

Gist of **YOJANA**

VOL.01

January 2021



India@75

75 years of Independence

Democracy, Polity and
Governance

Industry@75

Education for New India

Successful Endeavour in Space

Outstanding performance by BYJU'S students in IAS 2019

Congratulations to our toppers

04 Ranks in Top 10

09 Ranks in Top 20

13 Ranks in Top 50

22 Ranks in Top 100



RANK 03

Pratibha Verma



RANK 06

Vishakha Yadav



RANK 08

Abhishek Saraf



RANK 10

Sanjita Mohapatra



RANK 11

Nupur Goel



RANK 12

Ajay Jain



RANK 14

Anmol Jain



RANK 16

Gunjan Singh



RANK 19

Shresta Anupam



RANK 23

Nidhi Bansal



RANK 24

Abhishek Jain



RANK 30

Pari Bishnoi



RANK 34

Apurv Chauhan



RANK 52

Om Kant Thakur



RANK 56

Pankaj



RANK 66

Saurav Pandey



RANK 69

Navneet Mittal



RANK 81

Anil Kumar Rathore



RANK 84

Jivani Kartik Nagjibhai



RANK 85

Shubhank Mishra



RANK 96

Hardik Aggarwal



RANK 98

Y Megha Swaroop

INCREDIBLE RESULTS

CSE 2018 Results

11 Ranks in Top 50

28 Ranks in Top 100

183 Ranks in the Final List



Rank 11
Puja Priyadarshni



Rank 16
Dhodmise Trupti Ankush



Rank 21
Rahul Jain



Rank 24
Anuraj Jain

CSE 2017

5 Ranks
in top 50

34 Ranks
in top 100

236 Ranks
in the final list



Rank 3
Sachin Gupta



Rank 6
Koya Sree Harsha



Rank 8
Anubhav Singh



Rank 9
Soumya Sharma



Rank 10
Abhishek Surana

CSE 2016

8 Ranks
in top 50

18 Ranks
in top 100

215 Ranks
in the final list



Rank 2
Anmol Sher
Singh Bedi



Rank 5
Abhilash Mishra



Rank 12
Tejaswi Rana



Rank 30
Prabhash Kumar



Rank 32
Avdhes Meena

CSE 2015

5 Ranks
in top 50

14 Ranks
in top 100

162 Ranks
in the final list



Rank 20
Vipin Garg



Rank 24
Khumanthem
Diana Devi



Rank 25
Chandra Mohan
Garg



Rank 27
Pulkit Garg



Rank 47
Anshul Agarwal

CSE 2014

6 Ranks
in top 50

12 Ranks
in top 100

83 Ranks
in the final list



Rank 4
Vandana Rao



Rank 5
Suharsha Bhagat



Rank 16
Ananya Das



Rank 23
Anil Dhameliya



Rank 28
Kushaal Yadav



Rank 39
Vivekanand T.S

CSE 2013

5 Ranks
in top 50

62 Ranks
in the final list



Rank 9
Divyanshu Jha



Rank 12
Neha Jain



Rank 23
Prabhav Joshi



Rank 40
Gaurang Rathi



Rank 46
Udit Singh

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Team BYJU'S

Gist of Yojana – JANUARY 2021 INDIA@75

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Chapter 1: Introduction

Providing avenues and opportunities through policy initiatives, planning and effective implementation can work as a catalyst in building a New India. Transformation is envisaged on the pillars of Aatmanirbhar Bharat, Sabka Saath Sabka Vikas, Sabka Vishwas, Digital India and Skill India among many others.

- This issue reflects upon the trials and tribulations over these 75 years of independence and the road ahead towards being an economic powerhouse, with a robust infrastructure leading to a \$5 trillion economy.
- It highlights the contributions of various sectors and its people during these 75 years.

Way Forward for India:

- The world has entered a new decade. With expectations of healing this year of the pandemic, this is the opportune time for India to be at the forefront in leading the global and regional strategies, strengthening the 'Brand India' through Make in India, Invest in India, ease-of-doing business, better infrastructure, Digital India, being vocal for local and by projecting India's soft power including spiritual & cultural connect, [Yoga](#), heritage-tourism and cinema globally.
- Public participation is the key to the success of any initiative.
- Swachh Bharat is a recent example and its phenomenal feat is due to the fact that from a Government-led initiative, it became a people-led movement, a Jan Andolan of its own sorts.

Chapter 2: 75 Years of Independence

India is on the cusp of a major transformation. The aim now, is to build an ecosystem where everyone can reach his or her full potential and lead a fulfilling and meaningful life. The youth should be at the forefront of fighting social evils like corruption, casteism, communalism and gender discrimination. India needs to grow at a rapid pace to raise the standard of living of the people.

Scenario Post Independence:

- After centuries of subjugation and struggle, when India attained independence on August 15, 1947, it was a new dawn filled with hope and promise of a better future.
- But challenges were enormous—poverty, illiteracy, malnutrition, and lack of any worthwhile industrial and scientific base, to name a few.

Current Scenario:

- Currently, India is recognized as an emerging world power and is the third-largest economy in terms of Purchasing Power Parity.
- India was known as Vishva Guru and was home to great philosophers like Patanjali and Shankaracharya, doctors like Charaka and Sushruta, mathematicians like Aryabhatta and Varahmihira.

Demographic Dividend:

- With a median age of less than 30 years, India is a young nation in an ageing world. Youthful energy needs to be channelized constructively for nation-building.
- If our youth are sufficiently motivated and equipped with the necessary skills, they can become change-makers of society.
- The youth should take the lead in the transformation of the nation today to reap the benefits of the [demographic dividend](#).

Way Forward:

- Sustainable development is key. We are duty-bound to leave a livable planet for our future generations.
- We should strive to bridge the disparities that still exist among people, communities or regions.
- It is true that governments alone cannot fulfil all these tasks. The private sector will also have to join hands. Public-Private Partnership is the way forward for India's development. Equally important is people's participation in developmental programs.

Conclusion:

India is a vibrant parliamentary democracy that is emerging as an important player on the world stage and continues on its developmental journey with greater confidence, competence and commitment. It should be ensured that the country's growth has to be inclusive, environment-friendly and sustainable.

Chapter 3: Democracy, Polity & Governance

India is the largest democracy in the world. Amidst the complications, pluralistic diversities, differences and confrontations, we ultimately adopted a Constitution of India on November 26, 1949, opting for a federal form of Government, with the [Preamble](#). "Sovereign, Socialist, Secular, Democratic Republic". Our Constitution in its Preamble aspires to build a Sovereign, Socialist, Secular, Democratic Republic dedicated to the ideas of justice, liberty, equality and fraternity.

Concerns:

- The original concept, public perception and philosophy behind the term "democracy" has been degraded because of the misuse, abuse and misinterpretation of the same to fulfil ulterior motives of the vested interests.
- Unfortunately, people in India, more often than not, experience rampant inequalities, injustice or non-fulfilment of social expectations as assured in the [Indian Constitution](#).
- Democracy as a system of governance is supposed to allow extensive representation and inclusiveness of as many people and views as possible to feed into the functioning of a fair and just society.
- The definition of democracy is incomplete unless it is defined in social and individual contexts.
- Muscle power, money power and worthless propaganda are publicized as means and ways to garner votes.
- Even after the elections, the practices of unnecessary and unreasonable horse-trading have also been alarmingly increasing during the last few years.

Democracy:

- Democratic ideals represent various aspects of the broad idea of "Government of the people, by the people and for the people."
 - They include political characteristics that can be seen to be intrinsically important in terms of the objective of democratic social living, such as [freedom of expression](#), participation of the people in deciding the factors governing their lives, public accountability of leaders and equitable distribution of power.
- Democratic Governance is a condition in which the promise of justice, liberty and equality enshrined in the Constitution is realized in a democratic political framework, where the Government is sensitive to the people's identities, aspirations and needs and where people feel secure and content. Only then the meaning of democratic governance will be honoured.

