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on **MAJOR ISSUES** *for*
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HIGHLIGHTS

-  Question on Debatable Topic for Self-paced Preparation
-  Analysis of Controversial Topics & Tips to handle
-  DAF Analysis
-  1 Mock Interview
-  Mock Feedback
-  Video Recording

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The Link Between Food, Nutrition, Diet and Non-Communicable Diseases

BACKGROUND

- The recent test results of the Environment Monitoring Laboratory at Delhi-based non-profit Centre for Science and Environment (CSE) have unmasked two anomalies:
 - ▶ First, food manufacturers blatantly sell products that have unhealthy levels of nutrients.
 - ▶ Second, a nexus between the industry and regulating agencies backs this brazen which act?

ANALYSIS

- India urgently needs a robust law on labelling and disclosure of nutritional information on food packs.
- The existing Food Safety Standards (Packaging and Labelling) Regulations, 2011, is too weak and ineffective.
- Even some-thing as basic as salt is not mandatorily disclosed.
- But the statutory framework is just not coming along, clearly due to pressure from the powerful junk food industry and the resultant red tape.
- In 2013, Food Safety and Standards Authority of India (FSSAI), the country's food regulator, set up an expert committee to regulate junk food available in schools following an order of the Delhi High Court.
- In 2014, the expert committee, comprising doctors, nutritionists, public health experts, civil society and industry, suggested labelling of calories, sugar, fat, saturated fat and salt on the front of food packs as this would help people make an informed choice about the food they eat.
- **D Prabhakaran Committee** suggested resolving ambiguities on the correct serving size of packed and fast foods and the exact nutritional information people need.

LABELLING PROPOSALS

Under the new regulations, companies will have to display nutritional data clearly on front of their product packs

PROVISIONS	 CURRENT LAW FSS (Packaging & Labelling) Regulations, 2011	 PROPOSED REGULATION Draft FSS (Labelling and Display) Regulations, 2019
NUTRITION LABELLING	• Energy (in Kcal) • Protein (in g) • Carbohydrate with sugar (in g) • Total fat (in g) • Trans fat (in g) [included after law was amended in 2016] • Saturated fat (in g) [included after law was amended in 2016] These nutrients are to be declared at the back of pack per 100 g or ml or per serve Serving size only in case of per serve declaration of nutrients	• Energy (in Kcal) • Carbohydrate with sugar • Trans fat • Cholesterol • Added sugar • Protein • Total fat • Saturated fat • Sodium These nutrients are to be declared at the back of pack per 100 g or ml or per serve Their per serve contribution to RDA*, considering 2,000 Kcal, 67 g of fat, 22 g of saturated fat, 2 g of trans fat, 50 g of added sugar, and 2,000 mg of sodium will also be declared Serving measure and number of servings
FRONT-OF-PACK LABELLING	No provision	It has two parts Upper part declares the amount of energy, saturated fat, trans fat, added sugar and sodium per serve Bottom part declares per serve percentage contribution to RDA (this block to be coloured red if nutrients, except calories, exceed the defined threshold)

■ **Junk food monster: Communicating diseases**

- A lab study by the Centre for Science and Environment has found extremely high levels of salt, fat and trans fat in junk foods responsible for obesity and non-communicable diseases like hypertension, diabetes and heart ailments.
- Trans fats are deadly. Their intake must be avoided to prevent heart diseases.
- The new trend of unhealthy food habits among the youth in India has put them at a risk of developing obesity, diabetes, heart attack -basically non-communicable diseases (NCDs) accentuated by unhealthy lifestyles.
- NCDs are those diseases that are not caused by an infection and not spread through contact with another person. They are the silent killers of our generation. Nearly two out of three deaths in India are due to NCDs, with heart diseases and chronic obstructive pulmonary disease (COPD) becoming the leading causes of death in the country.

■ **How is Behavioural change possible?**

- This behaviour can be changed through socio-ecological approach, which involves influencing both personal and environmental factors of an individual to bring behaviour change.
- Sensitisation programmes to popularise healthy eating among the youth should aim at improving the environment where they spend most of their time.
- Displaying educational posters about healthy eating in the canteen and replacing unhealthy food items offered there with nutritious ones, along with access to clean water, will help instil healthy eating habits among students.
- Group educational sessions about healthy eating help target a larger cohort in the community rather than one-on-one counselling
- Social and digital interventions via internet-based coaching and self-management programmes and introducing mass media campaigns can also encourage youngsters to choose healthy foods.
- The best way to tackle this growing epidemic of NCDs is to focus on creating an environment that supports positive knowledge, attitude and behaviour change around healthy eating habits.

■ **Regulation is crucial**

- Along with these programmes targeted at individuals, there needs to be a strong regulation on food labelling that will push the private players in the domestic food industry to show their social responsibility towards the youth of the country.
- Laws and policies to ensure that meals in school follow nutritional guidelines, offering healthy snacks at work meetings and regulating the marketing of unhealthy foods and beverages, could go a long way in supporting and sustaining healthy behaviours.
- The government of India has taken cognizance of this situation and the Safe and Nutritious Food campaign by the Food Safety and Standards Authority of India (FSSAI) that is helping people adopt the habit of eating safe and eating right.

■ **Why NCDs need to be considered when addressing major nutritional challenges**

- **Foods, diets and nutritional status are important determinants of non-communicable diseases:** Diet can lead to cardiovascular diseases, some types of cancer and diabetes. Foods, diet and nutritional status, including overweight and obesity, are also associated with elevated blood pressure and blood cholesterol, and resistance to the action of insulin.
- **NCDs affect people in every corner of the world:** Of 52.8 million deaths worldwide, 34.5 million were due to NCDs.
- **Populations around the world are increasingly exposed to foods and diets that influence the risk of developing NCDs:** Globally, calories obtained from meat, sugars and oils and fats have been increasing during recent decades, and those from fibre-rich foods such as whole grains, pulses and roots have been declining. Consumption of processed and convenience foods continue to rise rapidly.

- **Under nutrition places people at risk of developing NCDs:** Under nutrition, and its effects on growth, development and maturation, has numerous detrimental outcomes, including the potential to increase risk of developing an NCD later in life.

■ Recommendations for priority actions

- **Key actions for national governments:** Develop and implement a comprehensive range of well-targeted policy actions to provide an environment conducive to nutritious, healthy diets. This should include the options set out in WHO and UN documents and take a coordinated approach to under nutrition, obesity and NCDs.
- **Key actions for international health, food and development agencies:** The institutional architecture for NCDs and nutrition should be strengthened to ensure different UN agencies and programmes work more effectively together, engage in constructive dialogue, and agree on common objectives.
- **Key actions for researchers:** Researchers should engage proactively with the monitoring and evaluation of policy actions in order to build the evidence base, and communicate the full range of available evidence clearly and consistently to policymakers.
- **Key actions for donors and research funders:** Support capacity building for effective policy development in governments, the development of a trained workforce of public health nutrition professionals, and advocacy in civil society organisations.
- **Key actions for civil society:** Civil society should act as advocates and watchdogs, by monitoring and assessing policy actions being taken by government agencies and commercial operators and their impact on nutrition and NCDs.

N O U R I S FOOD ENVIRONMENT		H FOOD SYSTEM	I N G BEHAVIOUR CHANGE
	POLICY AREA	POLICY ACTIONS FOR NUTRITION AND NCDs	
N	Nutrition label standards and regulations on the use of claims and implied claims on foods	Nutrition labelling that is clear and concise, such as interpretative signals, on all packaged foods	
O	Offer healthy foods and set standards in public institutions and other specific settings	Offer healthy foods in school feeding, social safety net programmes and other institutional settings, including the use of behavioural incentives	
U	Use economic tools to address food affordability and purchase incentives	Use financial instruments, such as health-oriented cash transfer programmes, and well-targeted taxes and healthy food subsidies	
R	Restrict food advertising and other forms of commercial promotion	Restrict advertising and promotion of breast-milk substitutes, and of unhealthy foods especially to children	
I	Improve nutritional quality of the whole food supply	Improve the nutritional quality of the food supply, such as through community food production, biofortification and reformulation	
S	Set incentives and rules to create a healthy retail and food service environment	Set incentives and rules for retailers and traders to ensure a healthier community food environment	
H	Harness the food supply chain and actions across sectors to ensure coherence with health	Harness the power of other sectors to improve nutrition governance and policy coherence	
I	Inform people about food and nutrition through public awareness	Inform the public and private sector about nutrition and health, the role of government policy, and the need for responsible corporate actions	
N	Nutrition advice and counselling in health care settings	Nutrition interventions, including support for breastfeeding and complementary feeding, and dietary counselling in primary care	
G	Give nutrition education and skills	Give training and education to increase skills, including targeted health literacy to health workers	

CONCLUSION

- Reports present alarming figures for the prevalence of obesity and non-communicable diseases. Overweight and obesity are potent risk factors for cardiovascular diseases and type 2 diabetes and are major contributors to premature death.
- The escalating level of overweight and obesity among children and adolescents is of particular concern, given the recent evidence linking childhood and adolescent obesity to increased risk of obesity and morbidity in adulthood.

Commercialisation of NavIC

Debates

The Indian Space Research Organisation and its older commercial arm Antrix Corporation Ltd. are poised to commercialise India's regional navigation satellite system, NavIC, with Antrix recently floating two separate tenders to identify industries that can develop dedicated NavIC-based hardware and systems.

BACKGROUND

- **ISRO and Antrix** are set to **commercialise India's regional navigation satellite system, NavIC.**
- NavIC '(Navigation in Indian Constellation)' is the Indian system of eight satellites that is aimed at telling business and individual users where they are, or how their products and services are moving.
- It is an **indigenous positioning or location based service (LBS)** and works just like the Global Positioning System (GPS), but **within a 1,500-km radius over the Indian sub-continent.**
- NavIC can work with global navigation satellite systems of Europe (Galileo), Russia (GLONASS), China (Beidou) and GPS (US).
- All other global systems like **Glomass, GALILEO and Beidou operate on L1 and L2 frequencies.** L2 is solely meant for US Defence use.
- **For civilian usage,** the new GPS satellites use **L5 and L2C band.**
- **Navic operates on L5 and S bands.**
- NavIC has been **certified by the 3GPP** (The 3rd Generation Partnership Project), a global body for coordinating mobile telephony standards.

