

Gist of Yojana January 2019

Innovation

Preface

Yojana, January 2019: Innovation

No one can deny the importance of value addition in the answer writing of CSE mains to get good marks. The magazines like Yojana become essential in this aspect. It is a repository of good points, data, facts and statements which can be used directly to score good marks. Many a times, direct questions are picked up from Yojana in essays or general studies papers. Moreover, it provides you with the good, in-depth and holistic understanding of the specific issue covered with almost all the analytical aspects related to the issue. It helps you in answering questions in mains exam which are becoming more and more analytical. Even in prelims exam, we find statements picked up from Yojana.

All this indicates inevitability of reading magazines like Yojana. Though reading whole magazine has its advantages, but one also has to keep in mind the time available. For this, one can choose to read the summary of magazine which also ensures the manageability of information which can be stored in mind and easily reproduced in exam. Our presented work is an effort in that direction only. It will equip you with all important points and analysis related to the topic which can be used directly in exam to score well.

The present issue is a summary of Yojana, January 2019 edition which discusses important aspects about India's development. We believe it will prove highly beneficial to aspirants in ensuring highest return for the time invested.

All the best 😊

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Scientific Innovation in service of society

Introduction:

- Technology form the subtext of human development. History is replete with instances of technology serving as catalyst in the grand narrative of human development. From basic necessities like food, air, water, clothing and shelter, to structural requirements like security, technology has played a tremendous role in every field of human growth and survival.
- Over the, years, the world has witnessed various innovations happening in the field of science and technology (S & T) which have made significant difference to the lives of the common man.

Historical Perspective:

- Manifestation of various technological developments have resulted in various industrial revolutions since 17th/18th century onwards. The beginning of the industrial revolution had British industry at the centre.
- Slowly industrialisation spread from Britain to other European countries like Belgium, France and Germany and then to the United States.
- In Asia, countries like Japan, in the later part of 20th century, South Korea contributed much towards the industrial revolution. However, during the last few decades, one country that has shown remarkable progress towards industrialisation in China. Countries like Israel and India are known to have made some contributions too.
- The main features of these industrial revolutions are as follows:
 - a) The first Industrial Revolution: 1760-1840. It was a period which witnessed the emergence of steam engine, textile industry and mechanical industry.
 - b) The Second Industrial Revolution: 1870 - 1914. The revolution was about emergence of railways and steel industry.
 - c) The Third Revolution: 1969 - 2000. Electric engine, heavy chemicals, automobiles and consumer durables made their presence felt during this period.
 - d) The Fourth Revolution: The digital revolution, since 2000 or a few decades prior. This is an ongoing phase of this industrial revolution which has also been called as Industry 4.0.

Innovation in various sectors:

Biology, Biotechnology, Pharmacy and Medicine

- These are the areas which have witnessed various important innovation over the years. Particularly, all these innovations matter much to humanity because they have helped to increase the life expectancy of humans.
- The discovery of DNA (deoxyribonucleic acid) has totally revolutionized the field of biology and demonstrated that this discovery would help humans to resolve various challenges beyond medicine. Today, DNA profiling has major utility for confirming if people are related to each other (parenthood testing). It also helps the law enforcement agencies towards solving crimes.
- Research in stem cell is another important innovation.
- In, addition, various innovations in the organ donation field which assist to replace (repair) eyes, lung, heart, kidney, liver, pancreas or intestine have helped human race immensely.

Energy Generation

- In the power sector, from nuclear power to solar power to space based solar power to biofuels, various clean options have been made available.
- A major innovation with regard to wind turbines is getting discussed where a start-up is working on an environmentally friendly aero-generator which needs no blades.
- Another interesting technology for energy generation is by using nuclear fusion reactors.

Manufacturing:

- Today, with the developments taking place in the additive manufacturing (AM) sector it is expected that a major change is at the doorstep of global manufacturing processes. This technology which is commonly known as 3D printing is a mechanism of direct digital manufacturing.

Internet:

- Internet 2.0 is expected to bring in major changes in the present day setup of doing various things. Internet of things (IoT) is considered to be simply a means of connecting different sensors to a network. Technologies like Fog computing, Distributed computing, Cloud computing, Big data and Blockchain are expected to impact the future of IoT.
- Artificial Intelligence (AI) is another technology which has been there for many years and is presently found making a lot of impact on the developmental cycle in various disciplines.