Challenges:

- The biggest challenge and threat that our democracy is facing in India today is rampant corruption.
- Nexus can be seen between politicians, bureaucrats and industrialists which has resulted in corruption and corrupt practices.
- The high level of corruption in India has been widely perceived as a major obstacle in improving the quality of governance.
- Apart from rampant corruption, criminalization has also tarnished the image of Indian electoral politics.
- While it is a fact that during the pre-independent period, Hindus and Muslims of India were fairly united, the greatest threat to Indian democracy and polity today is disunity among the different communities of the country.

Way Forward:

- Good governance does not occur by chance. It is associated with responsible political leadership, enlightened policy-making and a civil service imbued with a professional ethos.
- To have good governance is a collective effort and not an individual effort.
- A team of dedicated and honest public leaders from every field is quite indispensable at this critical juncture.
- The presence of a strong civil society including a free press and independent judiciary is also a pre-condition for such good governance.
- It must be demanded by citizens explicitly and nourished consciously by the Nation-State.
- When there is unity among different communities in India, Indian Democracy, Polity and Governance will be meaningful.
- All the citizens of our country should always remember that India is a Nation of "Unity in Diversity".
- We all should always unitedly uphold the value of "Democracy, Polity and Governance".

Chapter 4: Industry@75

India, being the world's largest democracy, has seen a rapid transformation in recent times.

Key developments:

- India is one of the world's youngest democracy but still among the fastest-growing nations.

- India has doubled its GDP to nearly \$3 trillion within a decade and is currently the world's sixth-largest economy.
- The Indian economy is expected to touch the USD 5 trillion mark in the coming years and progress as a key economic engine in Asia.

Industrial Growth in India:

- Industrial growth in India has not been easy, it has gone through various phases of development over the years.
- The advent of the British in India led to the decay of the Indian handicraft industry and machine-made goods started flooding into the Indian markets post the [industrial revolution](#) in Britain.
- The policies of the British encouraged the imports of their goods and exports of raw materials from India.
- But soon after independence, things started changing and through the subsequent five-year plans, the government shifted its focus on industrialization.
 - The First Five-year Plan mainly focused on the development of both the private and public sectors.
 - The second plan on the Mahalanobis Model gave priority to industrialization.
 - The third plan along with the first and second ones helped build up the capital goods industries in India.
 - Between 1965-1980, industrial growth saw a decline mainly due to the negligence of the consumer goods sector in the first three plans.
 - But between 1980-1991, industries recovered from downfall due to an increase in the productivity of Indian industries and improvement in the manufacturing and capital goods sector.
- During the post-1991 economic liberalization of India, many reforms were brought which helped shape the future of industries in India.

Ease of Doing Business (EoDB):

- India's Ease of Doing Business (EoDB) rank according to the 'World Bank's Ease of Doing Business Report 2020 is 63rd among 190 countries.
- This is a jump of 79 positions from 142nd in 2014 to 63rd in 2019.
- Among 10 parameters for measuring EoDB, rapid changes have been brought about especially in issuing construction permits where India's ranking has improved from 184 in 2014 to 27 in 2019, and ease of getting electricity where the ranking has improved from 137 in 2014 to 22 in 2019.

Foreign Direct Investment (FDI):

- During FY 2020-21, the total [FDI](#) inflow of \$35.73 billion is the highest ever for the first five months of a financial year.
- Recently, the government has also approved 100 percent FDI through the automatic route in coal mining, 100 percent FDI through the direct route in contract manufacturing, and 74 percent through the automatic route in the defense sector.
- FDI in India is estimated to reach a \$100 billion inflow per annum by 2022. This will further boost our domestic manufacturing and will also help in employment generation.

Innovation:

- The startup culture in India has seen massive growth with more than 40,000 startups recognized till December 2020 by the Department for Promotion of Industry and Internal Trade ([DPIIT](#)) under the Start-Up India scheme launched in 2016.
- The government's flagship initiatives like Atal Innovation Mission (AIM), have helped advance India's position in the Global Innovation Index from 81 in 2015 to 48 in 2020.

Aspirational Districts:

- The NITI Aayog is playing a big role in tackling development challenges in the country through policy advocacy.
- 115 districts have been identified across the nation as aspirational districts and are being ranked based on progress being made (delta ranking) on a real-time basis based on 49 indicators from 5 identified thematic areas — Health & Nutrition, Education, Agriculture & Water Resources, Financial Inclusion & Skill Development, and Basic Infrastructure.
- In December 2019, NITI Aayog had released the second edition of the Sustainable Development Goals (SDG) India Index and an online dashboard to track the progress on 17 SDGs of all the States and Union Territories (UTs) on a set of 100 National Indicators.
- India has made considerable progress especially in SDG 6; Clean water and sanitation by constructing over 11 crore toilets to become open defecation-free (ODF) in five years through [Swachh Bharat Abhiyan](#) launched in 2014.

Digital Inclusion:

- The Digital India campaign launched in 2015 has ensured the creation of a digitally empowered society and knowledge economy.
- Development of broadband highways, universal access to mobile connectivity, public internet access programmes, e-governance among others have seen considerable growth with Aadhaar, Smart Cities Mission, BHIM UPI, RuPay, GSTIN, GeM (Government e-Marketplace), DigiLocker coming under the aegis of the [Digital India programme](#).
- Through the Bharat Net programme which is also the world's largest rural broadband connectivity programme, 2.5 lakh gram panchayats are being connected by a fibre-optic network of which around 1,48,000 connections have been achieved so far.
- India's Aadhaar has become the world's largest biometric database with almost 125 crore Aadhaar cards being issued so far and is playing a pivotal role in preventing leakages via its integration with the Direct Benefit Transfer (DBT) scheme.
- Apart from this, through schemes like Jan Dhan Yojana launched in 2014 by the government, 41.38 crore beneficiaries have banked so far.

Financial Inclusion:

- According to the 2019 global Multidimensional Poverty Index, India has lifted 271 million people out of poverty between 2006 and 2016.
- Mudra loan scheme, launched in 2015, by providing credit up to 10 lakh to non-farming and non-corporate micro and small enterprises has helped enable every last mile financier to lend credit to all types of businesses in the country.
- Pradhan Mantri Kisan Samman Nidhi Yojana launched in 2019 is providing 6,000 per year as minimum income support to all farmers.

Agriculture:

- The recent agriculture sector reform bills passed by the government is aimed at further empowering farmers by providing them with new markets, advantages of technology, and helping bring investments and double their income by 2022.

Read more on the [farm laws](#) in the link.

India's Global Stature:

- India's global stature has improved considerably with its recent election as Chair of the World Health Organization's Executive Board in May 2020 and being elected as a non-permanent member of the United Nations Security Council (UNSC) for a two-year term in June 2020.
- India is emerging as a global power and is scheduled to host the G20 in 2023.

Tackling COVID-19:

- India faces some major challenges like tackling the Covid-19 pandemic, cross-border terrorism and competition from global markets.
- India is dealing strategically with all these challenges as it has especially dealt with the pandemic better than any country in the world.
 - India manufactures more than 60% of all vaccines sold across the globe and today is the most sought-after destination for manufacturing Covid-19 vaccines.
 - The world's largest distributor of vaccines – Serum Institute of India (SII) is also located in India.
- Aatmanirbhar Bharat economic stimulus relief package of 20 lakh crore amounting to 10% of GDP was released to fight the pandemic.
- 80 crore people were given free food grains till November 2020 under [PM Garib Kalyan Yojana](#) and 20 crore women Jan Dhan holders were given 500 per month for 3 months.
- MNREGA wage rate was increased.

Way Forward:

- The new National Education Policy (NEP) 2020 will make India a global knowledge superpower.
- Artificial Intelligence, Machine Learning, and Big Data are setting the path for the future and India is not far away.
- Through the SWAYAM portal, the government is bridging the digital divide for students who have limited access to the digital revolution and have not been able to join the mainstream of the knowledge economy.
- Under the 'Make in India' initiative the Micro, Small, and Medium Enterprises' (MSME) contribution to the GDP is being targeted to be increased to 50 percent from the existing 30 percent which will create 5 crore jobs in the next few years.
- The industrial sector will play a major role in creating a New India by 2022.

Chapter 5: Education for New India

Education develops cognitive, social and soft skills including cultural awareness and empathy, perseverance and grit, teamwork, leadership, communication, among others. The education of New

India will enable learners for faster character-making while preparing for gainful and fulfilling employment.