ANALYSIS

■ Potential for NavIC use in civilian arena

- **Some potential applications of the regional navigation system include:**
 - Terrestrial, aerial and marine navigation;
 - Disaster management;
 - Vehicle tracking and fleet management;
 - Integration with mobile phones;
 - Precise timing (as for ATMs and power grids);
 - Mapping and geodetic data capture;
 - Terrestrial navigation aid for hikers and travellers;

- ▶ Visual and voice navigation for drivers.
- ▶ Precision surveys
- **Transporters of resources such as mined ore, coal and sand** in various states currently use GPS-based systems to check pilferage and fudging. NavIC can be used in these sectors as a **vehicle tracking application** that is tied to revenue sharing systems of the government.
- Recently the government mandated that **all national-permit vehicles must have tracking devices**. As a pilot, many fishing boats were fitted with these devices that have a unique texting facility. NavIC will be used in extending this facility.
- Lately NavIC was used to **assess safety of unmanned level crossing**.
- NavIC support would be **available for Original Equipment Manufacturers (OEMs)**. This will enhance the use of NavIC on **mobile, automotive and Internet of Things (IoT) devices**.
- Since now Indian companies and start-ups can do the designing part, the **potential market for NavIC-based products and integrated circuits** can be very large.
- Isro wants **chipmakers to integrate NavIC in all upcoming handsets** that would be sold in India. Now, **Qualcomm Technologies, Inc.** (a leading producer of semiconductor chips) is set to add NavIC-chipsets across its user base.

Original Equipment Manufacturer (OEM) is a company that manufactures or develops something that is sold by another company under their own name and branding. In the computer world, it can refer to both hardware and software.

Example: Apple does not make all the components in an iMac. While Apple designs the computer, it incorporates components from other manufactures. An iMac might contain an Intel processor and Micron RAM. In this case, Intel and Micron are processor and micron OEMs, respectively.

L band refers to the operating frequency range of 1–2 GHz in the radio spectrum. The wavelength range of L band is 30–15 cm. The L band is one of the chief operating ranges used by various applications such as radars, global positioning systems (GPS), radio and telecommunications, and aircraft surveillance. The L band has a low bandwidth due to its low frequency, and is the easiest to implement for many applications due to this low frequency. The equipment needed is less sophisticated less expensive.

■ Will commercialisation of NavIC be a success?

- **No advantage economies of scale:** The success of **GPS**, which Navic seeks to replace, is due to the **enormous volumes of devices** that use the service. Commercially the biggest users of GPS are the positioning, navigation and location industries. Today every smartphone has a GPS chip inbuilt that provides location and navigation services **free of cost via Google Maps**. Augmented Reality apps using GPS make for a very powerful and useful handheld device. NavIC does not have this **advantage of volume**
- **NavIC was a late-comer:** Navic, being a late-comer, **could not get allocations in the L1 and L2 bands** but was allocated L5 and S bands. The problem is that **S band cannot be used globally**. This is because International Telecommunications Union (ITU) cleared S band only for Region 3 (Asia and Oceania). It is for secondary use in region1 (Europe and Africa). Hence most modern civilian receivers (that use L1, L2C and L5) can only receive Navic L5 signals, but not the S band signal.
- **S band Antenna issue:** The **S band receiver and antenna is quite different** from the L band receiver and antenna. While ISRO has overcome this issue by developing a suitable receiver and antenna combination, it is **doubtful if the smartphone industry will pick this up**. Hence, Indian users may have to use a separate global smartphone when they go abroad. But if ITU opens up S band, this issue can be resolved.
- **NavIC- a defence workhorse:** The evolution of NavIC centres on the need for precision data during the Kargil war. This was then an exclusivity only of the US Defence forces, and was denied by the US. The sovereign **need for precision data in modern warfare** including missile control led to the evolution of NavIC. Hence commercialisation of Navic is only an value addition, because mainly Navic will become the workhorse for the Defence forces.

CONCLUSION

- Given the prevalence of so many location-oriented apps, ISRO believes that it is a business opportunity to make the most of by commercialising the indigenous NavIC system. While, in future NavIC will mostly be a defence workhorse, its application in civilian arena can be accelerated efficiently, for Navic to pay for itself.

Crypto Currencies

ABOUT

- Also, banning the consumption of a good or service doesn't really mean that people will stop consuming it.

■ What is Crypto Currency and general information?

- A crypto currency is a digital asset designed to work as a medium of exchange that uses strong cryptography to secure financial transactions, control the creation of additional units, and verify the transfer of assets.
- A crypto currency is a digital or virtual currency that uses cryptography for security.
- A crypto currency is difficult to counterfeit because of this security feature.
- Many crypto currencies are decentralized systems based on block chain technology, a distributed ledger enforced by a disparate network of computers.
- The first block chain-based crypto currency was Bit coin, which still remains the most popular and most valuable.

■ Advantages of Using Crypto currency

- Easy access and globally recognized:** Crypto currency is readily accessible to all its intended users. It is a decentralized system of currency which can be used and accessed globally. In the case of Fiat currency the value of Euro, Dollar or yen may go up or down, but in the case of crypto currency, the market remains worldwide the same.
- Quick and easy payments:** It is a quick transaction process. It takes hardly a few minutes to initiate a transaction. You have no obligation to disclose and share your personal details unless the details of your crypto wallet. Only the payer and the receiver will get to know about the payment and transaction and that is completely secured.
- Facility of faster settlement:** Being based on Block chain, crypto currency works in the peer-to-peer algorithm and the payment settlement gets completed flawlessly almost immediately.
- Private and secured:** Cybercrime has become a global threat and doing online financial transaction has become extremely irksome due to the risk of identity theft, phishing, unwanted tracking of the regulatory body, non-transparency in the online payment system, etc. Crypto currency is private as well as secured.
- Facilitate e-commerce trade:** It is a global currency and there is no restriction of using or paying by this global currency, which is easier and convenient for business and shopping portals. If the ultimate aim of an e-commerce portal is to business, crypto currency transaction can simply facilitate that. If e-commerce is the ultimate of global business, crypto currency can be the global currency for facilitating the business worldwide.
- Free from the risk of identity theft:** With block chain integration in crypto currency, the risk of identity theft is not prevalent at all.

■ Disadvantages of Using Crypto currency

- Difficult to understand:** Crypto currency is a new age currency and based on quite complicated block chain technology. It has lots of tweaks and twists in its learning curve. Without understanding the nitty-gritty of crypto currency, it is unsafe to deal with it.

- **Uncertainty and volatility:** The market for crypto currency is quite volatile hence it is unpredictable. It can be risky to invest in crypto currency without understanding its risk factors. Because of its volatile market, a group of people still feel uncertain about dealing with this digital currency.
- **Still not accepted by all:** Although crypto currency is a global concept and people have gained adequate knowledge about it, it is not accepted still by all. Some countries in the world have not legalized the use of crypto currency, and that is the reason, buying and selling via crypto currency is still some uncertain.
- **No way to reverse the payment:** Unlike check stop payment or request for cancellation of NEFT, it is next to impossible to stop the transaction of crypto currency once it is done. This irrevocable nature of payments may create a problem in business dealings, which cannot be countered.
- **Losing wallet:** If a user forgets his crypto wallet password, it is not possible to revive the lost data because of tight security encrypted block chain integration, which can be disastrous for its users.
- **Problem of scaling:** The crypto currency transaction speed can be limited due to the smart contract design. However, only by proven design, this problem of scaling can be solved, and it is expected also that in near-future crypto currency programmer will be able to sort out this scaling issue.

Tackling Cyber Bullying

INTRODUCTION

- The increasing access to affordable data service has given rise to these faceless evil worldwide - young children, in particular teenagers, being the most vulnerable victims. One in every three young people has reported to be a victim of cyber bullying, according to a survey conducted by UNICEF in as many as 30 countries.
- The problem is particularly bad in India which had the highest rate of parents confirming instances of cyber bullying. A total of 37% of parents across India said their child was bullied online, 14% among them said the bullying occurred on a regular basis. Studies show cyber bullying can cause profound harm as it can quickly reach a wide audience, and can remain accessible online indefinitely, virtually following its victims online for life.

■ What is cyber bullying and how it is prevalent in world?

● Cyber bullying:

- It is bullying that takes place over digital devices like cell phones, computers, and tablets. Cyber bullying can occur through SMS, Text, and apps, or online in social media, forums, or gaming where people can view, participate in, or share content.
- It includes sending, posting, or sharing negative, harmful, false, or mean content about someone else. It can include sharing personal or private information about someone else causing embarrassment or humiliation. Some cyber bullying crosses the line into unlawful or criminal behaviour.

● The most common places where cyber bullying occurs are:

- Social Media, such as Facebook, Instagram, Snapchat, and Twitter.
- SMS (Short Message Service) also known as Text Message sent through devices.
- Instant Message (via devices, email provider services, apps, and social media messaging features)

● Most of the cases of cyber bullying could be categorized in two main parts:

- **Hate speech:** Somebody wants to express its hatred towards a particular out of its particular grudge.
- A person harms a person through gossip and rumour.

● **Cyber bullying throughout world:**



CYBER BULLYING WORKDWIDE (2018)	
COUNTRY	CHILDREN CYBERBULLIED (IN %)
India	37
Brazil	29
United States	26
South Africa	26
Belgium	25
Japan	5
Russia	1

■ **What are the cyber bullying cases and how do the police tackle them?**

- Cyber bullying does not qualify in the category of cognizable criminal offences. Only if it is in aggregated form. For example, someone created fake profile of others and used that account for detrimental things that only qualifies as offence of impersonation.
- Most of the time the victim is a juvenile but at the same time the person who is committing this crime is also a juvenile and therefore this is covered under juvenile justice act. So the role of police authority in the conventional manner is limited hence registering an FIR and arresting the juvenile, these scenarios are not possible.
- In case bullies are not teenagers then the police deal with such perpetrators under the conventional provisions of the law and they will be treated as the ordinary criminals are treated.

