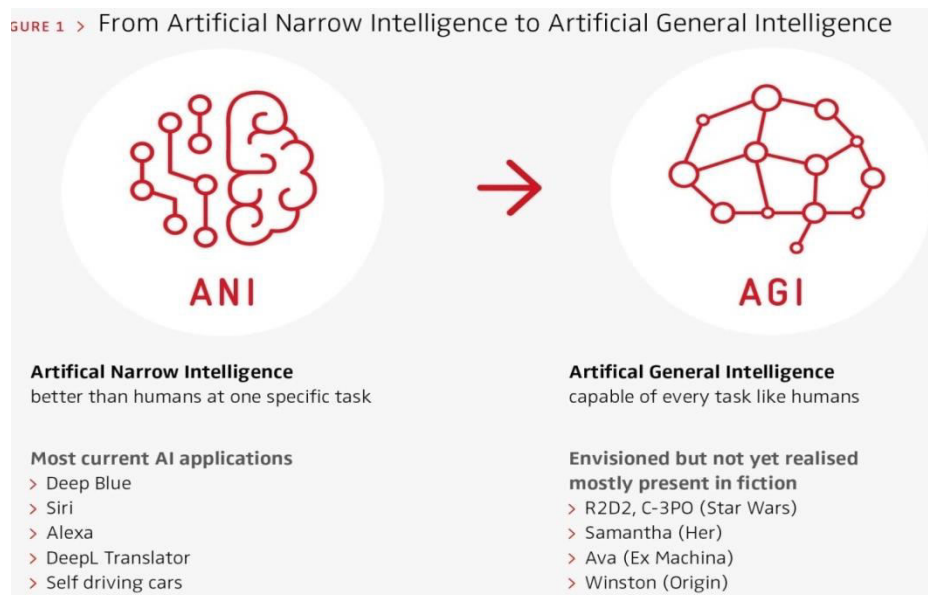


- AGI systems will need to be easily explainable to humans in their decision-making processes. We cannot trust decisions until we understand how the conclusions was arrived at.AGI, in its pure form, will be designed to learn and reason like humans. This means that it should pull knowledge and inputs from experience, reason about complex concepts, and make decisions based on incomplete or uncertain information.

- In contrast, ANI is typically trained using machine learning algorithms such as supervised learning, unsupervised learning, or reinforcement learning. These algorithms are designed to optimize the AI system's performance on a specific task or set of tasks, but they are not necessarily capable of reasoning or learning in the way that humans do.

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- AGI is still largely in the realm of theoretical research and development, and it is not yet clear whether it will be possible to create a truly general AI system.
- ANI is already in widespread use in a variety of industries and applications. including image recognition, natural language processing, and predictive analysis.

> **The future of jobs**

- ANI products like ChatGPT have



FIGURE 1 > From Artificial Narrow Intelligence to Artificial General Intelligence

**ANI**

**Artifical Narrow Intelligence**
better than humans at one specific task

**Most current AI applications**
> Deep Blue
> Siri
> Alexa
> DeepL Translator
> Self driving cars

**AGI**

**Artifical General Intelligence**
capable of every task like humans

**Envisioned but not yet realised mostly present in fiction**
> R2D2, C-3PO (Star Wars)
> Samantha (Her)
> Ava (Ex Machina)
> Winston (Origin)