History of Education System in India:

- From ancient times, our education system has focused on the pursuit of knowledge (Gyaan), wisdom (Pragya), and truth (Satya) as the highest human goal.
- Institutes such as Takshashila, Nalanda, Vikramshila, Vallabhi had set the highest standards of multi-disciplinary teaching and research while fostering internationalization at home.
- India has been honoured as the land of prodigious scholars such as Charaka, Susruta, Aryabhata, Varahamihira, Bhaskaracharya, Brahmagupta, Chanakya, among several others.
- However, sadly the essence of the Indian education system was crushed in the following eras with the coming of the British in India.
- The indigenous institutes became extinct by the late 19th century and the British schools catered to very few. Read about the educational system in India during the British Raj [here](#).
- The education imparted focused mainly on reading. Even the skills of writing and arithmetic were cultivated in a few.
- The system was entirely alien and rootless as wished by Lord Macaulay.
- The irrelevancy of the education system then burdened the education post-independence too. The situation called for a radical reconstruction of education for the nation to progress.

Evolution of the Indian Education System:

- Post-independence, the concerns were widely addressed in several commissions and committees, like the University Education Commission (1948-49), Secondary Education Commission (1952-53), National Education Policy (1968), National Commission on Teachers (1983-85), National Policy on Education (1986) modified in 1992 and National Curriculum Framework (2005).
- Significant development has been made post the enactment of the Right of Children to Free and Compulsory Education Act 2009 ([RTE Act](#)).
- The literacy rate presently stands at 74.04% as compared to 14% at the time of independence.
- Further, for the first time, India is among the 50 countries with a rank of 48 in the Global Innovation Index.
 - India stood at the 81st position in the year 2015.
- In the Employability Rankings 2020, India has improved its ranking from 23 in 2010 to 15 in 2020 even as developed countries like the UK and US varsities showed a decline.

New National Education Policy (NEP):

- As a step forward, augmenting the progress achieved in the past years, the Ministry of Education has introduced the National Education Policy.
- The policy is introduced in response to the changes that have happened in the past three decades post the last Education Policy.
- It aims to cater to the many growing developmental imperatives of this country on the one hand, while creating a just and equitable society on the other.

Significance of NEP:

- The NEP will enable students to move towards 'learning to learn', with the spirit of critical inquiry, problem solving and creativity.

- Students will be provided with a platform to evolve themselves in a culture of multidisciplinary education and innovation.
- Along with science and mathematics, the curriculum and vocations will equally include arts, crafts, humanities, games, sports, languages, literature, culture, and values that will enable holistic and well-rounded development of students nurturing realization and liberation of the self.
- Thus by 2022, New India will provide a strong foundation for an education system based upon the principles of accessibility, equity, quality, affordability and accountability.

Chapter 6: Successful Endeavour in Space

Indian Space Research Organization:

The Indian space programme implemented by the Indian Space Research Organization ([ISRO](#)) has enabled the pursuit of various frontier areas of space research besides facilitating the country's overall development and technological advancement. ISRO sprawls across the country with huge launch stations, tracking centres, R&D facilities and manufacturing and data processing units, all engaged in highly sophisticated and complex technological activities.

- The Indian space programme has come a long way in the 57 years since its inception.
- From a fledgeling Sounding Rocket Launch Facility established in the early 1960s in Thumba near Trivandrum, it has matured into a giant world-class space power.
- The Indian space programme began in a modest way in 1962 with the formation of the Indian National Committee on Space Research ([INCOSPAR](#)), barely five years after the launch of the Earth's first artificial satellite Sputnik-1, that heralded the space age.

Indian Space Programme:

- The formal beginning of the Indian space programme can be traced to the launch of a Nike-Apache sounding rocket on November 21, 1963, from Thumba.
- Later, Thumba became an international sounding rocket launching facility and such rockets were launched for upper atmospheric, geomagnetic and space research by many countries.
- It was at this time [Dr Vikram Sarabhai](#), the architect of the Indian space programme, set up a Space Science and Technology Centre at Thumba for the development of technologies necessary for space research. In 1969, the Indian Space Research Organization, better known as ISRO, was formed.
- India's public as well as private sector industries are playing a crucial role in the space programme.
- Besides, academic institutions have also contributed to the Indian space endeavour.
- India's first satellite, Aryabhata, was launched on April 19, 1975, from a launch centre in the former Soviet Union.
- Bhaskara 1 and 2, the two experimental earth observation satellites, provided the rich experience and the confidence to build complex operational remote sensing satellites.
 - Today, India is a world leader in the satellite-based remote sensing area.
- APPLE, India's first experimental communication satellite, though launched by the European Arlene rocket, reached its final geosynchronous orbital home in June 1981 with the help of a rocket motor developed in India.
- Aryabhata, the two Bhaskaras, as well as APPLE were launched free of cost, which reflects India's successful international space cooperation policy.

- In the recent past, India has not only flown foreign scientific instruments on-board Indian spacecraft but has also launched them.

Evolution:

- ISRO conducted two significant experiments in the 70s - SITE and STEP - to obtain hands-on experience on the utilization of satellites for television broadcasting and telecommunications. ISRO developed its first Satellite Launch Vehicle SLV-3.
- The 1980s were the times for experimentation for the launch vehicle technologies when it endeavoured to demonstrate the country's ability to develop ASLV.
 - ASLV is a more capable launch vehicle compared to SLV-3.
- During the same period INSAT-1B, India's first multipurpose operational satellite launched in 1983, demonstrated its ability to bring about a rapid and major revolution in India's telecommunications, television broadcasting and weather forecasting fields.
- Today, communication satellites are an integral part of India's economic infrastructure.
- An indication of India's ability to design, build and maintain a complex remote sensing satellite was demonstrated in 1988 when [IRS- 1A](#), the first operational satellite built in India started imaging the earth from orbit.

Remote Sensing Satellites:

- During the 1990s, ISRO began building the INSAT-2 series of multipurpose satellites indigenously.
- At the same time, systematic usage of imagery from our remote sensing satellites for tasks like crop yield estimation, groundwater and mineral prospecting, forest survey, urban sprawl monitoring and wasteland classification and fisheries development began.
- Today, India has a fleet of advanced remote sensing satellites equipped with high resolution and multispectral cameras.
- These are dedicated to the themes of cartography, resource survey and ocean and atmospheric applications & weather watching.
- Satellites INSAT-3D and INSAT-3DR — circling the earth in the 36,000 km high geosynchronous orbit, are providing valuable inputs to weather forecasting.

Communication Satellites:

- Apart from these satellites, the Indian National Satellite (INSAT) system today is one of the largest domestic communication satellite systems in the Asia-Pacific region.
- The INSAT system with over 300 transponders in the C-band, Extended C-band, Ku-band, Ka/Ku band and S-band provides services to telecommunications, television broadcasting, radio networking, satellite newsgathering, societal applications, weather forecasting, disaster warning and search & rescue operations.
- High throughput satellites (HTS) such as GSAT-11, GSAT-29 and GSAT-19 are supporting the "Digital India" campaign by boosting the broadband connectivity to the rural and inaccessible Gram Panchayats in the country.
- The transponders on these satellites will bridge the digital divide of users including those in Jammu & Kashmir and the North-Eastern regions of India.

Launch Vehicles:

- Till now, ISRO has developed five launch vehicles (SLV-3, ASLV, PSLV, GSLV and GSLV Mk III which is also known as LVM3) and mastered the technology of rockets that use solid, liquid as well as cryogenic propellants.
- India developed its first launch vehicle SLV-3 in the 70s and persevered to perfect its second-generation launch vehicle ASLV during the 80s and early 90s.
- PSLV, India's first launch vehicle capable of launching large satellites, had its first successful flight in 1994.
- Polar Satellite Launch Vehicle (PSLV) is the third generation launch vehicle of India.
- It is the first Indian launch vehicle to be equipped with liquid stages.
- With 49 successful flights over the years, PSLV has emerged as the reliable and versatile workhorse launch vehicle of India.
- It has launched 328 foreign satellites as of November 7, 2020, and has carved out a niche in the commercial satellite launch arena.
- On February 15, 2017, PSLV created a world record by successfully placing 104 satellites in orbit during a single launch.

