



Disruptive Technology

What is Disruptive Technology?

- Disruptive technology is an innovation that significantly **alters the way that consumers, industries, or businesses operate**. It displaces a well-established product or technology, creating a new industry or market.
 - New technology can either be **sustaining or disruptive**. While sustaining technology depends on the **incremental improvements** in the already existing technology, disruptive technology is a completely new one.

What are the Examples of Disruptive Technology?

Disruptive technologies **evolved with time**, a few years back the automobile, electricity service, and television were disruptive technologies.

However, **the time is changing and so are they**. Some of the examples which are included in disruptive technologies that are being used currently involve:

- **Blockchain Technology:**
 - Blockchain derives its name from the digital databases or ledgers where information is stored as **“blocks”** that are coupled together to form **“chains”**.
 - It offers a **singular combination** of permanent and tamper-evident record-keeping, real-time transaction transparency and auditability.
 - An exact copy of the blockchain is **available to each of the multiple computers** or users who are joined together in a network.
 - Any new information added or altered via a new block is to be vetted and **approved by over half the total users**.
 - **Applications of Blockchain Technology:**
 - Blockchain technology **can facilitate innovations across a range of processes and applications** requiring management, storage, retrieval and safety of vast and important information.
 - These include - management of information pertaining to financial transactions (as in the case of cryptocurrencies), **electoral voting**, medical records, academic lessons, property ownership records and professional testimonials.



- **Indian Initiatives Related to Blockchain:**

- **Centre of Excellence (CoE):** In 2020, the Union Government has CoE. It has been set up by the **National Informatics Centre (NIC)**.
 - **Objective:** To provide **Blockchain as a Service (BaaS)** for efficient hosting of Blockchain network and allowing all stakeholders to benefit from shared learning, experiences and resources.
 - Blockchain-as-a-Service (BaaS) is a **third-party cloud-based infrastructure** and management for companies building and operating blockchain apps.
- **National Strategy on Blockchain:** This strategy is recently brought out by the **Ministry of Electronics and Information Technology (MeitY)**.
 - It is the move in the direction towards enabling trusted digital platforms creating blockchain framework for the development of applications based on this technology.

- **Artificial Intelligence (AI):**

- **About:**

- It **describes the action of machines** accomplishing tasks that have historically required human intelligence.
- It **includes technologies like** [machine learning](#), pattern recognition, **big data**, neural networks, self algorithms, etc.
- AI **involves complex things** such as feeding a particular data into the machine and making it react as per the different situations.
- It is basically about **creating self-learning patterns** where the machine can give answers to the never answered questions like a human would ever do.
- AI technology helps in analyzing data and thus **can improve the efficiency** of systems like power management in cars, mobile devices, weather predictions, video and image analysis.

- **Indian Initiatives Related to AI:**

- **The US-India AI Initiative:** In 2021, the **Indo-US Science and Technology Forum (IUSSTF)** launched its flagship program, the US-India Artificial Intelligence Initiative.
 - The activity will bring together key stakeholders from India and the USA to foster AI innovation by sharing ideas and experiences, identifying new opportunities in research and development, and bilateral collaboration.
- **Ministry of Corporate Affairs (MCA) 21 Version 3.0:**
 - In 2021, The Ministry of Corporate Affairs (MCA) launched a new version of its portal, MCA 21, version 3.0.
 - It **will leverage the use of the latest technologies** like data analytics, AI, and Machine Learning (ML), to simplify regulatory filings for companies.
- **AI in Schools:**
 - As part of the NEP 2020, AI will **now be a part of the Indian school curriculum**.