Conclusion:

- Technology could be said to have evolved as a response to the various requirements of society and it is expected that the S & T innovations happening in the future too would help humans to live more peacefully and happily.

Contribution to a knowledge-based revolution

Introduction:

- India, over the centuries has never had a dearth of great thinkers, scientists, engineers, innovators, philosophers and artists.
- Our philosophy, culture, fine arts, temples and sculptures over thousands of years also bear testimony to the same.
- Many like Sundar Pichai, Satya Nadella and other Indians are leaders in some of the largest and most innovative companies of the world like Google, Microsoft, etc.
- We need to ensure that our youth can also realise their true potential through the creation of a vibrant ecosystem of innovation and entrepreneurship in this country. A strategic national flagship initiative Atal Innovation Mission (AIM) has been set up under the auspices of the NITI Aayog. AIM's focus is to create and promote a world class innovation and entrepreneurial ecosystem.

A Holistic Framework:

- The Atal Innovation Mission has adopted a holistic framework to achieve its objective.
- At the school level there is a tremendous need for creation of an innovative, problem solving mind-set in the students of high schools. These students are going to be the future of our country and we need to ensure that thousands of entrepreneurs and innovators blossom from our school education systems.
- At the university and industry levels, there are a growing number of start-ups thanks to several start-up initiatives in the country. But there is a growing need for world class incubators in various institutions of the country to foster and nurture start-ups enabling their success.
- Finally a cultural shifts in attitudes towards entrepreneurship is needed. Education and awareness of the immense opportunities for entrepreneurial ventures is needed. Incentivization of relevant product innovations with commercial and social impact through national challenges are necessary.

Tinkering Labs:

- Revolutionary technological advances are transforming the world. 3D printers are enabling real time conceptualization, design, prototyping and manufacturing. IoT or the Internet of Things are connecting sensor technologies to man, machine, devices, mobile and satellite technologies in every industry. Big Data and Analysis, Artificial Intelligence is enabling complex data processing and decision making through advanced easy to use tools.
- Unless children in our schools have access to new technologies and get familiar with them, tinker with them, experiment with them, design solutions with them, prototype them, test them, allowing unbridled expression to their imagination and creativity, they will be left far behind.
- AIM has already launched the implementation of 5441+ Atal Tinkering Labs across 715 districts of the country.

Atal Incubators:

- The Atal Incubators initiative is to create world class incubators to support the burgeoning number of start-ups in the country.
- AIM has already launched 101 incubators to date all of which would be operational by end 2019. These incubators will provide the necessary ecosystem of access to technology labs, hiring, training, mentoring, finance, venture capital networks and corporate networks.

Atal Challenges:

- There is an urgent need to incentivise relevant problem solving innovations at local, regional and national levels across the country - at school, university and industry levels.
- The Atal Tinkering Challenges at a school level, the Atal New India Challenges at Industry levels, the Atal Small Business Innovation and Research Challenges at a national level will incentivise relevant problem solving.
- Atal New India Challenges stimulating product innovations in five sectors have been launched in areas such as drinking water and sanitation, urban housing and development, climate smart agriculture, rail safety and transportation which can have great benefit for the country.

Collaboration is the key

- Corporates and SMEs can adopt ATLs and coach the students into problem solving, ideation, prototyping, triggering small innovations. Global partnerships can enable sharing of best practices. NGOs and multinational companies can collaborate on almost all of these initiatives.
- Collaboration will be key to the success of these initiatives. AIM has, therefore, launched a Mentors of Change - Mentor India Network across the country and plans to expand it worldwide. Over 10000 mentors have already registered as mentors of change, and many corporates have adopted Atal Tinkering Labs.

Conclusion:

- India got left behind in the Industrial Revolution that swept the world in the last century. But India does have a unique opportunity to contribute in the knowledge based revolution that is sweeping the world today.
- That is why Atal Innovation Mission initiatives are so important and need to be embraced by all. The children and youth of our country deserve it. We all need to collectively make it happen.