Launch of 104 Satellites by PSLV-C37:

- Geosynchronous Satellite Launch Vehicle Mark II (GSLV Mk II) is a fourth-generation launch vehicle having three stages (including the cryogenic upper stage) with four liquid strap-ons.
- Cryogenic technology involves the storage of liquid hydrogen and liquid oxygen at very low temperatures.
- With the successful qualification of the indigenously developed Cryogenic Upper Stage (CUS) in the GSLV-DS flight on January 5, 2014, ISRO demonstrated its mastery of cryogenic rocket propulsion.
- From January 2014, the vehicle has achieved six consecutive successes.
- GSLV Mk III, India's fifth-generation satellite launch vehicle has two solid strap-ons, a core liquid booster and a cryogenic upper stage.
- The vehicle is designed to carry 4 ton class of satellite into Geosynchronous Transfer Orbit (GTO) or about 10 tons to Low Earth Orbit (LEO).
- With two successful developmental flights and with the successful injection of [Chandrayaan-2](#) into Earth Parking Orbit in July 2019, GSLV Mk III successfully entered into its operational phase.

Reusable Launch Vehicle Technology Demonstrator (RLV TD):

- India's Reusable Launch Vehicle Technology Demonstrator (RLV TD) was successfully flight tested in May 2016.
- Several of its critical technologies were successfully validated.

SCRAMJET:

- The first experimental mission of ISRO's Supersonic Combustion Ramjet (SCRAMJET) engine towards the realization of an air-breathing propulsion system was also successfully conducted in August 2016.
- With this, India became the fourth country to flight test the SCRAMJET engine.

Space Technologies for the overall development of the country:

- After Aryabhata – India's first satellite, ISRO entered into the realm of science missions again with a unique mission that caught the attention of the world – the Space Capsule Recovery Experiment-1 (SRE-1).

- It was launched by PSLV in January 2007.
- SRE-1 with its scientific experiments orbited the Earth for 12 days and was successfully deorbited and recovered over the Bay of Bengal.
- This proved several technologies necessary for reusable launch vehicles and human spaceflight.
- The space science missions of India—Chandrayaan-1, Mars Orbiter Mission, Astrosat and Chandrayaan-2 have caught the attention of millions of Indians as well as the outside world.
 - Launched by PSLV on October 22, 2008, the 1380 kg Chandrayaan-1 spacecraft was successfully navigated to the Moon in three weeks and was put into an orbit around the moon.
 - On November 14, 2008, when 'Moon Impact Probe' separated from Chandrayaan-1 spacecraft and successfully impacted on the surface of the moon, India became the fourth country to send a probe to the lunar surface after the United States, the Soviet Union and Japan.
 - Chandrayaan-1 conclusively discovered water molecules on the lunar surface, it was widely hailed as a path-breaking discovery.
- ISRO endeavoured to realize [Mars Orbiter Mission](#), for demonstrating India's capability to build, launch and navigate an unnamed spacecraft to Mars.
 - Launched by PSLV on November 5, 2013, the 1340 kg Mars Orbiter Spacecraft encountered Mars on September 24 2014.
 - With this, ISRO has become the fourth space agency to successfully send a spacecraft to Mars orbit.
 - Achieving success in the first mission itself is yet another accomplishment of ISRO.
- AstroSat launched by PSLV in September 2015 is the first dedicated Indian astronomy mission aimed at studying celestial sources in X-ray, optical and UV spectral bands simultaneously.
 - AstroSat recently made a major breakthrough by discovering one of the earliest galaxies in extreme-Ultraviolet light.
- The Chandrayaan-2 mission is India's second mission to the moon.
 - It was successfully launched on July 22, 2019.
 - Chandrayaan-2 Orbiter spacecraft was placed in its intended orbit.
 - The eight instruments onboard the Orbiter are continuously providing useful science data which will enrich our understanding of the moon's evolution and mapping of the minerals and water molecules in Polar regions.
- ISRO has successfully established and operationalized Navigation with Indian Constellation (NavIC) which provides highly accurate Position, Navigation and Time information to users in India and its surroundings.
- Through GPS Aided GEO Augmented Navigation (GAGAN), ISRO is providing Satellite-based Navigation services with the accuracy and integrity required for civil aviation applications and to provide better Air Traffic Management over Indian Airspace.
- ISRO has also facilitated students in building/launching satellites for various applications. So far, 10 student satellites have been launched by ISRO.

Human Space Flight:

- The "Gaganyaan Programme" approved in 2018 is a point of inflection in the growth profile of India's space endeavour, marking a seminal foray into the new age of human space exploration.
- The Human Space Flight Centre (HSFC) was constituted in ISRO in January 2019 for implementing the vision on the human space flight programme.
- HSFC is entrusted to implement the Gaganyaan programme and to act as the lead centre for sustained and affordable human spaceflight activities.
- The Gaganyaan project has the objective of demonstrating human space flight capability to Low Earth orbit (LEO) with 3 crew members for 5-7 days in orbit and safely recover them after the mission.

- ISRO successfully proved a crucial technology element of human spaceflight in July 2018—the Pad Abort Test (PAT), which is the first in the series of tests to qualify the Crew Escape System (CES).
 - The Pad Abort Test flight was a demonstration of the capability of CES to evacuate the crew in case of a contingency at launch pad.
 - With this, India has become the fourth country in the world to acquire this vital technology after the USA, Russia and China.

IN-SPACE:

- Recently, the space sector was opened up to promote, handhold, regulate and authorise private enterprises and start-ups to undertake space activities by the creation of the Indian National Space Promotion and Authorization Center (IN-SPACE).
- IN-SPACE will enhance the diffusion of space technology and boost the space economy within the country.

Conclusion:

- The Indian space programme has many challenges ahead. There are ambitious plans to build heavier and more capable and efficient satellites.
- Space science missions like Chandrayaan-3, Aditya-L1, Mission to Venus to further explore the solar system, are in progress.
- Pursuit of research and development activities pertaining to the small satellite launch vehicle, air-breathing rocket propulsion and demonstration of reusable rocket technology, are also progressing.
- Thus, the Indian space programme implemented by ISRO has enabled the pursuit of various frontier areas of space research besides facilitating the country's overall technological advancement.

Chapter 7: Fiscal Federalism

With constantly changing economic conditions, the development of new technologies and an evoking new governance structure, new reforms are required in the public financial management system both at the Centre and State levels. In India, fiscal federalism as it stands today is a result of the historical evolution that originated in pre-independence India. Over time, through various commissions, committees and parliamentary enactments, a rigid unitary system with immense scope of discretionary power to the Central Government was transformed into a constitutionally regulated federal system.

Fiscal Federalism:

- 'Fiscal Federalism' refers to the financial relations between the country's Central Government and other units of Government.
- It essentially represents how expenditure and revenue are allocated across different layers of Government administration. Fiscal federalism helps Government realise cost efficiency by economies of scale in providing public services, which correspond most closely to the preference of the people.

Evolution of Fiscal Federalism:

- The evolution of Fiscal Federalism can be traced back to the 18th century when Alexander Hamilton in his federalist papers, written in the 1780s, stated that a Multi-layered Government (Federal) permits various functions to be assumed by different layers, potentially improving the efficiency of Government since different activities have different optimal scales.
- The evolution of fiscal federalism in India has its roots in 1858 when the British Government assumed direct sovereignty over the Indian Territory.
 - At that time, there was no standardized system of accounting and annual budgets did not exist.
 - Central Government retained the entire control on finances and made grants of money at its discretion to meet the demands of local governments.
 - Local Governments collected revenue as agents of Central Government resulting in no direct interest in the result of the collection.
 - However, the need to decentralize the financing system was an inevitable necessity in a country as diverse and vast as India.
- Substantive efforts in the freedom struggle led to the British Government's declaration in 1917 of gradually introducing a responsible Government in India.
- This was followed by the [Government of India Act, 1919](#) based on Montague Chelmsford reforms, which introduced a system of diarchy, dividing the administrative subjects and sources of revenue into two categories — Central and Provincial.
 - The first category was administered by councillors, appointed by the crown.
 - The second was administered by Ministers who were chosen by the Governor from the elected members of the provincial legislature.
 - Though the system of fixed grants from central revenues was continued which led to increase in horizontal imbalances amongst provinces, it also gave thrust to the process of decentralization.
- Later, the [Government of India Act, 1935](#) was brought forth which established a federal system with Provinces and Indian States as two distinct units.
- Thus, the acts of 1919 and 1935 established a basic structure of fiscal federalism in India.
- At the time of independence in 1947, when India was beset with multiple problems, the vision and pragmatic approach of Sardar Vallabhbhai Patel helped in the unification of more than 560 princely states with the Union of India, laying the foundation for a federal structure in India.