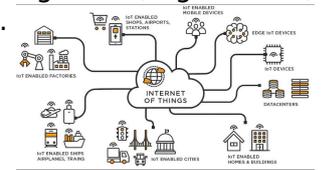
- **5G Technology:**

- 5G is the 5th generation mobile network. It is a **new global wireless standard** after 1G, 2G, 3G, and 4G networks.
- It enables a new kind of network that is **designed to connect virtually everyone and everything together** including machines, objects, and devices.
- Internet speeds in the **high-band spectrum of 5G** has been tested to be as high as 20 Gbps (gigabits per second), while, in most cases, the maximum internet data speed in **4G has been recorded at 1 Gbps**.
- In India, Satcom Industry Association-India (SIA) has voiced concerns over the Government's plan to include the **Millimetre Wave (mm Wave) bands** in the 5G spectrum auction.
- **Significance:**

- 5G technology would also **bring positive changes** in the governance of the country, ease of living and **ease of doing business**.
 - This would **boost growth in every sector** like agriculture, health, education, infrastructure and logistics.
- This will also increase convenience and **create many employment opportunities**.
- **Indian Initiatives Related to 5G Technology:**
 - **India's First 5G Testbed:**
 - Recently, Prime Minister inaugurated the country's first 5G testbed that will enable **start-ups** and industry players to test their products locally, thereby **reducing dependence on facilities abroad**.

▪ **Internet of Things (IoT):**

- It is a computing concept that describes the idea of everyday physical objects being **connected to the internet** and being able to identify themselves to other devices.
- It is **one of the fastest emerging technologies** across the globe, providing enormous beneficial opportunities for society, industry, and consumers.
- **Application of IoT:**
 - It is being **used to create smart infrastructure** in various verticals such as Power, Automotive, Safety & Surveillance, Remote Health Management, Agriculture, Smart Homes and Smart Cities, etc, using connected devices.



- **Supplementary Technologies:**
 - IoT is **benefitted from recent advances** in several technologies such as sensors, communication technologies (Cellular and non-cellular), **Artificial intelligence/ Machine Learning, Cloud / Edge computing** etc.
- **Indian Initiatives related to IoT:**
 - **Smart City Project:** In 2015, the Government of India formulated a **Draft IoT Policy** with a vision to develop connected and smart IoT based systems for our country's economy, society, environment and global needs.
 - This Policy launched a **Smart City project**, with a plan of developing 100 smart cities in the country.
 - **Digital India Program:** The launch of this program aims to transform the Indian society into a **digitally empowered society** and boost the IoT industry.
 - The proposed smart cities shall consist of smart homes, smart parking, smartphone detection, smart transportation, smart roads and smart lighting.
 - **FutureSkill PRIME (FSP):** In collaboration with NASSCOM, MeitY initiated **FutureSkills PRIME program** for re-skilling/ up-skilling of IT professionals which aims to create an ecosystem reskilling/upskilling ecosystem in ten emerging and futuristic technologies including IoT.

▪ **Drone Technology:**

- **About:**
 - It is a layman terminology for **Unmanned Aircraft (UA) Vehicle**.
 - Originally **developed for the military and aerospace industries**, drones have found their way into the mainstream because of the enhanced levels of safety and efficiency they bring.
 - A drone's autonomy level can range from remotely piloted (a human controls its movements) to advanced autonomy, which means that it relies on a system of sensors and **LIDAR detectors** to calculate its movement.
- **Significance:**
 - **Defence:** Drone system can be used as a symmetric weapon against terrorist attacks.
 - **Healthcare Delivery Purposes:** Recently, the Ministry of Civil Aviation has approved a project with the Telangana government for **using drone technology to deliver vaccines** in remote areas.
 - **Agriculture:** In the agriculture sector, micronutrients can be spread with the help

of drones.