Capitalizing on Technology for Farmer's welfare

Introduction:

- Farming is both a way of life and means to livelihood for nearly 60% of our population, a majority of whom are women and youth.
- The basic difficulties of farmers can be overcome only if integrated attention is given to pricing, procurement and public distribution. Compounding the difficulties of today, farmers are facing serious problems from climate change.
- The progress made by our farmers in improving production and productivity (wheat production in India going up from 7 million tonnes in 1947 to over 100 million tonnes in 2018) has been rendered possible due to public interaction between technology and public policy.

Innovations for farmer's welfare:

- Technology has been mainly in the field of designing plant architecture characterised by resistance to lodging and ability to transfer more of the photosynthesis to grain formulation.
- Ever since the publication of Mendel's Laws of Inheritance in 1865, many innovations have taken place in the effective use of genetic knowledge for improving productivity and profitability of crops.
- Genetic modification has made it possible to transfer genes across sexual barriers.
- Gene editing technologies have become available which can help to achieve directed mutagenesis.
- Breeding helps to develop strains with a higher yield potential. However, for achieving the higher yield, we need interaction between technology and public policy. New scientific innovations, farmer friendly economic policies and farmer's own enthusiasm to take to new technologies are all important for achieving the desired goal of quantum jump in production.
- It is important to understand the risks and benefits associated with the new technologies. Before taking the new technology to the field, it is important that they are assessed for their positive as well as potentially negative effects.
- The future belongs to nations which give importance to grains rather than guns. Genetic engineering technology has opened up new avenues of molecular breeding. However, their potential undesirable impacts will have to be kept in the view. What is important is not to condemn or praise any technology, but choose the one which can take us to the desired goal sustainably, safely and economically.

NCF Recommendations:

The National Commission on Farmers (NCF) made the following goals for ensuring sustainable agriculture and food security –

- To improve the economic viability of farming by ensuring that farmers earn a "minimum net income".
- To mainstream the human and gender dimension in all farm policies and programmes to give sustainable rural livelihoods.
- To complete the unfinished agenda in land reforms and initiate comprehensive asset and Aquarian reforms.
- To develop and introduce a social security system and support services for farmers.

- To protect and improve the land, water, biodiversity and climate resources essential for sustained advances in the productivity.
- To foster community-centred food, water and energy security systems in rural India and to ensure nutrition security at the level of every child, woman and man.
- To introduce measures which can help attract and retain youth in farming by making it both intellectually stimulating and economically rewarding.
- To strengthen the biosecurity of crops, farm animals, fish and forest trees for safeguarding both the work and income security of farmer families.
- To restructure agricultural curriculum and pedagogic methodologies for enabling every farm and home science graduate to become an entrepreneur.
- To make India a global outsourcing hub in the production and supply of the inputs needed for sustainable agriculture.

Actions taken recently:

During the last four years, several significant decisions have been taken to improve the status and income of farmers. Some of them are:

- Designating the Ministry of Agriculture as Ministry of Agriculture and Farmers' Welfare as the measure of agriculture progress.
- Issue of Soil Health Cards (SHC) to all farmers to promote the adoption of balanced nutrition.
- Promoting micro-irrigation through the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY).
- Conservation and sustainable use of indigenous breeds of cattle through a Rashtriya Gokul Mission.
- The creation of Gramin Agriculture Markets (GrAMs) will provides scope for direct sales to consumers in both retail and bulk form.
- Electronic Negotiable Warehouse Receipt (eNWR) system for increased institutional credit to the farm sector.
- Determination of Minimum Support Price (MSP) based on the recommendation of the NCF. Assured procurement at MSP of more crops.
- Integration of protein rich pulses and nutri-rich millets into welfare programmes including Public Distribution System (PDS), mid-day meals, ICDS etc.
- Increase in the income of farmers through activities like apiculture, mushroom cultivation, bamboo production, agro-forestry, vermin-compost and agro-processing for generating additional jobs and income for farm families.
- Setting-up several corpus funds to complete ongoing irrigation production, modernised infrastructure in dairy cooperatives and strengthen the adoption of inland and marine aquaculture.

Anticipatory Research in an era of Climate Change:

- There are several reports in the media about the bio-shield function of mangrove forests along coastal areas. Mangroves have helped to save both lives and livelihoods particularly of fisher and coastal communities. The beneficial impact of mangroves has been observed by the local community on several occasions including the recent Gaja in Tamil Nadu.
- It is in recognition of the critical role of mangroves in the conservation of coastal ecosystems that the famous temple at Chidambaram chose a mangrove plant as a Temple Tree.