The Federal Character of Public Finance in India:

- The Indian Constitution defines India as 'Secular, Federal, Socialist Union of States'.
- The Seventh Schedule of the Constitution demarcates the powers and functions of the Union and the States viz, Union List, State List and Concurrent List.
- The Constitution also lists out the principles governing the sharing of revenue and certain other resources between the Centre and the State.
- Post the implementation of the Goods and Services Tax (GST) which is shared between Centre and States, Central Government retains the exclusive right for income tax (corporates and individuals) while States have the right to collect stamp duty, excise duty on alcoholic beverages, registration/commercial use of vehicles, and a few other minor taxes.

Central Transfers to States:

- In India, in order to correct the vertical and horizontal imbalance and for equitable and efficient development, the Central Government transfers funds to State Governments as General Purpose transfers and Specific Purpose transfers.
- The General Purpose transfers are untied funds devolved to the State Governments via the Finance Commission.

- Finance Commission is appointed every five years since 1951 under Articles 275-278 of the Constitution with the purpose of addressing the horizontal and vertical imbalance.
- It recommends the criteria for devolution of central taxes to States and the principles for distribution of grants-in-aid.
- So far, fourteen Finance Commissions have completed their terms and the [15th Finance Commission](#) has already made recommendations for 2020-21.
- Specific Purpose Transfers are tied for specific purposes mostly in social sector areas.
 - These transfers are made by the concerned Central Ministries/Departments in the form of Centrally Sponsored Schemes (CSS).

Transfers of Resources to Local Bodies:

- After the 73rd and 74th Constitutional Amendment Acts were passed in 1992, the two-tiered Indian federal structure evolved into a three-tiered structure giving constitutional status to the rural and urban local bodies respectively.
- State legislatures are expected to devolve responsibilities, powers and authorities to the Panchayats and Municipalities in order to bring about greater decentralization and to increase the involvement of the community in implementing schemes, bringing transparency in decision-making, ensuring accountability and monitoring of outcomes.

Redefining Fiscal Federalism to Ensure Better Utilization of Funds:

The last few years witnessed certain major pronouncements which brought about structural changes in the Centre-State financial relations:

(I) Increase in untied funds devolved to States:

- Finance Commission (FC) transfers, comprising tax devolution and grants to the States, have remained the major source of transfers to the States.
- These increased from 60.1 % of total transfers in the award period of the FC-VIII to 68.6 per cent in the award period of the FC-X.
- In FC-XIII, with the restructuring of Centrally Sponsored Schemes, the share of non-FC transfers increased to around 32%. Following the recommendation of FC-XIV the share of FC grants in total transfers increased to 74%.
- This whopping increase of 10% in the share of union tax proceeds underpins the objective of greater fiscal autonomy to States, thereby allowing them to set their expenditure priorities and undertake State-specific development schemes, based upon their own assessment.

(II) Rationalization of Sponsored Schemes:

- The total number of Centrally Sponsored Schemes has evolved over time.
- The most recent rationalization took place in 2016-17 based on the recommendations of the sub-group of Chief Ministers on Rationalization of Centrally Sponsored Schemes (CSS).
 - The number of Centrally Sponsored Schemes were reduced from 66 to 28.
 - The funding pattern of core schemes was changed for large States to 60:40 (Centre: State) from 70:30 earlier.
 - The flexibility for States to use funds as per their local needs and requirements within schemes was increased from 10% earlier to 25%.

- Each Ministry/Department along with NITI Aayog was recommended to evolve transparent criteria for allocation under each scheme.
- NITI Aayog was entrusted with carrying out third party evaluation to improve the efficiency of expenditure and to improve outcomes.

(III) End to Centralized Planning Era and Discretionary Grants:

- Plan and Non-Plan distinction in the budgeting exercise was done away with by the Union Budget 2017-18.
- With an increase in general devolution and untied transfers, discretionary transfers such as additional central assistance, special plan assistance, special central assistance granted by the erstwhile Planning Commission were discontinued.

(IV) Introduction of Goods and Services Tax (GST):

- The Constitution with Article 279A provided for the creation of a GST Council which is a joint forum of the Union and States entrusted with the responsibility of making recommendations on GST rates, taxes, cesses, exemptions, etc.
- This unique institution has been working in an exemplary manner resonating with cooperative federalism where Centre and States jointly decide on the taxes and related matters.

(V) Outcomes Based Budgeting:

- An important expenditure reform was introduced in 2017-18 with the formulation of the output outcome framework.
- Data Monitoring and Evaluation Office (DMEO) of NITI Aayog and Public Finance (States) of the Ministry of Finance are key coordinators in finalizing and monitoring this framework.

Role of NITI Aayog in Strengthening Federalism:

- NITI Aayog substituted erstwhile Planning Commission with effect from January 1, 2015, and has since engaged itself in strengthening cooperative and competitive federalism.
- The Governing Council of NITI Aayog, comprising Chief Ministers of all the States and Union Territories with Legislatures and Lt. Governors of other Union Territories provides a platform whereby the Centre and the States can come together to resolve differences, and chart a common course to progress and prosperity.
- NITI Aayog has been providing relevant technical advice to the Centre, States and UTs.
- NITI Aayog has also established models and programmers for the development of infrastructure and to reignite and establish private-public partnerships, such as:
 - The Centre-State partnership model: Development Support Services to States and Union Territories (DSSS)
 - The Sustainable Action for Transforming Human Capital (SATH) programme.
- Some of the indices launched by NITI Aayog include Education Index; Health Index; Composite Water Management Index; SDG Index; and Delta Rankings for Performance of Aspirational Districts.

Going Forward:

- The challenge of striking a balance between efficiency and equity has always been a critical aspect of federalism.

- Meeting the aspiration of States is the foremost priority of Indian fiscal federalism.
- The recent experience of tackling the Covid crisis is a successful example of how the Centre and States have worked together to fight the pandemic which has created havoc throughout the world.
- Two-way communication channels need to remain open all the time so that the issues get resolved quickly and development is not hampered.

Chapter 8: Public Health Innovation

In the wake of Covid-19, public health has been brought to the forefront; there is a critical need to spotlight the conversation around ‘Health for All’.

Health for All:

- The idea behind ‘Health for All’ is intrinsically interlinked with the idea of Universal Health Coverage (UHC).
- UHC envisages that everyone, everywhere, has access to essential health care services without facing financial hardship.
- This concept is also outlined in the [Sustainable Development Goals \(SDGs\)](#), to which India is a signatory.
- SDG 3 aspires to ensure health and well-being for all, along with tackling epidemics and selected communicable diseases by 2030.
- It also aims to achieve universal health coverage and provide access to safe and effective medicines and vaccines for all.
- “Health for All” is innovation in public health research, driven by public-private partnerships.

Government Initiatives:

Ayushman Bharat Programme:

- Accessibility and affordability of health care, particularly, is a serious proposition for the vast majority of the population, especially at the tertiary level. Recognizing this gap, the Government of India in 2018 introduced the [Ayushman Bharat](#) programme.
- Ayushman Bharat is the largest such health care program in the world, with the aim to bolster the two pillars of Health for All:
 - Strengthening primary health care
 - Providing health coverage
- Under this programme, 1.5 lakh health and wellness centres are being set up to provide comprehensive primary health care to the community, including providing essential drugs and diagnostic services free of cost.
- Additionally, the programme also provides health coverage for the bottom 40% of people in the country, who are most likely to face financial hardships while accessing quality health care services.

National Health Mission:

- Numerous programmes have been designed to address health issues under the wider umbrella of the National Health Mission.