- **Law Enforcement:** Drones are also significant for the law enforcement agencies, the fire and emergency services wherever human intervention is not safe and the healthcare services.
- **Indian Initiatives Related to Drone Technology:**
 - **SVAMITVA Scheme:** This scheme is a collaborative effort of the Ministry of Panchayati Raj, State Panchayati Raj Departments, State Revenue Departments and [Survey of India](#).
 - It is a scheme for mapping the land parcels in rural inhabited areas using drone technology and a **Continuously Operating Reference Station (CORS)**.
 - **Draft Drone Rules, 2021:** The Ministry of Civil Aviation has unveiled the Draft Drone Rules, 2021 based on “trust, self-certification and non-intrusive monitoring”.
 - **Hara Bhara Campaign:** The idea of the campaign is to accelerate the mission of reforestation by planting one billion trees **using drones by 2030 in the country**.
 - The project **uses drones to disperse seed balls** over thin, barren, and empty forest lands to turn them into lush green abodes of trees.
 - **PLI for Drone Sector:** It covers a wide variety of drone components, including airframe, propulsion systems, power systems, batteries, inertial measurement unit, flight control module, ground control station, communication systems, cameras, sensors, spraying systems, emergency recovery system, and trackers.

▪ Genome Editing:

◦ About:

- Genome editing (also called [gene editing](#)) is a group of technologies that give scientists the ability to change an organism's **Deoxy-Ribonucleic Acid (DNA)**.
- These technologies allow genetic material to be added, removed, or altered at particular locations in the genome.



• Indian Initiative related to Genome Editing:

- **Genome Engineering/Editing Technologies Initiative (GETin):** A fellowship program between Indian institutes and premier U.S. Universities, in significant areas of GETin, has been introduced in acknowledgement of the importance of strategies and techniques in genome modification as a modern day essential tool for research & development (R&D).

▪ 3D Printing:

◦ About:

- It is also known as [additive manufacturing](#) which uses materials such as plastics and metals to convert products envisaged on computer-aided design to real three-dimensional items.
- 3D printing is the **opposite of subtractive manufacturing** which is cutting out/hollowing out a piece of metal or plastic with, for instance, a milling machine.
- 3D printing traditionally has been **used for prototyping**. 3D printing has a lot of scope in making artificial limbs, stents, dental crowns, parts of automobiles and consumer goods, among others.
- **Indian Initiatives Related to 3D Printing:**
 - **National Strategy for Additive Manufacturing Policy:** Recently, the Ministry of Electronics and Information Technology (MeitY) unveiled this Policy.
 - The policy **aims to increase India's share in global additive manufacturing to 5%** within the next three years and add USD 1 billion to

the gross domestic product.

What are the Benefits of Disruptive Technology?

- **Innovation in Regular Activities:** One of the key features of disruptive technology is its **ability to offer consumers new and notable benefits**. When this type of technology enters the marketplace, it changes the entire industry.
 - By embracing disruptive technology, individuals and businesses alike can enjoy the benefits that the technology offers to their regular activities.
- **Improves and Modifies Techniques:** To provide solutions to the problems of the consumers, modern methods need to be adopted.
 - Disruptive innovation **modifies how a company evaluates its processes** and how to adapt according to them, helps in the provision of better services, and **brings about a modification in the industry**.
- **Growth of Startup Companies:** Disruptive technology provides opportunities for startup companies to gain a significant foothold in existing industries.
 - This provides a **unique chance for small startups** to experience rapid growth and potentially outperform larger, more well-established companies.
- **Business Expansion:** When an established business willingly embraces disruptive technology, it enjoys prime opportunities for growth within its current industry or within a new industry created by the technology. This results in the **economic growth of the country** also.
 - Companies that can smoothly incorporate disruptive technology in their existing line of products and services can help existing customers transition into using the disruptive technology while also capturing **new buyers with their entry into the fresh market**.
- **Leveraging India's IT Power:** The Indian software industry is well-established, and plans to increase connectivity are well underway as part of **'Digital India'**.
 - This would allow for the creation of additive manufacturing facilities in small towns and foster industrial development outside of major cities.

What are the Challenges Regarding Disruptive Technology?