existed for some time now but have recently taken the world by storm. Besides its technological prowess, it is also a matter of right place and right time.
- Other revolutionary technologies such as Q–Chat, Dall E-2, Synthesia are also on the rise to promote art and academia through fun and adaptive chat experiences.
- ChatGPT is a chat bot(short for robot), which allows users to engage in a conversation about a variety of topics to which it like personal hobbies, interests, or current events and generates human-like responses in text form.
- ChatGPT, and similar solutions, are particularly adept at automating routine and repetitive tasks, such as data entry and customer service, replacing acquisition teams administrative work, which could perhaps replace low-skill level workers.
- Many experts believe that AI will transform industries in significant ways, creating new opportunities for growth and innovation. In industries like healthcare, for example, AI can optimise transportation networks, develop new materials, and even simplify manufacturing processes.
- AI can very well can lead to the displacement of some jobs. Buzzfeed layoffs were almost at the same time during its new deal with OpenAI to leverage ChatGPT for its articles.
- Many more industry veterans are on the cusp of an internal upheaval. However, we should not forget that disruptive tech also creates new jobs and skill sets. AI may create demand for workers with expertise in machine learning, data science and natural language processing. and project management. It may also create opportunities for workers to specialise in areas where human judgement and creativity will remain critical.
- The impact of AI on jobs and industries is likely to be uneven, with some workers and industries experiencing greater disruption than others. But this can be said for nearly every disruptive technology that was introduced in legacy business sectors. The printing press and the telephone transistors created vastly more opportunities in the long term.
- In the case of AI, workers in low-wage and low-skill occupations may be more vulnerable to job loss than those in high-wage and high-skill occupations. But all is not lost. As AI continues to transform the job market, workers may need to acquire new skills and knowledge in order to remain employable. This could require significant investment in education and training programs, as well as new approaches to lifelong learning and skills development.
- Overall, while there is still much uncertainty about the impact of AI on jobs and industries, it is evident that the technology is likely to have significant implications on the future of work. It will be important for policymakers, businesses, and workers to take proactive steps to manage this transition and ensure that the benefits of AI are shared widely across society.

**WOMEN EMPOWERMENT**

❖ **International Women's Day 2023: What is the gender gap in STEM?**
> **CONTEXT: International Women's Day 2023 (IWD) was commemorated on March 8 under the theme "DigitALL: Innovation and technology for gender equality".**
- The United Nations has highlighted the need for inclusive technology and digital education. It plans to have discussions on the role of all stakeholders in improving access to digital tools.
- With the IWD's origins linked to women workers' movements, it is important to note that women's lack of access to technology and digital tools makes them less likely to be a part of the wider domains of Science, Technology, Engineering and Mathematics – collectively termed the STEM fields.

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➢ **Why does women's underrepresentation in STEM fields matter?**

• Across the world, there has been a marked absence of women in the professional realm of STEM subjects – including the IT sector, environment and climate, medical sciences, etc.

• This underrepresentation is of note because developments in STEM fields, particularly in technology, are increasingly shaping all aspects of modern life – from chatbots like ChatGPT that are expected to replace workers in various settings to the ubiquity of social media which shapes identities and public discourse.

• Furthermore, from a career perspective, these fields are generally lucrative for workers. A typical STEM worker earns two-thirds more than those employed in other fields, according to Pew Research Center. Therefore, the underrepresentation of women in STEM impacts the overall gender pay gap as well – women are typically overrepresented in lower-paying jobs and underrepresented in higher-paying jobs such as in STEM fields.

➢ **What is the 'gender gap' in STEM?**

• Globally, 18 per cent of girls in higher-level education are pursuing STEM studies, compared with 35 per cent of boys. Even within the STEM fields, there lies a gender divide, with similar numbers of boys and girls pursuing natural sciences while far more boys looked to engineering, manufacturing and construction.

• In India, the enrolment of girls in engineering programmes is significantly lower when compared to their male counterparts. Overall in UG, PG, MPhil and PhD engineering programmes, the total enrolment is 36,86,291 where 71 per cent of enrolled students were males and 29 per cent were females, according to data from the All India Survey of Higher Education for 2020-2021.

• But of all students enrolled in science courses at undergraduate, post-graduate, MPhil and PhD levels, women at 53 per cent of enrolment outnumbered men and some increases have been witnessed of late. These gains, though, don't necessarily mean there will also be an increase in employment, because of multiple factors.

➢ **Why does the gap exist?**

• Multiple factors determine how women choose to work and the options available to them. These include the presence of existing resources such as mentors and programmes offering scholarships, as well as, on a broader level, general societal attitudes on women's education that do not encourage families to invest in it as much as they do for boys.

• UNICEF points to gender bias in curricula. For instance, in India, more than 50 per cent of illustrations in math and science textbooks in primary show boys and only 6 per cent show illustrations of girls. In the UK, over a quarter of girls say they have been put off a career in tech as it is too male-dominated and only 22 per cent can name a famous female working in the field.