- Emphasis has been on improving the availability and access to services catering to the basic needs of people such as sanitation (Swachh Bharat Mission), sewage treatment, and clean drinking water among others.

Universal Immunization Programme:

- Along with it, the [Universal Immunization Programme](#), which is one of the largest health programmes in the world has achieved stellar results such as the eradication of smallpox and polio along with ensuring coverage to millions of people.

Other Programmes:

- ICMR is striving hard to provide research support to national programs to achieve the targets as set under National Health Policy and United Nations Sustainable Development Goals (SDGs) towards Universal Health Coverage (UHC) as well as to tackle emerging and re-emerging infections and newer health challenges towards a healthy and happy India.
- Various national programs on health ranging from Reproductive, Maternal, Neonatal, Child and Adolescent Health (RMNCAH), nutritional programmes have been designed and implemented by the Health Ministry.
- There is an increasing focus on curbing old existing diseases such as TB and Malaria.
- Prime Minister gave a clarion call to end TB and Malaria by 2025 and 2030 respectively and launched the National Strategic Plans (NSP) to this end.
 - It is critical to note that 2025 is five years ahead of the global target of TB elimination by 2030.

Healthcare during the COVID-19 Pandemic:

- During the national lockdown, the services of the Ministry of Civil Aviation under 'Mission Lifeline Udan' were availed.
- They carried ICMR consignments of diagnostic material across the country.
- From the initial days of 1000 tests per day, India is now conducting more than 14 lakhs tests per day. This is an unparalleled achievement in the history of the Indian health system.

Way Forward:

- Indeed, there is a need for greater involvement of the private sector in taking an active role in driving innovation and initiatives that support the goals of UHC and Health for All.
- The National Health Policy (2017) envisages the attainment of the highest possible level of health and well-being for all at all ages, through a preventive and promotive health care orientation in all developmental policies.
- It aims to ensure universal access to good quality health care services without anyone having to face financial hardship as a consequence.
- This would be achieved through increasing access, improving quality and lowering the cost of health care delivery.
- Digital transformation of health services can lend a positive push towards health care delivery, health promotion and prevention, therefore encompassing all aspects of universal health care.
- For a sustainable and effective model for Health for All, maintaining synergy between cost, quality and access to essential health care services is crucial.

Chapter 9: Infrastructure Development

Infrastructure:

- All infrastructure are those economic activities that support a whole host of many other activities that improve quality of life and economic development, while at the same time embracing social inclusion and sustainability with nature.
- While the share of Public Private Partnerships (PPPs) in infrastructure development being significant, direct investment by the government and execution through contracts has been and will continue to be the major share.
- The Government has tried to create a larger vision by having infrastructure projects listed under grander schemes, like the National Highways Development Project, [Pradhan Mantri Gram Sadak Yojana](#), Sagar Mala, National Infrastructure Pipeline, etc.

Regulatory infrastructure has come a long way, both through instruments and institutions. There are eight dimensions that enable infrastructure development: Project Structuring, Project Evolution: Financial, Economic and Risks, Sourcing of Funds, Tendering and Bidding Process, Agreements, Project Management, Post-Project Issues, and Regulation and Dispute Resolution. This article examines how infrastructure development has changed over the years along these dimensions.

Project Structuring:

- To enable greater focus, and to facilitate PPPs, the government had to 'unbundle' activities, either vertically or horizontally or both, and in some cases, even 'bundle'.
- To enable 'inclusion', especially where affordability for some user segments was an issue, many sectors have come up with a structuring that recognizes the need for subsidy.
 - The telecom sector created a Universal Obligation Fund, by sourcing a percentage of commercially viable calls into this fund, from which subsidies would be provided for the rural and remote segments.
 - Aviation tried to do it by having a cross-subsidy model, forcing every airline to follow 'route dispersal guidelines'.
 - In the road sector, the initial PPP attempted on the Build-Operate-Transfer model. When projects were not taking off, a capital subsidy based bid model was structured. Later, Viability Gap Funding made the road sector take off. Then, as more and more projects started getting vulnerable to toll, a revenue-based model called Hybrid Annuity Model was brought in.

Project Evaluation: Financial, Economic and Risks:

- Projects have moved from being evaluated just financially-often without a revenue model, to economic evaluation with externalities (also called social cost benefit analysis) to evaluations that include the identification of risks and risk mitigation/management plans.
- The road sector is a good example.
 - Here, initially, only budgetary support was sought, and there was no revenue model.
 - Then financial models became more important, along with social cost benefit analysis, and then a risk management plan.

Sourcing of Funds:

- Various sources of funding have come to play. Eg: budgetary support, private funding, revenue models, viability grants.
- Due diligence practices have become more rigorous, making project evaluations more meaningful.

Tendering and Bidding Process:

- Over the years, the documentation and processes have gotten more structured.
- The documentation brings multiple stakeholders together with a focus on anticipating issues.
- The currently ongoing privatisation of certain Passenger Train Operations is an example of openness, transparency and responsiveness.

Agreements:

- This is a critical area, which binds (and regulates) the relationship between the authority and concessionaire.
- Over a period of time, agreements have gotten sharper on competition, scope increase, and other revenue sources.
- This has resulted in the recognition and need for more careful thought on outcome specifications, time frames, review triggers, termination conditions, and internal consistency.

Project Management:

- Construction management has evolved as a discipline, with professionals being trained at the post-graduate level.

Post-Project Issues:

- Facilitating the concessionaire to face operating challenges has increased over time.
- The original goal of completion, conflict of interest, etc. are considered.

Regulation and Dispute Resolution:

- This space has changed quite significantly over the years.
- Many regulatory institutions have been set up—The [Telecom Regulatory Authority of India](#), the Central and State Electricity Regulatory Commissions, Tariff Authority for Appellate for each regulator, so that appeals against any regulator's act can be heard and resolve. And then there is the judiciary.
- Robust competition can address some of these to varying levels, like say tariff and service levels, where regulation may not be required or 'light touch' regulation may be required.
- Environmental issues are being addressed through lawmaking and rules by empowered ministries.

Issues:

- In terms of regulation, there are still under-regulated areas like Railways and Road Safety.
- Also, a regulator should be empowered sufficiently, that they can be proactive in formulating regulations, of course through a transparent process.
- Concession Agreements have yet to mature by providing trigger-based review mechanisms.

- Telecom is a sector where, over the years, these conflicts have been addressed through structural reforms, with much value being derived for the fast development of the sector. On the other hand, Railways have not yet addressed this, leading to slower development of the sector.
- The project structuring, risk allocation, CA, and regulatory outlook are still vulnerable to crony capitalism.
 - Transparency, mature media attention and regulatory oversight can address this.

Conclusion:

- Apart from being responsible for envisioning infrastructure, Government will continue to be the major financier and executor of projects. PPPs and the ability to think of commercializing infrastructure have provided a new platform for developing infrastructure.
- The idea of balanced risk allocation has gained traction.
- Regulatory infrastructure has come a long way, both through instruments and institutions. However, further progress is required to cover more domains, strengthen staffing, independence and processes.

Chapter 10: Sports and its Role in the Making of the New India

It's a well-said fact that a healthy mind resides in a healthy body, and a country with such a young population as ours needs a healthy population to be productive as against spending money on health care. Sports provides that necessary exercise to keep the blood flowing and the body healthy.

Importance of Sports:

- Sports are important for the overall development of an individual.
- Sports build character and help develop the human capital of a nation.
 - A person learns how to handle adversity and yet succeed through perseverance.
 - Sports teach an individual decision-making and humility too.
- From sports, we learn sportsman spirit and that acts as a lubricant in our social life.
- Sports can be a great means of national integration.

Top sportsmen going out and representing their countries successfully operate as brand ambassadors of goodwill for the country. They bring laurels to the nation and also help build national pride. The increased awareness of sports and fitness contributes towards a healthier and resilient nation with more pride and the attitude of a winner.

Conclusion:

Enhancing sports consciousness in India will certainly lead to more effective and resilient human capital.

Chapter 11: Agriculture: The Road Ahead

India has done a remarkable job in enhancing agricultural production in nearly all the key areas. However, the current challenges are looming large over the coming years as the population is increasing. Naturally, strengthening research and development and innovations to create new technologies will be an important step for Indian agriculture as a road ahead.