- **Ongoing Challenges:** Developing countries like India are starting from a difficult position, because they are already grappling with the challenges of low human capital, ineffective institutions, and a difficult business environment.
- **Trust and Ethical Questions:** Disruptive Technology per se is not the problem, but there are ethical issues **surrounding privacy, ownership and transparency** which are related to these technologies that can become a cause of concern.
- **Challenges in Adaptability:** Disruptive innovations take time to prove in the complex market conditions and a significant time period is also consumed in penetrating the market. Disruptive innovations also **have to be adaptive to the market environment**.
- **Untested & Time Consuming:** New technology is typically **untested and unrefined** during its early stages and development can continue for years.
 - Any innovative idea depending upon its utility and ability to meet the market needs has to **undergo a gestation period**. It takes a significant period for any innovative idea or a product or service to get established in the market.
- **Redundancy of Prevalent Old Technology:** New ideas or business models have got a tendency to disrupt the existing and established ideas/products/services/business models and this **creates fierce competition in the market**.
 - This is very challenging for any new idea as the existing and established business may take any course to prevent them from being thrown out of the market.

What can be the Way Forward?

- **Favorable Environment:** A policy framework for the next generation of technology and innovation should focus on creating an enabling environment for disruptive technologies to positively impact the economy, society, and environment, and reduce inequalities.
- **Holistic Approach:** Whole-of-economy or most-of-society approach should be followed, technology alone will not guarantee success. Policymakers must also account for local contexts

and conditions so that they can create social, political and economic ecosystems in which technology creates jobs and drives inclusive growth.

- **Promotion of R&D Sector:** There is a need to encourage the formation of product design centers so that the products are built to suit the Indian environment and consumers.
- **Need for Government Support:** There is a need for government support to provide incentives for distributed manufacturing in smaller towns, and for the IT industry to work on creating platforms and marketplaces that connect consumer demands, product designers and manufacturers in a seamless way.
- **International Cooperation:** Given that various governments have only recently established these types of disruptive technologies like AI, and in some cases are still formulating them, international cooperation is still very much a work in progress. In the setting of standards at the multilateral level.

Conclusion

This type of technology, if introduced, gives loads of notable benefits to both consumers as well as businesses. An entire industry is changed due to innovative technology, and that too in a positive manner. Thus, if the technology is embraced and used properly as the Internet, it can offer immense innovative benefits both to the consumers of the industry as well as the producers.

Civil Services Examination Previous Year's Questions (PYQs)

Q. With the present state of development, Artificial Intelligence can effectively do which of the following? (2020)

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

Ans: (B)

Q. With reference to "Blockchain Technology", consider the following statements: (2020)

1. It is a public ledger that everyone can inspect, but which no single user controls.
2. The structure and design of blockchain is such that all the data in it are about cryptocurrency only.
3. Applications that depend on basic features of blockchain can be developed without anybody's permission.

Which of the statements given above is/are correct?

- (A) 1 only
(B) 1 and 2 only
(C) 2 only
(D) 1 and 3 only

Ans: (D)

Q. When the alarm of your smartphone rings in the morning, you wake up and tap it to stop the alarm which causes your geyser to be switched on automatically. The smart mirror in your bathroom shows the

day's weather and also indicates the level of water in your overhead tank. After you take some groceries from your refrigerator for making breakfast, it recognises the shortage of stock in it and places an order for the supply of fresh grocery items. When you step out of your house and lock the door, all lights, fans, geysers and AC machines get switched off automatically. On your way to office, your car warns you about traffic congestion ahead and suggests an alternative route, and if you are late for a meeting, it sends a message to your office accordingly. **(2018)**

In the context of emerging communication technologies, which one of the following terms best applies to the above scenario?

- (A) Border Gateway Protocol
- (B) Internet of Things
- (C) Internet Protocol
- (D) Virtual Private Network

Ans: (B)

Q. Consider the following activities: (2020)

1. Spraying pesticides on a crop field
2. Inspecting the craters of active volcanoes
3. Collecting breath samples from spouting whales for DNA analysis

At the present level of technology, which of the above activities can be successfully carried out by using drones?

- (A) 1 and 2 only
- (B) 2 and 3 only
- (C) 1 and 3 only
- (D) 1, 2 and 3

Ans: (D)