- Mangrove areas are being converted into aquaculture farms and tourist centres.

Conclusion:

New technologies are the basic raw material for productivity improvement. There are adequate opportunities for anticipatory research involving new technologies. We should capitalise on them to ensure the well-being of farmers and farming.

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Space Programmes: Spin Offs for Humanity

Introduction:

- India has launched its largest and heaviest communication satellite into orbit. It weighs nearly 6 tons and has capability to support high speed data transfer to remote parts of the country.
- This mission GSAT 11 will fulfil yet another goal of ISRO's founding father Dr Vikram Sarabhai to use high technology for the benefit of common man.
- Though the Indian space programme started nearly 20 years later than in developed countries, today it has emerged as one among six nations i.e. Russia, USA, Europe, China and Japan having total indigenous capability in building satellites for earth observation communication and scientific research.
- Indian launch vehicles like PSLV, GSLV have proven track record and cost effectiveness so that even developed countries are approaching ISRO for launching their satellites.
- Direct to home transmission of TV signals, connectivity to banks and financial organisations, telemedicine, tele-education and disaster warning system are a few examples of the benefits that we have derived from such innovations.

Human Space Flight:

- Space is going to be the next frontier for human exploration and presence of humans in outer space and planets is going to be the next challenge.
- India will be having its own human space flight in 2022. This is really going to be a great technology challenge but the goal has to be met if we have to maintain our leadership position in the global scenario.
- Creating living conditions inside the module to support human life, providing oxygen, water and food as well as waste disposal for several days needs development of innovative technologies.
- Training of astronauts to face zero G as well as high acceleration levels during launch and re-entry needs thorough understanding of behaviour of human psychology and psychology as well as conditioning the astronauts by going through a series of simulated environmental tests.
- A branch medicine i.e. space medicine will emerge.

Reliable Vehicles:

- The PSLV and GSLV have emerged as reliable satellite launch vehicles globally. That is the reason that other countries including USA, Europe and Canada are approaching ISRO for launching their satellites.
- Though they have demonstrated reliability of around 95 percent but not adequate to carry the manned capsule. At present the only launcher available for the free world for human space flight is Russian Soyuz rocket.
- Though the GSLV Mk III recently developed by ISRO can take the manned capsule weighing nearly 10 tonnes to low earth orbit, improvement of reliability of launch system is a must before it carries human on board.
- More important is introduction of redundant and fail safe systems to ensure safety of the crew.
- Providing oxygen and maintaining the temperature within reasonable limits, shielding the external radiation of charged particles and providing waste management on board are other new developments.

- After completing the orbital mission, breaking the orbit, sending the module in precise trajectory in guided manner and managing re-entry heating load using appropriate ablatives and material which can withstand high temperatures require advanced materials and techniques.

Recovery System:

- ISRO has demonstrated a crew recovery experiment using which astronauts will be ejected from the launch system and brought back to earth in case of a mission abort.
- Developing space transportation system and enabling humans to stay in earth orbit for few days and bringing them back is only a small step forward. It will provide a platform for detailed observation of planet earth, scientific observation and studies of stars and galaxies conducting chemical or biological experiments under zero G condition to generate new molecules are some of the benefits.

Addressing Climate Change:

- To address climate change and associated changes in weather, India has done well in making the use of earth observation satellites, IRS and pictures from meteorological satellites for meeting these requirements on a day to day basis.
- The recently launched hyper-spectral imaging satellite is going to be a powerful tool for monitoring natural resources and supporting agriculture in a big way.
- To provide data on cloud covered regions, radar imaging techniques will have to be perfected and a constellation of Radar satellites are to be deployed.
- Satellite images can strengthen the security system and for continuous monitoring of sensitive regions high resolution imaging from geo stationary platform will have to be developed.
- Warnings on cyclone drought weather phenomena can be met using precision multi spectral images from geostationary satellites.