• In the US, 26 per cent of tech startups have at least one female founder, and in Europe, only 21 per cent of tech founders are female. But it points out that numbers are increasing — potentially creating more role models for girls and women.

**PRELIMS**

**1. Open Network For Digital Commerce (ONDC)**

➢ **CONTEXT: Open network for digital commerce (ONDC) will help small retailers survive the onslaught of large tech-based ecommerce companies, union minister Piyush Goyal said**.

➢ **About ONDC**

• Open Network for Digital Commerce, abbreviated ONDC, is a private non-profit Section 8 company established by the Department for Promotion of Industry and Internal Trade (DPIIT) under the Ministry of Commerce and Industry of Government of India to develop open e-commerce.

• It was incorporated in 2021 with initial investment from Quality Council of India and Protean eGov Technologies Limited(formerly NSDL e-Governance Infrastructure Limited)

• Often referred to as the UPI of e-commerce, ONDC is a freely accessible government-backed platform that aims to democratize e-commerce by moving it from a platform-centric model to an open network for buying and selling goods and services.

➢ **Aim**

• The ONDC (Open Network for Digital Commerce), is an initiative aiming at promoting open networks for all aspects of exchange of goods and services over digital or electronic networks.

• Open Network for Digital Commerce (ONDC) is being seen as a step in the direction of democratizing the e-commerce space in India, mainly controlled by multinational players Amazon and Flipkart.

➢ **What led to the creation of ONDC?**

• Technological self-reliance, demand for level playing field mainly from small retailers, smoothen the ease of doing business online, adoption of open digital ecosystem across key sectors and fixing the non-competitive behavior of big ecommerce firms like Amazon and Flipkart to capture the US$810 billion domestic retail market led to the creation of ONDC.

• It will also help check Big Tech companies violating Consumer Protection (E-Commerce) (Amendment) Rules, 2021 due to concentration of market power by integrating them into a decentralized open-source platform.

➢ **Major Objectives**

• The major objectives include: Ending monopolies of the platforms, democratisation and decentralization, digitisation of the value chain, standardisation of operations, inclusivity and access for sellers, especially small

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and medium enterprises as well as local businesses, increased efficiency in logistics, more choices and independency for consumers, ensured data privacy and confidentiality, decreased cost of operation

➢ **Key Features**
- Unlike the platform-based model, the ONDC will not be owned or controlled by a single entity or platform.
- Businesses and consumers will be able to carry out transactions over ONDC using any compatible application of their choice.

➢ **ONDC Advisory Council**
- About: The primary role of the advisory council is to watch over ONDC implementation in the country.
- Member and Convener: The members were selected based on their experience in fields such as technology, fiance, commerce etc. Convener of the ONDC Advisory Council is Additional Secretary from Department for Promotion of Industry and Internal Trade under Ministry of Commerce and Industry.

➢ **Structure**
- The ONDC uses "free softwared methodology, open specifications and open network protocol".
- The backend of the ONDC is built on Beckn Protocol, an open and interoperable protocol for decentralized digital commerce. Beckn Gateways provides anonymised aggregated data generated from the network.
- On the ONDC, the consumers and merchants can transact for goods and services via open protocol instead of the central platform or application.

**2. Exercise TROPEX**
➢ **CONTEXT: Indian Navy's major Operational level exercise TROPEX for the year 2023, conducted across the expanse of IOR over duration of four months from Nov 22 - Mar 23, culminated recently in the Arabian Sea.**
- The overall exercise construct included Coastal Defence exercise Sea Vigil and the Amphibious Exercise AMPHEX. Together, these exercises also witnessed significant participation from the Indian Army, the Indian Air Force and the Coast Guard.
- Set in the Indian Ocean including the Arabian Sea and the Bay of Bengal, the theatre of operations for the exercise extended approximately 4300 nm from North to South upto 35 deg South Latitude and 5000 nm from Persian Gulf in the West to North Australia coast in the East, spanning an area of over 21 million square nautical miles. TROPEX 23 witnessed participation of approximately 70 Indian Navy ships, six submarines and over 75 aircraft.
- The culmination of TROPEX 23 brings to an end an intense operational phase for the Indian Navy that commenced in Nov 2022.