Indian Agriculture: A Success Story

- Indian Agriculture is a vital sector of the national economy with the bulk of the population engaged in crop agriculture and allied fields.
- 17.9% of the global population lives on 2.4% of land and 5% of water resources of the world.
- Despite being highly populous, India has made remarkable strides in agricultural production since independence.
- With 11% of total global agriculture, India ranks second in the world in agriculture production as the leading producer of several commodities including food grains, cotton, cane, horticultural crops, dairy, poultry, aquaculture and spices.

Future Challenges:

- The growing population poses a challenge to food and nutritional securities when there is pressure on land due to urbanization, improved standard of living, changed food habits, etc., generating great demand for diversified agricultural commodities.
- These challenges are further exacerbated by declining soil health, low nutrient content, the occurrence of new biotic stresses and frequent droughts and floods due to climate change. Unprecedented change in the climatic conditions has posed a serious threat to crop, animal and fish productivity.
- As the economy grew, the workforce engaged in this sector sharply declined from 60% in 2000 to 42% in 2019.
- Climate change will impact the lives of the people in India mainly due to erratic rainfall as nearly 62% of cultivated land is rain-fed.
- India's performance on key malnutrition indicators is also not satisfactory.
 - According to [UNICEF](#), India was at 10th spot among countries with the highest number of underweight children and at 17th position for the highest number of stunted children in the world in 2019.
- To meet these challenges, it is estimated that the country must prepare for increasing land productivity by 4 times, water productivity by 3 times and labour output by 6 times.
- All this have to be achieved with low carbon emission technology, no ecological footprints but simultaneously doubling the farmer's income.
- Today's paradox is that on one hand, the country is planning for the management of surplus production, but on the other, the farmers are driven to poverty as they are unable to get sufficient returns for their produce.

The Road Ahead:

Technology Innovation:

- Globally agriculture sciences are experiencing a series of innovations and development of technologies.
- These could mitigate the effects of climate change, get better yields, reduce the effects of salinity, drought, biotic stresses, etc.

- For example, the science of genomics has seen exploratory changes when many crops are improved through genomics-assisted breeding, transgenics, and now through the CRISPR-Cas 9 technology.
- In India, several molecular breeding products have been commercialized in the field successfully.
 - Farmers are taking advantage of this technology in rice, wheat, maize, chickpea and groundnut.
 - Cotton, the first biotic crop, has brought Indian cotton production to the top level in the world.
- Genome-editing technology is the latest addition to the toolbox of crop, animal improvement.
- Technology is being used to overcome myriads of intractable problems and could be a game-changer in mitigation of the effects of climate change.

Regulation:

- In India, several rules and guidelines and policies notified under the [Environment \(Protection\) Act, 1986](#) have been in place.
- The country is also preparing guidelines for the safe use of gene-edited products.
- Thus, the country shall be benefitted once scientists are given the freedom to commercialize the products of modern breeding.

Integrated Crop Management Systems:

- Besides the seed technologies, refining integrated crop management systems like resource conservation, innovations in irrigation application, sustainable intensification, prevention of post-harvest losses, new crop protection techniques and modern communication tools including social media, ICT for updating the farmers in rural areas are important for mitigating the challenges of future agriculture.
- The use of drones in managing the recent locust infestation in India during the rainy season, 2020 have shown a new path of crop protection.
- Micro-irrigation systems are also finding large-scale acceptance as they not only save water but also double the yields.
- Harvesting technologies of storage, logistic and financing infrastructure should become priorities in India.

Investment in Research and Development:

- R&D systems have the potential to mitigate the challenges posed by climate change, biodiversity, small farming issues, and market reforms for the benefit of farmers.
- Simultaneously like the current reforms in farm produce marketing, a series of policy changes are needed to give emphasis on technology and skill-intensive agriculture.
- Suitable policy reforms will certainly act as a confidence-building mechanism amongst all the stakeholders of agriculture.

Policy Options:

- The Government of India for the first time introduced the long-pending reforms in agricultural marketing through the legislation of three major bills:
 - Farmers Produce Trade and Commerce (Promotion and Facilitation) Act 2020 (Trade and Commerce Act)
 - Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020 (Contract Farming Act)
 - Amendments to the Essential Commodities (Amendment) Act, 2020.

- These policy changes could prove to be revolutionary as the farmers are freed from the designated markets and are free to sell their produce anywhere to get the maximum price.
- The Contract Farming Act provides for them to enter into agreements with companies, retailers, agri-firms, etc., in which they can produce the crop for an agreed price so the current volatility in the market will not affect the prices that the farmers are entitled to under the contract.

The country needs to step up production by 30% to feed the expected 1.7 billion people by 2050. Simultaneously reforms in produce marketing, and a series of policy changes are needed to give emphasis on technology and skill-intensive agriculture.

Chapter 12: Indian Art & Culture

The spirit of India is all about the values of inclusiveness, beauty, aesthetics, purity of intention, attention to detail, discipline, focus, the pursuit of perfection, willingness to connect with one's higher self, openness, excellence, and plurality. Indian philosophy values beauty and aesthetic experiences and this inform Indian art & culture at every stage.

The article briefly reviews the impact of two major interventions - the Moghul rule (13th century onwards) and the European rule (18th century onwards) on Indian art & culture.

- In ancient India, the central courtyard in temples was often used for classical music or dance offerings to God.
- With Rajas and Nawabs becoming patrons of the arts, the performing space shifted from temple courtyards to court halls.
- And the purpose of art shifted from pleasing God to pleasing the King. It shifted the focus of the artist from spiritual attainment to entertainment but royal patronage nurtured the artist and the art.
- The European influx of Portuguese, French, Dutch and British rulers shifted the performing space from royal courts to smaller halls for their entertainment and introduced chamber music to India where the artist was now performing to please the listener sitting on chairs with their shoes on. This is the birth of art performances in auditoria.

Music and Instruments:

- The Moghuls introduced new instruments to India like the khamanche, rabab (which we know as the sarod today), ek-tar, du-tar, se-tar (3 strings), which we know as the sitar today in its modified version.
- The tabla is also said to have been introduced at this time otherwise this region had only the pakhawaj for North Indian, mridangam for South Indian music, and pang or dhol for Eastern music.
- North Indian classical music got more deeply influenced by khayal, qawwali, zikir-zad, Sufi and folk.
- Thumri was added in the Kathak repertoire by Nawab Wajid Ali Shah of Awadh.
- In the early 19th century, Baluswami Dikshitar, the brother of Muthuswami Dikshitar saw Irish fiddlers and was invited by the Mudaliyars to Manali in the present Himachal Pradesh to learn the violin from a visiting European violinist. He then adapted the violin to Carnatic music which was refined by Mysore T. Chowdaiah to a 7 stringed one and today violin is mainstreamed in pure Carnatic classical music.
- Vaidvelu, a Carnatic music genius is probably the first to form a quartet as early as the 19th century, a concept taken from western classical music.

- Since then, other western instruments like the clarinet, mandolin, piano have been adapted to play Carnatic music

Tribal Art, Music and Dance:

- Rural and tribal folk created their own music and dance and were presented in open spaces often accessible to the commoner.
- Gradually folk music and folk dance were performed in melas, rural festivals, at domestic ceremonies.
- Every state in India has folk music or dance form: Garba in Gujarat, Ghoomar in Rajasthan, Bihu in Assam, Santhal in West Bengal, Bhangra in Punjab and so on.
- Martial arts like Kalaripayattu, Chhau are also quite famous.
- Folk paintings started off with being done on the walls of people's houses, often depicting their everyday life like in Warli Painting from Maharashtra, Madhubani painting from Bihar, Gond painting from Madhya Pradesh, paintings telling religious stories on cloth, like Pichhwai or Phad from Rajasthan, Mata-ni-pachedi from Gujarat, Kalamkari painting from Andhra Pradesh, and Thangka painting from the Himalayan region.