■ **Do any of law in India explicitly define cyber bullying?**

- The term cyber bullying is neither mentioned in the Information Technology act 2000 nor in the Protection of Children from Sexual Offences (POCSO) Act, 2012. But there are certain provisions that tackle the problem of the same kind as that of cyber bullying

Sections of Indian Penal Code:

- Sec.66A – Sending offensive messages through communication service, etc.
- Sec.66C – Identity Theft.
- Sec.66D – Cheating by personation by using the computer resource.
- Sec.66E – Violation of privacy.
- Sec.67B – Punishment for publishing or transmitting of material depicting children in any sexually explicit act, etc. in electronic form.
- Sec.72 – Breach of confidentiality and privacy.
- Sec.503 – Sending threatening messages through email.
- Sec.509 – Word, gesture or act intended to insult the modesty of a woman.
- Sec.499 – Sending defamatory messages through email.
- Sec .500 – Email Abuse.

- **Anti-ragging law:** The central legislations keeps check on the practice of ragging in India through
 - Indian Penal Code
 - UGC Regulations On Curbing The Menace Of Ragging In Higher Educational Institutions, 2009
 - And other institute specific regulations.
- If an act of person is an intimidation or threat, or somebody is threatening another person by making a video to make it viral just to disparate somebody's reputation is also an act of cyber bullying which falls under **Indian Penal Code (IPC)**.
- If an act of person is an identity theft then it goes under **IT act**.

These all are punishable offences up to 3 years imprisonment and fine.

■ How does cyber bullying affects people?

- Same kind of effects happens in cyber bullying as the case of physical bullying but the cyber bullying goes indefinitely and impacts mentally.

■ Effects of cyber bullying:

- Sleep can be affected.
- Increasing tensions and anxiety.
- Appetite disturbances.
- Inability to concentrate on studies.
- Many students can become fearful of the school environment.

- 1 in 3 young people victims of online bullying
- 1 in 5 youngsters skipped classes due to internet bullying / violence
- Social media favoured medium for cyber bullies
- Facebook, Instagram, Snapchat, Twitter commonplace sites of cyber bullying

■ What are the government initiatives?

- **Guidelines by NCERT:** Because of lack of awareness about cyber bullying among the children's, teachers as well as the parents, NCERT came up with three guideline booklets one for teachers one for school and one for students. For students it's in the form of DO's & DON'Ts.
- **For case reporting:** Government of India is come up with ministry of home affairs Cybercrime reporting portal **cybercrime.gov.in**.
- **For creating Awareness:** For generating awareness in state of Delhi, Delhi police has come up with an initiative in which Police visits school administration to get aware of cyber bullying and also engage workshops for computer teachers.

■ What should be done?

● Parental controls and checks:

- Setting up some guidelines or rules to control misuse of internet.
- Controlling browsing level and limiting the usage of WIFI etc.
- **Net etiquettes:** Child needs to tell what to watch and what not to watch.
- Parents itself need to restrict their abusive language.

- **Licencing** like child licence and parents license can help restrict the content available for children.

- **Knowledge sharing:** Most of the people in the society don't know about cyber bullying. So through seminars, advertisements and knowledge sharing platforms the awareness about it can be created.

● Use of Artificial intelligence:

- Tools can be developed which can analyse the behaviour of every internet user. So it can help prevent the user from falling into cyber bullying.
- Developing some mobile applications that can alert parents if the child is under threat of cyber bullying.
- Prevent malware attacks by tying up with antivirus agencies.

- **Academic measures:**

- ▶ The subjects related to cyber bullying and cyber security should be made mandatory instead of only guidelines.
- ▶ In school there should be cyber cell where one could report their grievances whether by its name or anonymously.
- **Multipronged approach to handle cases:** Need to handle the cases of cyber bullying through multipronged approach such as counselling through Psychiatrist, approaching police, etc.

CONCLUSION

The cyber bullying is far more rampant and serious than we make out to be. The answer to online bullying and trolling is not to troll perpetrator because it will lead to vicious cycle. So we need to teach our children to stand up to bullying. But that does not mean flooding the wall of bullying with much more hate. It is the responsibility of society to report and prevent cyber bullying.

Artificial Intelligence Versus Human Intelligence

■ What is Artificial Intelligence?

- AI might just be the single largest technology revolution of our life times, with the potential to disrupt almost all aspects of human existence.
- With many industries aggressively investing in cognitive and AI solutions, global investments are forecast to achieve a compound annual growth rate (CAGR) of 50.1% to reach USD57.6 billion in 2021.

- **Definition:**

- ▶ AI is a constellation of technologies that enable machines to act with higher levels of intelligence and emulate the human capabilities of sense, comprehend and act.
- ▶ Thus, computer vision and audio processing can actively perceive the world around them by acquiring and processing images, sound and speech.
- ▶ An AI system can also take action through technologies such as expert systems and inference engines or undertake actions in the physical world. These human capabilities are augmented by the ability to learn from experience and keep adapting over time.
- ▶ AI systems are finding ever-wider application to supplement these capabilities across enterprises as they grow in sophistication.
- ▶ Irrespective of the type of AI being used, however, every application begins with large amounts of training data. In the past, this kind of performance was driven by rules-based data analytics programs, statistical regressions, and early "expert systems." But the explosion of powerful deep neural networks now gives AI something a mere program doesn't have: the ability to do the unexpected.

- **Significance of Artificial Intelligence over Human Intelligence:**

- ▶ AI reduces error due to big data and logical analysis hence improves accuracy and saves time.
- ▶ AI can work in a hostile environment efficiently without threat to human example space, mines, deep oceans.
- ▶ AI replaces humans in repetitive and tedious work and reduces fear of inconsistency example automation robot.
- ▶ It doesn't get tired, unlike humans, for example, performing car assembly or long medical surgeries.

- ▶ Reduces delay and cost, improves response and quality, for eg., crime-solving, weather predictions.
- ▶ Increases certainty and stability in decisions.
- ▶ Natural language processing:: Which increases interaction; personal assistants, for eg., Siri (Apple Inc.).
- ▶ Machine vision, for example, Valera based system to drive driverless cars, medical imaging.
- ▶ Smart robots and prosthetics to augment disabled.

■ Application of AI:

● In Economy:

○ Fourth Industrial Revolution:

- ▶ Artificial Intelligence (AI) is a key driver of the Fourth Industrial Revolution. Its effect can be seen in homes, businesses and even public spaces.
- ▶ In its embodied form of robots, it will soon be driving cars, stocking warehouses and caring for the young and elderly.

● Manufacturing:

- ▶ The manufacturing industry is expected to be one of the biggest beneficiaries of AI-based solutions, thus enabling 'Factory of the Future' through flexible and adaptable technical systems to automate processes and machinery to respond to unfamiliar or unexpected situations by making smart decisions.

● Smart Mobility:

- ▶ It includes transports and logistics like autonomous fleets for ride-sharing, semi-autonomous features such as driver assist, and predictive engine monitoring and maintenance.

● Retail:

- ▶ The retail sector has been one of the early adopters of AI solutions, with applications such as improving user experience by providing personalised suggestions, preference-based browsing and image-based product search.

● Energy:

- ▶ Potential use cases in the energy sector include energy system modelling and forecasting to decrease unpredictability and increase efficiency in power balancing and usage.
- ▶ In renewable energy systems, AI can enable storage of energy through intelligent grids enabled by smart meters, and also improve the reliability and affordability of photovoltaic energy.
- ▶ Similar to the manufacturing sector, AI may also be deployed for predictive maintenance of grid infrastructure.

● Banking:

- ▶ AI as customer care, for example, Laxmi at Union Bank, Eva at HDFC Bank.
- ▶ Artificial Intelligence is the future of banking as it brings the power of advanced data analytics to combat fraudulent transactions and improve compliance.
- ▶ AI algorithms accomplish anti-money laundering activities in few seconds, which otherwise take much more time.

■ In the Social Sphere:

● Healthcare:

- ▶ Application of AI in healthcare can help address issues of high barriers to access to healthcare facilities, particularly in rural areas that suffer from poor connectivity and limited supply of healthcare professionals.

● Education and Skilling:

- AI can potentially solve for quality and access issues observed in the Indian education sector.
- Potential use cases include augmenting and enhancing the learning experience through personalised learning, automating and expediting administrative tasks, and predicting the need for student intervention to reduce dropouts or recommend vocational training.
- For example, "*Thinker Maths*" (personalised teaching app) useful in rural areas where teachers are not willing to go.

● Agriculture:

- AI holds the promise of driving a food revolution and meeting the increased demand for food (global need to produce 50% more food and cater to an additional 2 billion people by 2050 as compared to today).
- It also has the potential to address challenges such as inadequate demand prediction, lack of assured irrigation, and overuse/misuse of pesticides and fertilisers.

■ In Security:

● Cybersecurity:

- User behaviour analysis to predict and detect threat and reduce fraud.
- Reduces crime by studying crime pattern using NCRB data, etc., this improves law and order.
- Psycho-analysis and lie detector tests

● Smart Cities:

- Integration of AI in newly developed smart cities and infrastructure could also help.
- Meet the demands of a rapidly urbanising population and providing them with enhanced quality of life.
- Potential use cases include traffic control to reduce congestion and enhanced security through improved crowd management.

● In the Political sphere:

- Employing AI can predict voting patterns or polls. For example, the US election in which the MogIA used facebook and twitter, etc., along with big data to come up with poll predictions.

■ Threat /Negatives of AI

- Though there are vast prospects, a nascent technology can't be left unchecked especially after cases where:
- Google translator developed own system to process data and bypassed the supervisor.
- Facebook AI developed own language and started communicating which had to be shut down.
- Human intelligence versus machine processing: machines process at high speeds and can learn fast and adapt to it, thus outperform humans.
- Morality issues: AI can be programmed to do any specific task and cannot differentiate between right or wrong.
- Goal-oriented: It may, therefore, use unethical means. The AI is programmed to do something beneficial, but it develops a destructive method for achieving its goal. This can happen whenever we fail to fully align the AI's goals with ours, which is strikingly difficult.
- The AI is programmed to do something devastating: Autonomous weapons are artificial intelligence systems that are programmed to kill. In the hands of the wrong person, these weapons could easily cause mass casualties.
- Moreover, an AI arms race could inadvertently lead to an AI war that also results in mass casualties. To avoid being thwarted by the enemy, these weapons would be designed to be extremely difficult to simply "turn off," so humans could plausibly lose control of such a situation.