**3. Sagarmala Programme**
➢ **CONTEXT: Sagarmala Program Boosting Tourism Economy in Karnataka and Tamil Nadu, Eight Floating Jetty projects 4 each in Tamil Nadu and Karnataka Sanctioned Including these total 11 Floating Jetty Projects sanctioned in Karnataka till date**
➢ **About:**
- Maritime sector in India has been the backbone of the country's trade and has grown manifold over the years. To harness India's 7,500 km long coastline, 14,500 km of potentially navigable waterways and strategic location on key international maritime trade routes, the Government of India has embarked on the ambitious Sagarmala Program which aims to promote port-led development in the country.
- The concept of Sagarmala was approved by the Union Cabinet on 25th March 2015. As part of the program, a National Perspective Plan (NPP) for the comprehensive development of India's coastline and maritime sector has been prepared which was released, on 14th April, 2016 at the Maritime India Summit 2016.
- Vision of the Sagarmala Program is to reduce logistics cost for EXIM and domestic trade with minimal infrastructure investment. This includes:
- Reducing cost of transporting domestic cargo through optimizing modal mix Lowering logistics cost of bulk commodities by locating future industrial capacities near the coast Improving export competitiveness by developing port proximate discrete manufacturing clusters Optimizing time/cost of EXIM container movement
- Sagarmala Program broadly consists of 5 components which are:
  ✓ Port Modernization & New Port Development Port Connectivity
  ✓ Enhancement Port-linked Industrialization
  ✓ Coastal Community Development
  ✓ Promotion of Coastal Shipping & Inland Waterways in India
  ✓ Create jobs and bridge skill gap in ports and maritime sector

## ANSWER WRITTING

**Q. Migrant workers continue to face several social, economic and safety issues in the host states around the country. Discuss.**

A migrant worker is a person who migrates within a home country or outside it to pursue work. They are casual and unskilled workers who offer their services on a temporary, usually seasonal, basis. Migrant workers usually do not have the intention to stay permanently in the country or region in which they work. According to the census 2011, there are 45 crore internal migrants in the country, who account for 37 per cent of the country's population.

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Migrant workers in India continue to face several issues in the host states such as:

- Economic issues:
  - Exploitative middlemen: Migrant workers often get caught in exploitative labour arrangements that force them to work in low-end, low-value, hazardous work.
  - Mainly engaged in informal work: The migrants primarily trace work in the informal sector in cities as they do not possess adequate skills that are required to get jobs in the organized sector.
  - Low wages and lack of social security: The informal sector in the urban areas is characterized by low wages, excessively long hours of work and social security almost not existing. Due to this, they lead a life of low quality, presumably reflected in their low human development.
- Social issues:
  - Lack of affordable housing: According to the ministry of housing and urban affairs migrants in urban areas are the largest population in need of affordable and adequate housing. The lack of housing facilities has led to the spread of informal settlements and slums.
  - Discrimination: Migrants can also become easy victims of identity politics and parochialism. This also leads to targeted violence against migrant workers. The urban labour markets treat them with opportunistic indifference extracting hard labour but denying basic entitlements.
- Poor implementation of the Inter-State Migrant Workmen Act, 1979 (ISMW Act): The act provides certain protections for inter-state migrant workers such as registration of migrant workers, accommodation and medical facilities by the contractor etc. however the implementation of the Act across states is poor. This Act has been subsumed into the four broad labour codes however the codes have not been implemented yet.
- Health and Safety issues: The migrants live in the jhuggis or slums that are not conducive to a safe stay and a sense of insecurity prevails among them. There is no protection from extreme climate, dust and mosquitoes which leads to terrible health outcomes.
- Psychological issues: Migrants are less familiar with the new environment and are prone to various social, psychological and emotional trauma in such situations. This emanates from the fear of neglect by the local community and concerns about the well-being and safety of their families waiting in their native places.
- Pandemic-induced woes: Migrant workers were the most vulnerable section of the population during the COVID pandemic. It led to reverse migration, loss of jobs and accidents while travelling back to home states.