Temple Art:

- In ancient India, temples were scientific and architectural wonders.
 - The Meenakshi Amman Temple in Madurai has one thousand pillars in perfect alignment.
 - Rameswaram Temple in Tamil Nadu has 1212 pillars on either side of a corridor that too in one dot.
 - Konark Sun Temple in Odisha, Rani Ki Vav in Gujarat, the Buddhist stupas built by Asoka the Great are examples of aesthetics coupled with excellence, scientific and architectural prowess.
 - Dry frescoes in the Ajanta caves near Aurangabad, Maharashtra show stories from the Jataka tales; Belur-Halebidu temples built by the Hoysala kings in Karnataka have fine stone sculptures that clearly show a hairpin in a woman's ornate bun or the folds of her clothes or a hole in the flute being played by Krishna.
 - Ranakpur Jain temple in Rajasthan has intricate carvings in white marble.
 - Mahabodhi Temple Complex in Bodhi Gaya, Bihar has fine brickwork.
 - Brihadeeswara temple in Thanjavur has sculptures of dancers showing 81 of the 108 karanas of [Bharatanatyam](#) as mentioned in the Natya Shastra by Bharata Muni.

Moghul Influence:

- The Moghuls brought an interesting application of scientific understanding.
- Eg. - the Gol Gumbaz in Vijayapura, Karnataka made by Adil Shah which has one of the largest domes built at that time and the Whispering Gallery which picks up the lightest sound made on one side heard by people standing far away on the other side.

European Influence:

- Europeans brought with them the Gothic style of architecture.
- This can be seen in the domes of the Chhatrapati Shivaji Terminus, Mumbai or the Victoria Memorial in Kolkata, West Bengal.

India has a variety of architectural styles and 38 [UNESCO World Heritage Sites](#).

Chapter 13: Great Indian Women: Inspiring Lives

History is witness to the fact that the women of India have contributed immensely in each and every sphere of life. They have always been at the forefront of the upliftment of family, society and the country.

Rani Durgawati

- She was the ruling Queen of Gondwana from 1550 until 1564.
- She was born in the family of Chandel king Keerat Rai.
- In the sixteenth century, Gond tribesmen used to rule the area around this Garhamandala.
- Rani (queen) Durgawati, wife of King Dalpat Shah of this very Gondwana state has been immortalized in the annals of history because of her extraordinary valour.
- She defeated and took the wind from the sails of the grand army of Mughal emperor Akbar and became immortal among the great women of India.
- After the death of her husband, Durgawati organized and administered Gondwana state, quite well, defeated many neighbouring rulers whenever the occasion arose.

Chand Sultana:

- Sultana Chand Bibi was an Indian Muslim ruler and warrior.
- She acted as the Regent of Bijapur Sultanate and Ahmednagar Sultanate in present Maharashtra.
- She was the daughter of Hussain Nizam Shah and the wife of Adil Shah. She was called 'Nadirat-ul-Jamani'.
- In 1591, emperor Akbar planned to conquer entire southern India, then known as Deccan.
- Chand Bibi is best known for defending Ahmednagar against the Mughal forces of [Emperor Akbar](#) in 1595.

Tarabai:

- Tarabai was a famous queen of the Marathas.
- For about 75 years, Tarabai participated actively in the governance of the Marathas.
- Tarabai Bhonsale was the regent of the Maratha Empire of India from 1700 until 1708.
- She was the queen of Chhatrapati Rajaram Bhonsale, and daughter-in-law of [Shivaji](#).
- She is acclaimed for her role in keeping alive the resistance against the Mughal occupation of Maratha territories after the death of her husband, and acting as the regent during the minority of her son.
- For seven years, Tarabai ruled over Maharashtra. She posed a tough challenge to Aurangzeb and demoralized him badly.

Brave Rani Chennamma:

- In India, the first big war of independence against British rulers was fought in 1857. The British called it just a Sepoy Mutiny.
- Indians call the war of 1857 'the First War of Independence'.
- Among the revolutionary leaders of the war of 1857, Rani (queen) Laxmi Bai of Jhansi had followed the traditional role of brave women of India.

- Much before Rani Laxmibai, a thrilling chapter in the War of Independence was written by a brave woman of Kittoor -Rani Chennamma.
- It was the brave Indian woman Chennamma, who for the first time inflicted severe jolts on the British even in the nineteenth century.
- She was the first queen in India who readied herself to chase the British out. Read more on Rani Chennamma [here](#).

Begum Hazrat Mahal:

- Begum Hazrat Mahal, also called Begum of Awadh, was the second wife of Nawab Wajid Ali Shah.
- She rebelled against the British East India Company during the Indian Rebellion of 1857.

Chapter 14: Paris Agreement

What is the Paris Agreement?

- The Paris Agreement is a legally binding international treaty on climate change.
- It was adopted by 196 Parties at COP 21 in Paris, on December 12, 2015, and entered into force on November 4, 2016.
- Its goal is to limit global warming to well below 2 degrees Celsius, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.
- To achieve this long-term temperature goal, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate-neutral world by mid-century.

The [Paris Agreement](#) is a landmark in the multilateral climate change process because, for the first time, a binding agreement brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects.

How does the Paris Agreement work?

- Implementation of the Paris Agreement requires economic and social transformation, based on the best available science.
- The Paris Agreement works on a 5-year cycle of increasingly ambitious climate action carried out by countries.
- Countries submit their plans for climate action known as nationally determined contributions (NDCs).

NDCs:

- In their NDCs, countries communicate actions they will take to reduce their Greenhouse Gas emissions in order to reach the goals of the Paris Agreement.
- Countries also communicate in the NDCs actions they will take to build resilience to adapt to the impacts of rising temperatures.

Long-Term Strategies:

- To better frame the efforts towards the long-term goal, the Paris Agreement invites countries to formulate and submit long-term low greenhouse gas emission development strategies (LT-LEDS).
- LT-LEDS provide the long-term horizon to the NDCs.
- Unlike NDCs, they are not mandatory. Nevertheless, they place the NDCs into the context of countries' long-term planning and development priorities, providing a vision and direction for future development.

Tracking Progress:

- With the Paris Agreement, countries established an enhanced transparency framework (ETF).
- Under ETF starting in 2024, countries will report transparently on actions taken and progress in climate change mitigation, adaptation measures and support provided or received.
- It also provides for an international procedure for the review of the submitted reports.
- The information gathered through the ETF will feed into the global stocktake which will assess the collective progress towards the long-term climate goals.
- This will lead to recommendations for countries to set more ambitious plans in the next round.

What is Achieved So Far?

- Paris Agreement, the years since its entry into force have already sparked low-carbon solutions and new markets.
- More and more countries, regions, cities and companies are establishing carbon neutrality targets.
- Zero-carbon solutions are becoming competitive across economic sectors representing 25% of emissions.
- By 2030, zero-carbon solutions could be competitive in sectors representing over 70% of global emissions.

AIPA of India:

- The Ministry of Environment Forest and Climate Change (MoEFCC) has constituted a high-level inter-ministerial Apex Committee for Implementation of Paris Agreement (AIPA) under the chairmanship of Secretary, MoEFCC.
- The purpose of AIPA is to generate a coordinated response on climate change matters that ensures India is on track towards meeting its obligations under the Paris Agreement including its Nationally Determined Contributions (NDC).
- Senior officials from fourteen ministries will serve as Members of AIPA.
- They will oversee the progress in the implementation of India's NDCs and receive periodic information updates to monitor, review and revisit climate goals to fulfil the requirements of the Paris Agreement.
- Other key functions of AIPA would be to:
 - Operate as a National Authority to regulate carbon markets in India under Article 6 of the Paris Agreement.
 - Formulate guidelines for the consideration of projects or activities under Article 6 of the Paris Agreement.
 - Issue guidelines on carbon pricing, market mechanism and other similar instruments that have a bearing on climate change and NDCs.
- It will take note of the contributions of the private sector as well as multilateral agencies in the field of climate change and provide guidance for aligning their climate actions with national priorities.
- The year 2021 would mark the beginning of the implementation of the Paris Agreement and the constitution of AIPA is central to strengthening the national systems and institutional arrangements for implementation and monitoring of climate actions.

- It will also ensure that India maintains its climate leadership as one of the few countries in the world whose climate actions are consistent with the goals of the Paris Agreement.
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