- Multi-tasking, consistency and speed have threatened jobs, especially semi-skilled. Thus, it can lead to increasing poverty leading widening inequality.
- Costly and expensive: Especially in India where to invest in costly AI or reducing poverty would still be a dilemma.

- **Limitations of Artificial Intelligence:**

- However, it doesn't matter how much AI excels as it cannot replace humans as it:
 - ▶ *Lacks creativity and human spontaneity:* AI is programmed for routine work, rule-based thus Lacks creativity and human spontaneity.
 - ▶ *Lacks emotions/values/morals:* example a kid and an adult may be drowning. Here, AI would save life based on calculated percentage of survival chances, but a human would go for the child first)
 - ▶ *Socialisation issues:* AI doesn't have five human senses.

Therefore, there is a need for balance of both artificial intelligence(logic) and human intelligence (emotions); both have their own benefits to taken sure world progress to the next level.

- **Artificial Intelligence and India:**

- ▶ India isn't exactly a hub for cutting-edge research in Artificial Intelligence (AI). There are still misconceptions about the fact that Machine Learning, Data Science, and Artificial Intelligence spells to loss of human jobs, hence the hesitation.
- ▶ That is probably the reason, India hasn't spelt out its long-term vision regarding the implementation of Artificial Intelligence. But recent developments have shown that contrary to everyone's belief, people willing to work in the field of AI, get the support they need. Be it on Government level or on a personal level.
- ▶ The focus is on areas such as agriculture, healthcare, education, and infrastructure. There are also moves to channel global Artificial Intelligence talent and resources to develop solutions that can benefit millions at the grassroots.

Bio Fuel

ABOUT

- Bio fuel refers to any fuel that is derived from biomass—that is, plant or algae material or animal waste.
- Feedstock material can be replenished readily, bio fuel is considered to be a source of renewable energy, unlike fossil fuels such as petroleum, coal, and natural gas.
- Bio fuel is commonly advocated as a cost-effective and environmentally benign alternative to petroleum and other fossil fuels
- The term bio fuel is usually used to reference liquid fuels, such as ethanol and biodiesel
- Bio fuels can also include solid fuels like wood pellets and biogas or syngas

■ Bio fuels

- **Jatropha:** Jatropha curcas is multipurpose non edible oil yielding perennial shrub. This is a hardy and drought tolerant crop can be raised in marginal lands with lesser input.
- **Sugarbeet:** Sugar beet is a biennial sugar producing tuber crop, grown in temperate countries.
- **Sorghum:** Sorghum is the most important millet crop occupying largest area among the cereals next to rice. It is mainly grown for its grain and fodder.
- **Pongamia:** There is several non edible oil yielding trees that can be grown to produce bio fuel. Karanja is one of the most suitable trees. It is widely grown in various parts of the country.

■ Categories of bio fuels

- **First generation bio fuels** - First-generation bio fuels are made from sugar, starch, vegetable oil, or animal fats using conventional technology. Common first-generation bio fuels include Bio alcohols, Biodiesel, Vegetable oil, Bio ethers, Biogas.
- **Second generation bio fuels** - These are produced from non-food crops, such as cellulosic bio fuels and waste biomass (stalks of wheat and corn, and wood). Examples include advanced bio fuels like bio hydrogen, bio methanol.
- **Third generation bio fuels** - These are produced from micro-organisms like algae.
- **Fourth Generation Bio fuels** - Fourth Generation Bio-fuels are aimed at not only producing sustainable energy but also a way of capturing and storing CO₂. Biomass materials, which have absorbed CO₂ while growing, are converted into fuel using the same processes as second generation bio fuels. This process differs from second and third generation production as at all stages of production the carbon dioxide is captured using processes such as oxy-fuel combustion. This system not only captures and stores carbon dioxide from the atmosphere but it also reduces CO₂ emissions by replacing fossil fuels.

■ Advantages

- **Cost:** Bio fuels prices have been falling and have the potential to be significantly less expensive than gasoline and other fossil fuels. In fact, ethanol is already cheaper than diesel and gasoline.
- **Source material:** Bio fuels can be manufactured from a wide range of materials including crop waste, manure, and other by-products. This makes it an efficient step in recycling.
- **Renewability:** It takes a very long time for fossil fuels to be produced, but bio fuels are much more easily renewable as new crops are grown and waste material is collected.
- **Security:** Bio fuels can be produced locally, which decreases the nation's dependence upon foreign energy. This way countries can protect the integrity of their energy resources and make them safe from outside influences.
- **Economic stimulation:** Because bio fuels are produced locally, bio fuel manufacturing plants can employ hundreds or thousands of workers, creating new jobs in rural areas. Bio fuel production will also increase the demand for suitable bio fuel crops, providing economic stimulation to the agriculture industry.
- **Lower carbon emissions:** When bio fuels are burned, they produce significantly less carbon output and fewer toxins, making them a safer alternative to preserve atmospheric quality and lower air pollution.

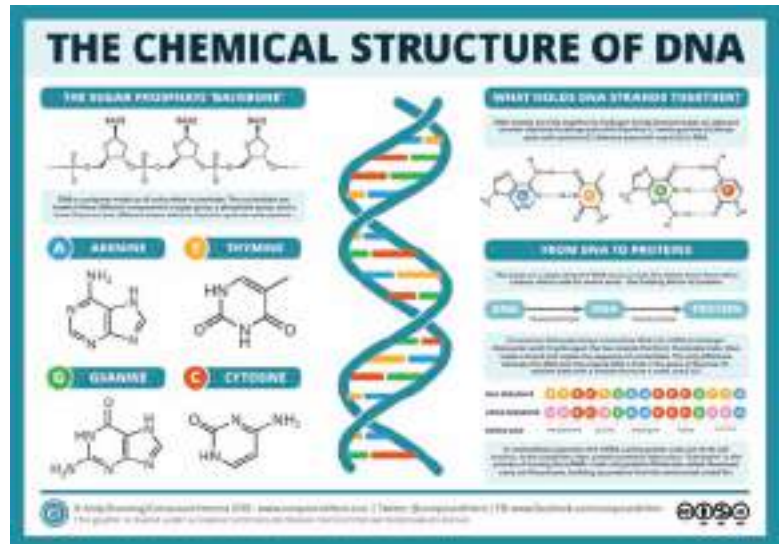
■ Disadvantages

- **Energy output:** Bio fuels have a lower energy output than traditional fuels and therefore require greater quantities to be consumed in order to produce the same energy level. Thus, it is believed that bio fuels are not worth the work to convert them to ethanol rather than electricity.
- **Production carbon emissions:** The process to produce the fuel - including the machinery necessary to cultivate the crops and the plants to produce the fuel - has hefty carbon emissions. In addition, cutting forests to grow crops for bio fuels adds to carbon emissions.
- **High cost:** To refine bio fuels to more efficient energy outputs, and to build the necessary manufacturing plants to increase bio fuel quantities, a high initial investment is often required, making its production currently more expensive than other ways to fuel cars.
- **Food prices:** As demand for food crops such as corn grows for bio fuel production, it raises prices for necessary staple food crops.
- **Food shortages:** There is concern that using valuable cropland to grow fuel crops could have an impact on the cost of food and could possibly lead to food shortages.
- **Water use:** Massive quantities of water are required for proper irrigation of bio fuel crops as well as to manufacture the fuel, which could strain local and regional water resources.

Genome Sequencing

■ DNA and its structure

- Deoxyribonucleic acid, as DNA, is a complex molecule that contains all of the information necessary to build and maintain an organism. All living things have DNA within their cells. In fact, nearly every cell in a multicellular organism possesses the full set of DNA required for that organism.
- The DNA molecule consists of two strands that wind around one another to form a shape known as a double helix.
- Each strand has a backbone made of alternating sugar (deoxyribose) and phosphate groups. Attached to each sugar is one of four bases--adenine (A), cytosine (C), guanine (G), and thymine (T). The two strands are held together by bonds between the bases; adenine bonds with thymine, and cytosine bonds with guanine.
- The sequence of the bases along the backbones serves as instructions for assembling protein and RNA molecules



■ Genome sequencing

- Genome sequencing is a method used to determine the precise order of DNA nucleotides, or bases -Adenine, Cytosine, Guanine, and Thymine- that make up an organism's DNA.
- These bases provide the underlying genetic basis (the genotype) for telling a cell what to do, where to go and what kind of cell to become (the phenotype).
- Nucleotides are not the only determinants of phenotypes, but are essential to their formation.
- Each individual and organism has a specific nucleotide base sequence.
- Human genome** is made up of 23 chromosome pairs with a total of about 3 billion DNA base pairs. There are 24 distinct human chromosomes: 22 autosomal chromosomes, plus the sex-determining X and Y chromosomes.

■ Importance of Genome Sequencing

- It helps finding the locations of the genes much more easily and quickly.
- It can help to understand how the genome as a whole works—how genes work together to direct the growth, development and maintenance of an entire organism.
- It would help in determining the thousands of nucleotide variations associated with specific genetic diseases, like Huntington's, which may help to better understand these diseases and advance treatment.
- Genes account for less than 25 percentage of the DNA in the genome. So knowing the entire genome sequence will help scientists study the parts of the genome outside the genes like junk DNA or regulatory regions that control how genes are turned on and off.
- With advances in technology, it has started to guide treatments for common cancers and is also being used to determine which medications are safe on a person-by-person basis.
- It can also help in agricultural sector. It can help identify genes governing the required trait and thus develop a new crop variety by breeding.

■ Challenges

- **Data interpretation** – There are practical challenges regarding the interpretation of data even with advancement of technology.
- **Limits to disease prediction** - As most of the genetic variants in the human genome are still not fully understood.
- **Lack of trained physicians** - Most physicians is not well trained in interpreting genetic data and so many are unwilling to work with their patients DNA results.
- **Data storage** – such a large amount of generated data needs huge storage space.

■ India and genome sequencing

- India didn't join **Human Genome Project** initiated in 1990s to determine DNA sequence.
- However, India is involved with a **100k GenomeAsia project** to sequence the whole genomes of 100k Asians, including 50,000 Indians.
- Council of Scientific and Industrial Research (CSIR) is also undertaking the genome sequences of nearly 1000 rural youth of India.
- Genome sequencing of endangered animals like Asiatic Lion and Royal Bengal Tiger has been done to understand their evolutionary linkages, perform comparative studies with other big cats and helps in preservation.
- India has been investing in various Next Generation Sequencing (NGS) facilities to expand its research base on genome sequencing.