Digital Connectivity:

- Today's knowledge society is totally dependent on digital connectivity. Geo stationary satellites always provided solutions for this. The recent launch of GSAT 11 is a clear example of how space is supporting the needs of the country in this area of high speed digital connectivity.
- Today, telemedicine is limited to remote consultation but the day is not far off when even telesurgery can be done using satellite connectivity.

Cost effectiveness:

- Today, space based services are efficient but expensive.
- If schemes are developed to recover and reuse the launch hardware considerable savings in cost can be achieved.
- Also, use of new propulsion systems using less expensive fuel like kerosene could bring down costs.

Conclusion:

- Space research always has been fascinating and India has not lagged behind.

- Future challenges related to space exploration, space travel, tourism application programmes based on space assets spin off technology benefits etc are going to provide a lot of opportunity to the new generation.
- Those who are adventurous can plunge into it and reap the benefits.

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Improving Governance in Public Systems

Introduction:

- Public sector innovation involves creating, developing and implementing practical ideas that achieve a public benefit.
- These ideas have to be at least in part new and they have to be taken up for implementation rather than remaining simply as ideas. And, most important is that they have to be useful.

Definition of innovation:

An innovation in public systems can be defined as a process/policy intervention that –

- a) Improves the public service delivery.
- b) Enhances the efficiency of governance structure i.e. simplifying procedures etc.
- c) Improves citizen satisfaction.
- d) Promotes transparency and accountability.
- e) Reduces the time taken for service delivery
- f) Reduces the cost without affecting the efficacy and efficiency.
- g) Leverages the use of technology.

Types of Innovation:

- Service Innovations:
Intend to introduce a new service, product or improvement in the quality of an existing service or product. BHIM App is one such example which enables e-payment directly through banks.
- Service Delivery Innovations
Create a new or improved way of delivering specific public service to the citizens that aim at improving accessibility, targeting user needs more accurately, bringing in simplification of procedures etc. Common Service Centres - They are the access points for delivery of essential public utility services, social welfare schemes, healthcare, financial, education and agriculture services, apart from a host of Business to Citizen (B2C) services to citizens in rural and remote areas of the country.
- Administrative/Organisational Innovations
They target to change the hierarchical structures and administrative routines in the Government. Electronic National Agriculture Market (e-NAM) - It is a pan India electronic trading portal implemented by Small Farmers' Agribusiness Consortium (SFAC). It creates a national network of physical mandis which can be accessed online.
- Policy Innovations –
They bring about the systemic culture of nurturing fresh ideas. o National Policy on Biofuels - It encourages the use of biofuels by extending appropriate financial incentives under various categories which results in reduced import dependency, a cleaner environment, employment generation etc.
- Systematic Innovations –
They employ new or improved ways of interacting with the citizens and engage them in service design. India Innovation Growth Program - It is a public, private partnership of the Department of Science and Technology and Lockheed Martin Corporation. It throws open a chance to the public to suggest innovative solutions to major societal problems.

Promoting Innovations in Public Systems:

- Understanding Opportunities and Problems –
 - a) Begins with a prompt or trigger including problems, failures and complaints.
 - b) Attuned to new trends, customer demands, data or technologies.
 - c) Emphasise better understanding of how people live their lives.
 - d) Find new insights into what people need.
- Generating and sharing useful ideas:
 - a) Prioritise the areas of concern (e.g. health, education, infrastructure, water supply, sanitation, PDS etc.) which need to be addressed.
 - b) Channelize data, information and knowledge into a usable form so that it can be fully exploited to support evidence-based decision making.
- Collaborating with Like-minded Stakeholders –
 - a) Identify and assess the importance of key people.
 - b) Define whom to involve in designing a multi-stakeholder process.
 - c) Understand the role of multiple stakeholders who are likely to be involved in promoting innovation.
 - d) Describe the roles and responsibilities.
 - e) Sensitise/build the capacities of relevant stakeholders.
 - f) Create a knowledge repository.
- Documenting innovations –
 - a) Concept and Types of Innovations.
 - b) Skills and Tools involved.
 - c) Learning based Monitoring and Evaluation System.
 - d) Processes and Linkages for scaling up.
 - e) Change in practices.
 - f) Use of new knowledge/new use of existing knowledge.

Challenges in future:

- Resource mobilisation.
- Departmental silos and lack of convergence mechanism.
- Fading away of the innovations due to a change in the personnel.
- Lack of institutional memory.
- Transfer of ownership.
- Lack of domain expertise.
- Internal animosity between different wings of Government/Organisation.