Therefore, in order to safeguard the rights of migrant workers there is a need for sound policy supported by law. Technological interventions such as digital public infrastructure, adopting grievance redressal mechanisms, awareness about entitlements and PPP models are some of the measures that should be implemented.

**MCQs**

1. With the present state of development, Artificial Intelligence can effectively do which of the following?
   1. Bring down electricity consumption in industrial units.
   2. Create meaningful short stories and songs.
   3. Disease diagnosis.
   4. Text-to-Speech Conversion.
   5. Wireless transmission of electrical energy.

Select the correct answer using the code given below:
   a) 1, 2, 3 and 5 only
   b) 1, 3 and 4 only
   c) 2, 4 and 5 only
   **d) 1, 2, 3, 4 and 5**

2. With reference to Generative Artificial Intelligence consider the following statements:
   1. It is a type of artificial intelligence that involves creating new data using machine learning algorithms.
   2. It can help health professionals with their medical diagnosis.
   3. It can help to create and simulate complex engineering, design, and architecture.

Which of the statements given above is/are correct?
   a) 1 and 2 only
   b) 2 and 3 only
   c) 1 and 3 only
   **d) 1,2 and 3**

3. Consider the following statements
   1. United Nations in celebrated under the theme DigitALL: Innovation and technology for gender equality.
   2. Women make up only 22 per cent of artificial intelligence workers globally.

Which of the above given statement/s is/are correct?
   a) 1 only
   b) 2 only
   **c) Both 1 and 2**
   d) Neither 1 nor 2

4. Consider the following
   1. Aarogya Setu

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    2.   CoWIN
    3.   DigiLocker
    4.   DIKSHA

Which of the above are built on top of open-source digital platforms?
    a)   1 and 2 only
    b)   2, 3 and 4 only
    c)   1, 3 and 4 only
    **d)   1, 2, 3 and 4**

5. With reference to Exercise TROPEX 2023 consider the following?
    1.   The exercise is designed to test the combat readiness of the Indian naval units, as well as the Indian Air Force, Indian Army and the Indian Coast Guard.
    2.   The exercise has been held annually since 2019

Which of the above statement/s is/are correct?
    **a)   1 only**
    b)   2 only
    c)   Both 1 and 2
    d)   Neither 1 nor 2

6. Which of the following statements is/are not correct regarding Sagarmala Project?
    1.   It is the flagship program of the Ministry of Shipping to promote port-led development in the country.
    2.   The main project is to reduce logistics costs for EXIM and domestic trade with minimal infrastructure investment.
    3.   It is a green field project only.

Choose the correct answer using the codes given below
    **a)   1 and 2 only**
    b)   2 and 3 only
    c)   1 and 3 only
    d)   All of the above

7. A circumnavigation mission called "Jeanne d'Arc" often mentioned in news is associated with which of the following country?
    a)   USA
    b)   UK
    **c)   France**
    d)   Germany

8. Navy Ships known as FS Dixmude, an amphibious assault ship and helicopter carrier recently seen in news belongs to which of the following country?
    a)   USA
    b)   Russia
    c)   Ukraine
    **d)   France**

9. With reference to National Assessment and Accreditation Council (NAAC) consider the following statements?
    1.   It is an autonomous statutory body funded by the University Grants Commission Act.
    2.   It assesses and accredits Higher Education Institutions (HEIs).

Which of the above statement/s is/are correct?
    a)   1 only
    **b)   2 only**
    c)   Both 1 and 2
    d)   Neither 1 nor 2

10. With reference to Fluorosis consider the following statements
    1.   It results from excessive fluoride intake from water only.
    2.   Prolonged fluoride consumption in higher concentrations in drinking water can cause dental fluorosis, skeletal fluorosis, kidney diseases and arthritis.

Which of the above statement/s is/ are correct?
    a)   1 only
    **b)   2 only**
    c)   Both 1 and 2
    d)   Neither 1 nor 2