Human Genome Project (HGP)

- It was the international, collaborative research program whose goal was the complete mapping and understanding of all the genes of human beings.
- It was a 13-year-long, publicly funded project initiated in 1990 coordinated by the National Institutes of Health and the U.S. Department of Energy.
- It helped to develop modern sequencing techniques, which have vastly improved the efficiency while reducing the costs of genomic research.
- It read the genetic code of just one species, Homo sapiens, between 1990 and 2003.

Human Genome Project - Write (HGP - Write)

- It's a proposed second Human Genome Project
- It is believed that to truly understand our genetic blueprint, it is necessary to "write" DNA and build human (and other) genomes from scratch.

About 100k genome Asia project

- The project aims to sequence 100,000 Asian individuals in hopes of accelerating precision medicine applications for Asian populations.
- It would be used to understand the population history and substructure of the region.

Gaganyaan Mission

■ About the mission

- The programme will make India the fourth nation in the world to launch a Human Spaceflight Mission. So far, only the USA, Russia and China have launched human spaceflight missions.

- ISRO has developed some critical technologies like re-entry mission capability, crew escape system, crew module configuration, thermal protection system, deceleration and floatation system, sub-systems of life support system etc. required for this programme.
- GSLV Mk-III launch vehicle, which has the necessary payload capability for this mission, will be used to launch Gaganyaan.
- Two unmanned Gaganyaan missions will be undertaken prior to sending humans.
- The mission will aim to send a three-member crew to space for a period of five to seven days.
- The spacecraft will be placed in a low earth orbit of 300-400km.
- The total programme cost is expected to be less than Rs. 10,000 crores.
- With the ability to hold one oxygen cylinder, the suit will allow the astronaut to breathe in space for 60 minutes.
- The capsule will rotate around the Earth every 90 minutes, and astronauts will be able to witness sunrise and sunset.
- The three astronauts will be able to see India from space every 24 hours, while they conduct experiments on micro-gravity.
- For its return, the capsule will take 36 hours, and will land in the Arabian Sea, just off the coast of Gujarat.
- ISRO will receive assistance from the French space agency CNES, in terms of expertise various fields including space medicine, astronaut health monitoring, radiation protection and life support.

● Objectives of the Mission

- ▶ Enhancement of science and technology levels in the country
- ▶ A national project involving several institutes, academia and industry
- ▶ Improvement of industrial growth
- ▶ Inspiring youth
- ▶ Development of technology for social benefits
- ▶ Improving international collaboration

● About GSLV Mk- III

- ▶ It is a three-stage heavy-lift launch vehicle which will be used to launch Gaganyaan as it has the necessary payload capability.
- ▶ It is designed to carry 4 ton class of satellites into Geosynchronous Transfer Orbit (GTO) or about 10 tons to Low Earth Orbit (LEO).
- ▶ The powerful cryogenic stage of GSLV Mk III enables it to place heavy payloads into LEO's of 600 km altitude.
- ▶ The launcher uses two S200 solid rocket boosters to provide the huge amount of thrust required for lift off.

CONCLUSION

This mission will be a turning point in India's space journey. It will enable ISRO to achieve higher levels of reliability in launch and satellite technology. It will help in providing employment to 15,000 people and out of them, 861 will be from Isro.

3-D Bio-Printing

ABOUT

- **Bio-printing** is an additive manufacturing process where **biomaterials such as cells and growth factors** are combined to create tissue-like structures that imitate natural tissues.
- A material known as **bio-ink** is used to create these structures in a layer-by-layer manner.
- **Bio-ink:** Bio-ink is a combination of living cells and a compatible base, like **collagen, gelatine, hyaluronan, silk, alginate or nanocellulos**. A compatible base provides cells with scaffolding to grow on and nutriment to survive on. The complete substance is based on the patient and is function-specific.
- **Next Big Innovation Lab (NBIL) case:** The NBIL has made human skin with its own 3D bio-printer using 3D bio-printing with a secret bio-ink. It has filed for patents related to its 3D bio-printing process and its bio-ink formulation is a trade secret. Using its internally developed 3D bio-printer gives NBIL a cost advantage.
- **History of bio-printing:** Creation of human skin in a lab for commercial use dates back to 1993 when MatTek, a company founded by two chemical engineering professors at MIT, launched **EpiDerm**.
 - They took live tissue cells from cosmetic surgeries and circumcisions, and then cultured them in petri dishes to produce skin.
 - EpiDerm is a proven in vitro model system for chemical, pharmaceutical and skin care product testing.

■ The process of bio-printing

- **Similar to conventional 3D printing:** Here a digital model becomes a physical 3D object layer-by-layer. However, a living cell suspension is utilized instead of a thermoplastic or a resin.
- **Caution:** In order to optimize cell viability and achieve a printing resolution adequate for a correct cell-matrix structure, it's necessary to **maintain sterile printing conditions**. This ensures accuracy in complex tissues, requisite cell-to-cell distances, and correct output.
- **Key steps in bio-printing:** Several bio-printing methods exist, based on extrusion, inkjet, acoustic, or laser technologies. But the process principally involves **preparation, printing, maturation, and application** which can essentially be summarized into **three key steps**:
 - **Pre bio-printing** involves creating the digital model that the printer will produce. The technologies used are computed tomography (CT) and magnetic resonance imaging (MRI) scans. The 3D imaging should provide a perfect fit of the tissue. Further, 3D modelling is done where the blueprint includes a layer-by-layer instruction in high detail.
 - **Bio-printing** is the actual printing process, where bio-ink is placed in a printer cartridge and deposition takes place based on the digital model. This process involves depositing the bio-ink layer-by-layer, where each layer has a thickness of 0.5 mm or less.
 - **Post bio-printing** is the mechanical and chemical stimulation of printed parts so as to create stable structures for the biological material. As deposition takes place, the layer starts as a viscous liquid and solidifies to hold its shape. This happens as more layers are continuously deposited. The process of blending and solidification is known as crosslinking and may be aided by UV light, specific chemicals, or heat (also typically delivered via a UV light source).

■ Application

- **Medicine and Bio-engineering:** The technique is widely applicable in fields of medicine and bioengineering. Recently, the technology has even made advancements in the production of cartilage tissue for use in reconstruction and regeneration.
 - The process can eradicate the need of organ donation and transplantation.
 - While **organ replacement** is the main objective, but **tissue repair** is also possible in the meantime.
 - With bio-ink, it's much easier to **solve problems on a patient-specific level**, promoting simpler operations.
 - Bone tissue regeneration as well as prosthetics and dental applications.
- **Pharmaceutical testing and reduced need for animal trials:** The bio-printed tissue-like structures mimic the actual micro- and macro-environment of human tissues and organs. This is critical in drug testing and clinical trials, with potential, for example, to drastically reduce the need for animal trials.
 - Treatment for diseases can be tested using artificially affected tissues.
 - This is a more cost-effective and ethical option.

- **Cosmetic surgery:** Cosmetic surgery, particularly plastic surgery and skin grafting, also benefits from this technology. Victims of burns and other wounds could get relief from its commercial availability, once it is developed further to be good enough for grafting.

■ Concerns

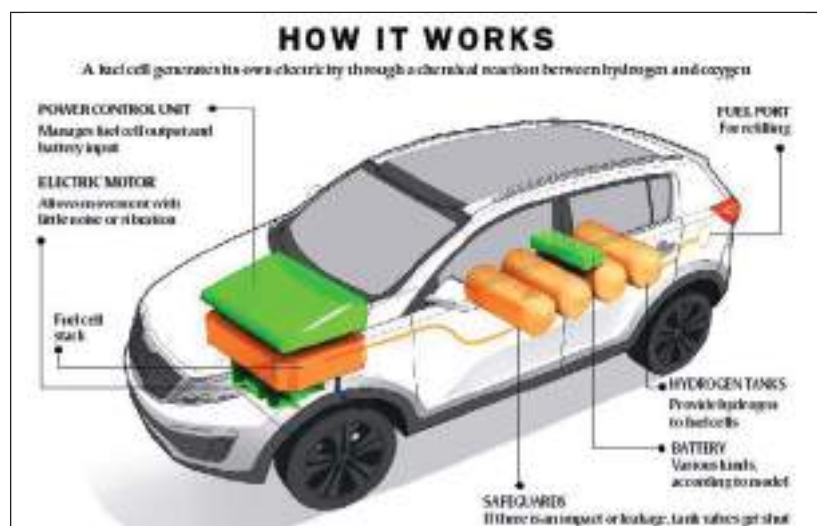
- **Hype:** Many new developments are over-hyped as the ultimate and ready-to-use breakthroughs in the field of 3D bio-printing, when in fact there are many unsolved problems in tissue engineering before complex organs like the heart, kidney and liver can be bio-printed.
- **Vasculature:** The vasculature—network of blood vessels that feeds the organ—is still a challenge. The vasculature still has to be developed to allow lab skin to integrate with the human body's blood vessels.
 - ▶ Stem cell engineering to grow all the cells of an organ in a personalised way to avoid rejection by the recipient's immune system is another challenge.
 - ▶ Researchers still have to ensure that a lab organ will work with all the other organs in a human body.
- **Regulatory concerns:** The future of 3D bio-printed tissues and organs depend on regulatory clearances and getting the technology right.
- **Moral and ethical concern:** The entire process is also criticized from a moral and ethical perspective.

Hydrogen-Based Cars

ABOUT

- A hydrogen car is a vehicle that uses hydrogen fuel for motive power (energy used to drive machinery).
- Hydrogen vehicles include hydrogen-fueled space rockets, as well as automobiles and other transportation vehicles.
- The power plants of such vehicles convert the chemical energy of hydrogen to mechanical energy either by burning hydrogen in an internal combustion engine, or by reacting hydrogen with oxygen in a fuel cell to run electric motors.
- Widespread use of hydrogen for fueling transportation is a key element of a proposed hydrogen economy.
- **India is looking closely at Japan**, which has made progress in this field.

■ How does the hydrogen fuel cell work?



- At the heart of the fuel cell electric vehicles (FCEV) is a device that uses a source of fuel, such as hydrogen, and an oxidant to create electricity by an electrochemical process.
- The fuel cell combines hydrogen and oxygen to generate electric current, water being the only byproduct.
- Like conventional batteries under the bonnets of automobiles, hydrogen fuel cells too convert chemical energy into electrical energy.
- From a long-term viability perspective, FCEVs are billed as vehicles of the future, given that hydrogen is the most abundant resource in the universe.
- The hydrogen fuel cell vehicle market is dominated by Japan's Toyota and Honda, alongside South Korea's Hyundai.
- The successful development of hydrogen would provide energy for transportation and electric power.

■ What are the advantages and disadvantages of fuel cells?

● Advantages

- ▶ They produce much smaller quantities of greenhouse gases and none of the air pollutants that cause health problems.
- ▶ Pure hydrogen fuel cells emit only heat and water as a byproduct. Such cells are also far more energy efficient than traditional combustion technologies.
- ▶ Unlike battery-powered electric vehicles, fuel cell vehicles do not need to be plugged in.

● Disadvantages

- ▶ The process of making hydrogen needs energy — often from fossil fuel sources that has raised questions over hydrogen's green credentials.
- ▶ Questions of safety are of great concern as hydrogen is more explosive than petrol.
- ▶ The vehicles are expensive, and fuel dispensing pumps are scarce. But this should get better as scale and distribution improves.

● What is the progress in India?

- ▶ In India, so far, the definition of EV only covers BEVs; the government has lowered taxes to 12%. At 43%, hybrid electric vehicles and hydrogen FCEVs attract the same tax as IC vehicles.
- ▶ The Ministry of Science and Technology has supported two networked centres on hydrogen storage led by IIT Bombay and Nonferrous Materials Technology Development Centre, Hyderabad. These involve 10 institutions, including IITs, and IISc, Bangalore.

Electric Vehicles V. Hydrogen Vehicles	
Electric Vehicles	Hydrogen Vehicles
◦ Whereas conventional vehicles burn fuel in an internal combustion engine, battery-powered electric vehicles don't have an engine. Instead, they use energy stored in batteries to power one or more electric motors. ◦ They are also capable of producing instant torque and smoother acceleration than conventional cars. ◦ But they are not environment friendly if the electricity used to charge the electric vehicle comes from a coal power plant. ◦ Electric vehicles are also limited by the range they can travel on a single battery charge.	◦ Fuel cell vehicles are also driven by an electric motor, but instead of being powered by a battery, they create the electricity in an onboard fuel cell, usually using oxygen from the air and stored hydrogen. ◦ The main disadvantages of today's hydrogen fuel cell vehicles are the lack of sufficient infrastructure for hydrogen refueling, and the cost of the catalysts. ◦ Pure hydrogen fuel cells emit only heat and water as a byproduct. Such cells are also far more energy efficient than traditional combustion technologies. ◦ Fuel cell vehicles don't have the same range limitations as battery-powered vehicles because they can simply store more (hydrogen) fuel.

CONCLUSION

- Hydrogen's proponents point to how clean it is as an energy source as water and heat are the only byproducts and how it can be made from a number of sources, including methane, coal, water, even garbage. However, lack of refuelling stations, which are costly to build, is usually cited as the biggest obstacle to widespread adoption of FCVs. On the other hand, electric vehicles provide a satisfactory alternative to the problems of internal combustion.
- While battery-powered electric vehicles may have a head start on fuel cell vehicles, both technologies are advancing rapidly. It will be interesting to see where they are five years from now

Double Burden of Malnutrition

■ What is Double Burden of Malnutrition?

- The double burden of malnutrition is characterized by the coexistence of undernutrition along with overweight, obesity or diet-related Non Communicable Diseases (NCDs), within individuals, households and populations, and across the life-course.

■ Who is affected by double burden of malnutrition?

The double burden of malnutrition can manifest at three levels:

● At individual level:

- It occurs at individual level through the simultaneous development of two or more types of malnutrition – for example obesity with nutritional anaemia or any vitamin or mineral deficiencies or insufficiencies.
- It can also occur across the life-course and be temporally separated, owing to contrasting nutrition environments resulting from a shift in economic or other circumstances. For example overweight in an adult who was previously stunted from chronic undernutrition during childhood.

● At the household level:

- An example would include nutritional anaemia in a mother, with a child or grandparent who is overweight or has diabetes (type 2).
- The dual-burden household is more common in middle-income countries undergoing rapid nutrition transition.

● At the population level:

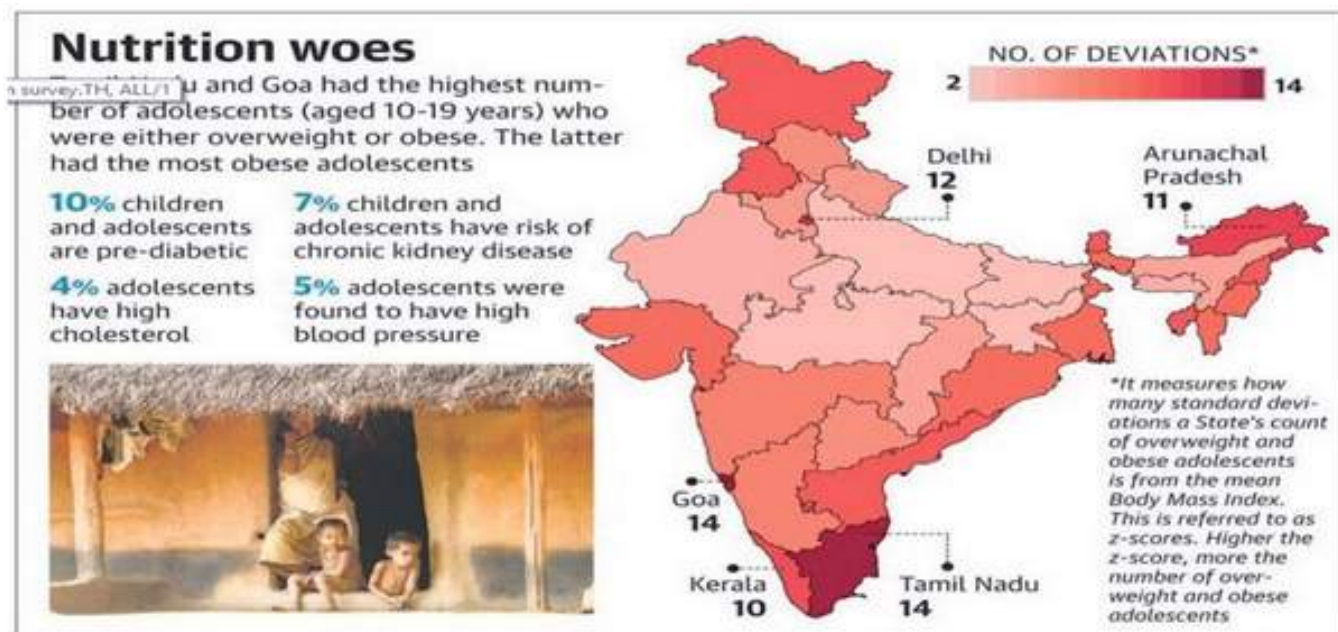
- This burden is also observed at population level with both undernutrition and overweight, obesity or NCDs prevalent in the same community, region or nation.

■ What are the drivers and detriments of the double burden of malnutrition?

The causes of the double burden of malnutrition relate to a sequence of epidemiological changes known as the nutrition transition, the epidemiological transition and the demographic transition.

- The nutrition transition:** It describes the shift in dietary patterns, consumption and energy expenditure associated with economic development over time, often in the context of globalization and urbanization. This change is associated with a shift from a predominance of undernutrition in populations to higher rates of overweight, obesity and NCDs.
- The epidemiological transition:** It describes the changes in overall population disease burden associated with the increase in economic prosperity – with a shift from a predominance of infection and diseases related to undernutrition to rising rates of NCDs.

- **The demographic transition:** It describes the shift in population structure and lengthening lifespans. This sees a transformation from populations with high birth rates and death rates (related to the above transitions), with relatively high proportions of younger people, to populations with increasing proportions of older people (with age also being a risk factor for many NCDs).



5G Debate

ABOUT

■ Timeline: Evolution from 1G to 5G

- **1G:** Launched in the 1980s. Analog radio signals and supported only voice calls.
- **2G:** Launched in the 1990s. Uses digital radio signals and supported both voice and data transmission with a BandWidth(BW) of 64 Kbps.
- **3G:** Launched in the 2000s. With a speed of 1 Mbps to 2 Mbps it has the ability to transmit telephone signal including digitised voice, video calls and conferencing.
- **4G:** With a peak speed of 100 Mbps-1 Gbps it also enables 3D virtual reality.
- **5G:** with a speed of more than 1Gbps, it is capable of connecting entire world without limits.

■ 5th Generation

- 5G is the next generation cellular technology that will provide faster and more reliable communication with ultra low latency.
- With 5G, the peak network data speeds are expected to be in the range of **2-20 Gigabit per second (Gbps)**.
- This is in contrast to 4G link speeds in averaging **6-7 Megabit per second (Mbps)** in India as compared to 25 Mbps in advanced countries.
- In April, South Korea and the U.S. became the first countries to commercially launch 5G services.

■ Benefits of 5G

- **Faster Download:** With 5G technology, consumers will be able to download data heavy content such as 8K movies and games with better graphics in just a few seconds.
- **Emerging Technologies:** The ultra low latency offered by 5G makes the technology desirable for emerging technologies, including driverless vehicles, tele-surgery and real time data analytics, sensor-embedded network that will allow real time relay of information across fields such as manufacturing, consumer durables and agriculture.
- **Transport:** 5G can also help to make transport infrastructure more efficient by making it smart because it will enable vehicle-to-vehicle and vehicle-to-infrastructure communication. Thus, making driverless cars, a reality.
- **Economic Impact:** 5G is expected to create a cumulative economic impact of 1 trillion in India by 2035. Moreover, 5G-enabled digitalisation revenue potential in India will be above 1 trillion in India by 2035. Moreover, 5G-enabled digitalisation revenue potential in India will be above 27 billion by 2026.

■ Challenges

- **Infrastructural Issues:** The first major challenge is that the users will be required to change their current devices in favour of 5G-enabled ones. Another challenge is that these new frequencies offer huge potential in regard to capacity, but the use of these frequencies is challenging due to limited propagation and penetration. Also, there are currently no India-specific use cases for deployment of 5G.
- **Cyber Security:** In the 5G world, cybersecurity challenges and risks will continue to grow as more data pours in and is processed faster than ever before. It is evident by the recently recorded data breaches of 2017 and 2018, as well as the predictions of advanced forms of breaches for 2019.
- **Technical Issues:** There is no unified, rigorously defined standard to guarantee interoperability, nor a methodology to assure continuous and consistent performance.

■ Steps Taken

- The government launched a three-year programme that started in March 2018 to advance innovation and research in 5G with a budget of ₹224 crore.
- Ericsson has also installed a 5G test bed at IIT Delhi for developing applications in the broadband and low latency areas.

Cellular Operators Association of India (COAI)

- COAI was constituted in 1995 as a registered, **non-governmental society**. The Association is dedicated to the advancement of modern communication through the establishment of world-class mobile infrastructure, products and services and to delivering the benefits of innovative and affordable mobile communication services to the people of India.

Electric Vehicle

Debates

Electric vehicles will be a disruption to existing automobile industry. Agree or not?

Will shifting to electric vehicles be beneficial?

What will be the challenges while shifting to the electric vehicles?

■ Why to shift to electric vehicles?

- Environment Friendly -NITI Aayog points out that India can cut 64% of road based mobility related energy demand and 37% of carbon emissions by pursuing shared, electric mobility in future.
- Positive externalities – Controlling emissions, will also positively impact public health as air quality in cities would improve. Apart from this, Electric vehicles create an opportunity for employment generation and pushing domestic industry.
- Energy firms find the prospects attractive as they will invest in setting up charging infrastructure. Electric vehicles thus will spur demand for electricity and help in resolving the stress in power sector.
- A shift to electric vehicles would also help in reducing India's import bill on account of crude oil imports.
- Low maintenance and average running costs.
- Electric vehicles can act as storage devices for excess power generated from renewable sources, thus aligning with the push for solar energy.

● Challenges while shifting to electric vehicles-

- **Availability of Lithium** – India does not have adequate lithium reserves to facilitate manufacture of lithium-ion batteries. Besides, China has been trying to establish a monopoly on lithium reserves by acquiring assets in countries that have rich lithium reserves – such as Bolivia, Chile etc. Thus, securing Lithium supplies could be a major challenge for India.
- **Poor manufacturing base** – The lack of battery manufacturing in India will further make the Indian electric vehicles market dependent on China for imports just as solar power developer's source cheap modules and equipment from China. This does not augur well for the local industry.
- **Enabling environment** – Electric vehicles would also require charging infrastructure to be set up in tandem. Currently, electricity sales in the country are regulated under the Electricity Act and can be carried out with a distribution license from SERCs. To set up a pan-India charging infrastructure, an overhaul of existing regulations is needed.
- **High infrastructure costs involved** – Currently, the cost of setting up a rapid-charging outlet ranges close to INR 25 Lakh, while that of a slow charging station will be around INR 1 Lakh. Building an extensive network of charging stations would, therefore, require substantial investments.
- **More expensive** – Electric vehicles are costlier than traditional cars on account of the cost of Lithium-ion batteries that make up nearly 50% of total costs. Further, EVs are costly on account of components used in them.
- **Performance** – EV cars are not as fast as conventional vehicles.

● Government initiatives:

- **The National Electric Mobility Mission Plan 2020** is one of the most important and ambitious initiatives undertaken by the Government of India that has the potential to bring about a transformational paradigm shift in the automotive and transportation industry in the country. This is a culmination of a comprehensive collaborative planning for promotion of hybrid and electric mobility in India through a combination of policies aimed at gradually ensuring a vehicle population of about 6-7 million electric/hybrid vehicles in India by the year 2020 along with a certain level of indigenization of technology ensuring India's global leadership in some vehicle segments. It is a composite scheme using different policy-levers such as:

● Demand side incentives to facilitate acquisition of hybrid/electric vehicles:

- Promoting R&D in technology including battery technology, power electronics, motors, systems integration, battery management system, testing infrastructure, and ensuring industry participation in the same
- Promoting charging infrastructure

● Supply side incentives:

- Encouraging retro-fitting of on-road vehicles with hybrid kit

- ▶ FAME India - Faster Adoption and Manufacturing of Hybrid and Electric vehicles in India - is a part of the National Electric Mobility Mission Plan.
- ▶ In Fame the customer can get the incentive in the form of lower cost of hybrid or electric vehicles at the time of its purchase. Manufacturers can claim the incentive from the government at the end of each month.

● ISRO involvement

- ▶ Lithium-ion (Li-ion) cell technology is one of the most promising electrochemical energy storage technologies owing to its **high voltage, high energy density, long life cycle and high storage characteristics**. Recent progresses in Li-ion battery technology have made it the favorite power source for electric and hybrid electric vehicles. ISRO's Vikram Sarabhai Space Centre (VSSC) has successfully developed and qualified lithium ion cells of capacities ranging from 1.5 Ah to 100 Ah for use in satellites and launch vehicles.

● Balanced view:

- ▶ As time changes and technology advances we have to adapt ourselves for new changes which will bring positive outcomes. Electric vehicles can be disruptions to the automobile industry if the industry fails to innovate in this new technology. Also, given the positive externalities, electric vehicles are way forward till even more new technology comes which will provide greener transportation. Until then, we must adopt electric vehicles and related technologies.

Big Data Initiative

Debates

Big Data is data whose scale, diversity, and complexity require new architecture, techniques, algorithms, and analytics to manage it and extract value and hidden knowledge from it.

In other words, big data is characterized by volume, variety (structured and unstructured data), velocity (high rate of changing) and veracity (uncertainty and incompleteness). However, the Big Data Initiatives are raising the issue of Right to Privacy also, as it is auto-generated, often without knowledge of people also, for example, US government, Google Corporation, etc. have been collecting data of people accessing internet.

THINKING LINE

Data collection—from medicine, financial institutions, social networking, and many other fields—has exploded over the past decade. And storage costs for this data have plummeted, which makes it easier to justify holding onto data instead of discarding it.

The Indian government has launched a Big Data Initiative, with the following aims:

- Promoting and fostering big data science, technology and applications in India and developing core generic technologies, tools and algorithms for wider applications in the government.
- Understanding the present status of the industry in terms of market size, different players providing services across sectors/ functions, opportunities, SWOT of industry, policy framework (if any), present skill levels available etc.
- Carrying out market landscape surveys to assess the future opportunities and demand for skill levels in next 10 years.
- Carrying out gap analysis in terms of skills levels and policy framework.

- Evolving a strategic road map and action plan clearly defining of roles of various stakeholders - government, industry, academia, industry associations and others with clear timelines and outcome for the next 10 years.

Some of the key actions required for successful implementation of initiative are:

- 1. Talent Pool:** Create industry academia partnership to groom the talent pool in universities as well as develop strong internal training curriculum to advance analytical depth.
- 2. Collaborate:** Form analytics forum across organization boundaries to discuss the pain-points of the practitioner community and share best practices to scale analytics organizations.
- 3. Capability Development:** Invest in long term skills and capabilities that form the basis for differentiation and value creation. There needs to be an innovation culture that will facilitate IP creation and asset development.
- 4. Value Creation:** Building rigor to measure the impact of analytics deployment is very critical to earn legitimacy within the organization.

■ **Concern for Privacy**

- While there are many benefits to the growth of big data analytics, traditional methods of privacy protections often fail. Many notions of privacy rely on informed consent for the disclosure and use of an individual's private data. However, big data means that data is a resource that can be used and reused, often in ways that were inconceivable at the time the data was collected. Anonymity is also eroded in a big data paradigm. Even if every individual piece of information is stripped of personal information, the relationships between the individual pieces can reveal the individual's identity.
- For example, how accurate is personal information obtained from social media? Should information from social media or other Web-enabled sources be used to screen or rank job applications, or increase the price of medical insurance? Basic profile data, such as age, marital status, education or employment, is typically unverified. A similar lack of verification is common in free email services in which the account holder, by accepting terms and conditions, has agreed to relinquish some degree of privacy for data aggregation purposes.
- Another quality issue is the way that Internet search terms or phrases can be misinterpreted, when this type of data is collected. Examples of poor enterprise use of big data would include using Internet search terms to evaluate product pricing or, perhaps, target potential customers. There can be multiple users on a household computer, and there are many reasons why someone might research a subject on the Internet that is not directly relevant to them. This type of data collection, analysis and usage can result in flawed analytic results leading to bad decisions, a lose-lose scenario for both individuals and the organizations acting upon that data. This lack of big data quality control points to another well-established privacy principle, which is to collect personal data that is consistent and appropriate for the intended purpose.
- Big data has the potential to discriminate in two ways. First, it can be used to identify aberrant data amongst larger sets, leading to the use of big data to discriminate against specific groups and activities. Second, big data will be used to draw conclusions about large groups of people, and yet some will be excluded because their data is not included in the sets, or the quality of their data is poorer. It is important to remember that data does not equal truth. It only offers correlations — for example, links between two different types of activities.

Thus for respecting Right to Privacy following principles should be followed:

- To respect the principle of purpose specification.
- To limit the amount of data collected and stored to the level that is necessary for the intended lawful purposes.
- To obtain, where appropriate, a valid consent from the data subjects in connection with use of personal data for analysis and profiling purposes.
- To be transparent about which data is collected, how the data is processed, for which purposes it will be used and whether or not the data will be distributed to third parties.
- To carry out a privacy impact assessment, especially where the big data analytics involves novel or unexpected uses of personal data.
- To exercise great care, and act in compliance with applicable data protection legislation, when sharing or publishing pseudonymised, or otherwise indirectly identifiable, data sets. If the data contains sufficient detail

that is, may be linked to other data sets or, contains personal data, access should be limited and carefully controlled.

Computer Games Addiction and Dangers

Debates

Various studies show that playing too much computer games causes physical damages and increases anxiety and depression in players. The cases of Blue Whale suicides have also came up. What are the steps needed to control this addiction?

THINKING LINE

Many children become addicted to playing these games, and they tend to concentrate more on them than their studies or other aspects of their life such as socializing or playing sports.

■ Negative effects

Internet addiction is nowadays not considered as a bad habit, but a disease. Its several consequences are

● Social consequences

- ▶ It leads to lack of physical interaction with the outside world.
- ▶ He/she may lack face-to-face human contact, experience isolation & loneliness, and the loss of friends or relationships.

● Physical consequences:

- ▶ Many children sacrifice precious time that should have been used to do school work or take part in physical exercises instead of playing computer games.
- ▶ This issue can accelerate when coupled with a poor diet, lack of Vitamin D and limited social interaction.

● Depression:

- ▶ Children often find comfort in playing computer games, and this creates a vicious cycle that can have a problematic effect on their mental health.
- ▶ Most computer games have internal feature that enables players to set targets and monitor their progress. For a child who is obsessed with computer games, failures, and pressures to achieve the set goals leads to stress.

The Blue Whale game or Blue Whale Challenge is believed to be a suicide game wherein a group of administrators or a certain curator gives a participant a task to complete daily — for a period of 50 days — the final of which is the participant committing suicide. Participants are expected to share photos of the challenges/tasks completed by them.

These daily tasks start off easy — such as listening to certain genres of music, waking up at odd hours, watching a horror movie, among others, and then slowly escalate to carving out shapes on one's skin, self-mutilation and eventually suicide.

The challenge is understood as- to find victims, create an emotional bond with them through arbitrary set of steps demanding completion in order to move forward in the game and then hope they follow through to step 50. 'Jump off a high building. Take your life.' It's simply a control and manipulation scheme directed toward vulnerable people who are predisposed to have serious thoughts of suicide, loneliness, and death.

When a person is suicidal, they feel, most of all, alone and worthless. The game creator understands these feelings and is taking advantage of them. Some experts believe these tasks may convince an impressionable young person to hurt themselves because of the “whale’s” influence.

■ Government initiative

Concerned over the issue of Blue Whale challenge, the Ministry of Electronics and Information Technology (MeitY) has written to major technology firms, including Facebook India, Google India, Instagram, Microsoft India, WhatsApp and Yahoo! India, to remove links of such games from their platforms.

Further IT platforms to abide by directions given by IT ministry and “any violation will be taken very seriously”.

■ Solutions for computer game addiction

- Parents can consider app locks or Internet locks on their children’s devices. There are dedicated apps like **‘Family Time’**, which will allow parents to keep track of their children’s gaming and browsing habits, especially if they are addicted to their phones and tablets and laptops.
- **One-to-One counseling with a psychologist or therapist:**
 - This may be the best option if one is able to find an affordable and qualified therapist in his or her area, but unfortunately video game addiction specialists remain quite rare (although this is changing as the problem becomes more prevalent)

It is important to point out that not all computer games are harmful to the growth and development of children. There are education games that children can play during their free time.





An Institute for Civil Services

IAS PRELIMS 2020

PRELIMS TEST SERIES

BATCH: 10 - PT MAXIMA

DAILY TEST

Total 63 Tests:

10 NCERT + 29 Sub Sectional + 6 Sectional +
5 Current Affair + 10 Mock Test + 3 CSAT

STARTS

**1 MARCH
2020**

TEST SCHEDULE

Test No.	Date	Subject	Subject	Topics Covered
Polity (01 March to 08 March, 2020)				
Test 1	1 March, 2020	Polity 1	NCERT	Fundamentals (NCERT 11th & 12th)
Test 2	2 March, 2020	Polity 2	NCERT	Fundamentals (NCERT 11th & 12th)
Test 3	3 March, 2020	Polity 3	Sub-Sectional	Constitutional Development + Preamble + Union Territories + Citizenship
Test 4	4 March, 2020	Polity 4	Sub-Sectional	FR + DPSP + FD + Other Constitutional Provisions such as Emergency Provisions etc.
Test 5	5 March, 2020	Polity 5	Sub-Sectional	Executive + Legislature + Judiciary - 1
Test 6	6 March, 2020	Polity 6	Sub-Sectional	Executive + Legislature + Judiciary - 2
Test 7	7 March, 2020	Polity 7	Sub-Sectional	Governance + Socio Economic Development + Reforms + Bills + Welfare Schemes + Policies
Test 8	8 March, 2020	Polity 8	Sectional	Polity & Governance
Economy (12 March to 18 March, 2020)				
Test 9	12 March, 2020	Economy 1	NCERT	Fundamentals (NCERT 11th & 12th)
Test 10	13 March, 2020	Economy 2	NCERT	Fundamentals (NCERT 11th & 12th)
Test 11	14 March, 2020	Economy 3	Sub-Sectional	Basic Concepts of National Income
Test 12	15 March, 2020	Economy 4	Sub-Sectional	Budgeting + Fiscal and Monetary Policy Agricultural and Industrial Policy
Test 13	16 March, 2020	Economy 5	Sub-Sectional	External Sector + International Institutes
Test 14	17 March, 2020	Economy 6	Sub-Sectional	Money, Banking Financial Market and Other Provisions
Test 15	18 March, 2020	Economy 7	Sectional	Indian Economy
Environment (21 March to 27 March, 2020)				
Test 16	21 March, 2020	Environment 1	NCERT	Fundamentals of Environment (NCERT Biology 12th - Ch. 10 to 16)
Test 17	22 March, 2020	Environment 2	Sub-Sectional	Environment and Ecology
Test 18	23 March, 2020	Environment 3	Sub-Sectional	Biodiversity
Test 19	24 March, 2020	Environment 4	Sub-Sectional	Environmental Pollution and Management
Test 20	25 March, 2020	Environment 5	Sub-Sectional	Climate Change + Global Warming
Test 21	26 March, 2020	Environment 6	Sub-Sectional	Environmental Governance
Test 22	27 March, 2020	Environment 7	Sectional	Environment and Ecology

Test No	Date	Subject	Subject	Topics Covered
HISTORY & CULTURE (30 March to 07 April, 2020)				
Test 23	30 March, 2020	History 1	NCERT	Fundamentals (Ancient + Medieval) (NCERT Old + New 11th & 12th)
Test 24	31 March, 2020	History 2	NCERT	Fundamentals (Modern) (NCERT Old + New 11th & 12th)
Test 25	1 April, 2020	Culture 3	Sub-Sectional	Visual Arts + Performing Arts
Test 26	2 April, 2020	Culture 4	Sub-Sectional	Religions + Languages + Literature + Institutions
Test 27	3 April, 2020	History 5	Sub-Sectional	Ancient India
Test 28	4 April, 2020	History 6	Sub-Sectional	Medieval India
Test 29	5 April, 2020	History 7	Sub-Sectional	Modern India (1757 – 1885)
Test 30	6 April, 2020	History 8	Sub-Sectional	Modern India (1885 – 1947)
Test 31	7 April, 2020	History 9	Sectional	History and Culture of India
GEOGRAPHY (10 April to 18 April, 2020)				
Test 32	10 April, 2020	Geography 1	NCERT	Fundamentals World Geography (NCERT 11th & 12th)
Test 33	11 April, 2020	Geography 2	NCERT	Fundamentals Indian Geography (NCERT 11th & 12th)
Test 34	12 April, 2020	Geography 3	Sub-Sectional	Geomorphology + Indian Physiography
Test 35	13 April, 2020	Geography 4	Sub-Sectional	Climatology + Indian Climate
Test 36	14 April, 2020	Geography 5	Sub-Sectional	Oceanography + Biogeography
Test 37	15 April, 2020	Geography 6	Sub-Sectional	Demography + Human Geography + Census
Test 38	16 April, 2020	Geography 7	Sub-Sectional	Economic Activities + Agriculture + Minerals + Energy
Test 39	17 April, 2020	Geography 8	Sub-Sectional	Industry + Transport + Trade + Communication
Test 40	18 April, 2020	Geography 9	Sectional	Geography of India and World
SCIENCE & TECHNOLOGY (21 April to 25 April, 2020)				
Test 41	21 April, 2020	Science & Tech 1		NCERT Biology + Everyday Science + + Institutions + Award
Test 42	22 April, 2020	Science & Tech 2		Sub-Sectional Biotechnology + Health + Nuclear tech
Test 43	23 April, 2020	Science & Tech 3		Sub-Sectional Space + Defence
Test 44	24 April, 2020	Science & Tech 4		Sub-Sectional IT + Telecom + IPR + Nanotech + Robotics
Test 45	25 April, 2020	Science & Tech 5		Sectional Science and Technology
CSAT (28 April to 30 April, 2020)				
Test 46	28 April, 2020	CSAT-1	Sectional	Reasoning
Test 47	29 April, 2020	CSAT-2	Sectional	General Mental Ability
Test 48	30 April, 2020	CSAT-3	Sectional	Reading Comprehension
CURRENT AFFAIRS (03 May to 07 May, 2020)				
Test 49	3 May, 2020	Current Affairs-1		Current Affairs June + July + August 2019
Test 50	4 May, 2020	Current Affairs-2		Current Affairs September + October, 2019
Test 51	5 May, 2020	Current Affairs-3		Current Affairs Nov + Dec 2019 + Jan, 2020
Test 52	6 May, 2020	Current Affairs-4		Current Affairs Feb + March + April, 2020
Test 53	7 May, 2020	Current Affairs-5		Current Affairs Economy Survey + Budget + Indian Year Book 2020
FULL MOCK TESTS (08 May to 19 May, 2020)				
Test No.	Date	Test		
Test 54	8 May, 2020	MOCK 1 PAPER 1 & 2		
Test 55	9 May, 2020	MOCK 2 PAPER 1 & 2		
Test 56	12 May, 2020	MOCK 3 PAPER 1 & 2		
Test 57	13 May, 2020	MOCK 4 PAPER 1 & 2		
Test 58	14 May, 2020	MOCK 5 PAPER 1 & 2		
Test 59	15 May, 2020	MOCK 6 PAPER 1 & 2		
Test 60	16 May, 2020	MOCK 7 PAPER 1 & 2		
Test 61	17 May, 2020	MOCK 8 PAPER 1 & 2		
Test 62	18 May, 2020	MOCK 9 PAPER 1 & 2		
Test 63	19 May, 2020	MOCK 10 PAPER 1 & 2		

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