Innovative Practices:

- Ecological Sanitation (ECOSAN)
 - As the country has set out on the Swachh Bharat Mission, one of the major attributes is to end open defecation.
 - ECOSAN, an initiative that is one of its kind, offers an economical and simple-to-use option in contrast to the convectional waste transfer methods where the human excreta and body wash water do not go waste.

- The toilet is in daily use and never smells. The urine is collected in a drum/pot outside the toilet for later use, and body wash water is used beneficially by diversion to the tress outside.
- ECOSAN toilets are much more helpful in flood-prone areas as it is completely sealed and would not result in overflow.
- They are highly useful in drought-prone areas for being a remarkable alternative in the sustainable use of water.
- ECOSAN toilets reduce health risks by avoiding contamination of drinking water by human waste; to prevent ground and surface water pollution, and to reuse the energy content within the human waste.
- Use of Plastic Waste in Road Construction
 - The technological approach developed by Prof. Rajagopalan Vasudevan has been found to be very useful in utilising plastic waste on a large scale.
 - The utilisation of plastic waste to improve the properties of the bituminous mix offers a very promising alternative with its bulk and eco-friendly usage.
 - The plastic roads ensure enhanced loads carrying strength, water resistance, negligible maintenance cost and reduction of bitumen consumption by 10 percent.
- Urban Greening Activities by Kochi Metro Rail Limited –
 - Kochi Metro Rail Limited (KMRL) is in the process of adding greenery to the infrastructure being created, thereby contributing to the enhanced green cover in and around Kochi.
- Mother Tongue Based-Multilingual Education (MTB-MLE) –
 - MTB-MLE is an approach to address the educational challenges faced by the indigenous population. In this approach, children start learning in their mother tongue in early grades with a gradual transition to a regional language and an international language.
 - It contributes to ‘quality education’ as it facilitates the learning process, improves the ability to learn other languages and enables to strengthen the process of education by reaching out to grass-root levels.
- Establishment of Vision Centres –
 - Establishment of Vision Centres in rural villages with tele-ophthalmology connectivity with Base Hospitals is an effective model to reach patients who otherwise do not have access to quality eye care.

Conclusion:

- CIPS, being a national body established by the Government of India in 2010 as an autonomous centre at ASCI, Hyderabad with a mandate to promote innovations in public systems, is working with Central Ministries, State Governments, Union Territories and Not - For-Profit organisations to actively promote and disseminate practices which have resulted in enhanced service delivery, increased efficiency and cost reduction.
- It is fair to conclude that innovations in public systems are indispensable and it is both a continuous process as well as a result.

Innovation oriented initiatives in higher education

Introduction:

- India for its 1.25 billion people offers higher or tertiary level education through nearly 800 universities, who are mostly governed by the University Grants Commission (UGC) and nearly 100 Institutes of National Importance (INIs) which were created through special acts of the Parliament or State Assemblies who directly report either to the Central or State Government.
- The latter group includes the famed IITs, IIMs, AIIMS etc.
- In order to remain relevant and serve the society, engineering education needs a special outlook or approach different than conventional pedagogic style only consisting of lecture, discourse, monologue, text books, notes and examination leading to a degree without practical training for invention and innovation.

Science-Engineering-Technology

- Engineering education must build on relevant scientific theories and principles to address the issues of 'need' of the society; e.g. high strength material, greater thermal/electrical conductivity, affordable healthcare, sustainable energy resources, remedial measures for carbon footprint, efficient devices/machines etc.

MHRD Innovations for promotion of Innovation:

- Research and Innovation: Start-up India Initiative for HEIs –
 - a) To promote the culture of 'innovation', MHRD has launched MHRD Innovation Cell (MIC) and Atal Ranking of Institutions on Innovation Achievements (ARIIA) to systematically foster the culture of innovation in all higher education institutes (HEIs) across the country by encouraging and nurturing young students to explore new ideas that can result into innovative products and activities.
 - b) The initiative envisages creation of 1000 Institute Innovation Centers (IIC) across the country.
- Global Initiative for Academic Network (GIAN) –
 - GIAN in Higher Education aims to connect the Indian academia with the international talent pool of scientists and entrepreneurs by inviting them to teach and participate in research in Indian HEIs.
- Scheme for Academic Research and Promotion by Collaboration (SPARC) –
 - SPARC is a new and logical follow up initiative of MHRD after GIAN. Under this scheme, 600 joint research proposals will be funded for 2 years to facilitate strong international research collaboration with leading foreign universities.
- Digital India e-learning –
 - The main objective of this virtual classroom initiative is to enable millions of youth outside the university campus to access best quality teachers and teaching courses in an easy paced manner without having to pay large admission/tuition fees or even qualify through JEE or other entrance examinations.
- Research and Innovation –

- Under this initiative, 20 new Design Innovation Centres (DIC), one Open Design School (ODS) and a National Design Innovation Network (NDIN) are planned to be set up with interlinks.
- Uchhatar Avishkar Yojana (UAY) –
 - UAY promotes industry sponsored, outcome oriented research projects with an outlay of Rs. 475 crore for a period of two years beginning 2016-17. The objectives of UAY scheme are to promote innovation in IITs, connect with manufacturing industries, spur innovative mind-set and promote collaboration and cooperation between academia and industry.
- Innovation in HEIs – IMPRINT-
 - Impacting Research Innovation and Technology (IMPRINT) aims towards the goal of translation of knowledge from research into viable technology (product or process). It is different from usual research initiatives because –
 - a. It is meant not only for creation but for translation of knowledge into viable technology
 - b. It addresses not just one but all technology challenges faced by the nation
 - c. It relies upon a total inclusive model of crowdsourcing and involving all concerned stakeholders from Ministry to industry.
- IMPRINT II –
 - Core mandate of IMPRINT II has been –
 - a. Develop products/processes and viable technologies for addressing the identified challenges in different domains.
 - b. Formulate and develop focused translational projects against identified technology thrust areas by various stakeholder ministries.
 - c. Evolve new technology transfer models for enabling technology diffusion to industry and stakeholders.
 - d. Continuously monitor and refine the challenges and gaps in the various technology domains and collect feedback from stakeholder ministries/ industry.
 - e. Align the programmers and projects with the needs of various industry sectors and the States of India.
 - f. Facilitate building capability and competence in identified technology thrust areas in the various HEIs and universities.

Conclusion

- Innovation has become synonymous with evolution and progress in life. Education is the only way to effectively train the population not only to benefit from the exploits and fruits of innovation but also to actively participate and contribute to this crusade for creating a better, safer and healthier planet.

Improving Competitiveness in SMEs

Introduction:

- Given the paramountcy of the sector, it is critical to ensure that our SMEs remain competitive both nationally and globally. Indian SMEs face a formidable challenge in this regard.
- The Ministry of MSME, apart from providing them financial subsidy and incentives to buy machinery, file trademarks, and gain access to tools, training, and expert advice, runs various schemes and programmes to support the technological and other innovations in Indian SMEs

Initiatives and innovation in this sector:

- Innovation plays a critical role in shaping the industrial and firm competitiveness of any nation. It has often been discussed in the context of developed countries but the rise of emerging economies such as India has generated a new interest in innovation in the context of developing economies.
- First and foremost is the huge allocation of Rs 3,794 crore in the current FY Union Budget, for enhancing the financing and innovative capacity of the MSME sector.
- Pradhan Mantri MUDRA Yojana is another milestone with a provision of Rs 3 lakh crore for the sector.
- Reduction in tax rates to 25 percent made by the Government during the last financial year, again, has proved to be a positive step.
- Budget allocation of Rs 550 crore for setting up ultra-modern technology centres.
- A grant of Rs 415 crore for the promotion of Khadi Udyog, is also going to help the growth of this sector.
- A scheme for promotion of innovation, rural industry and entrepreneurship (ASPIRE) was launched in 2015. The most important component of this scheme is setting up 100 livelihood and 20 technology related incubators.
- With a view to generate employment opportunities in rural as well as urban areas of the country, Prime Minister Employment Generation Programme has been allocated Rs 1,800 crores under the current FY budget.
- Another boost provided by the Government for the growth of MSME sector is the CGTMSE (Credit Guarantee Fund Trust for Micro and Small Enterprises) to provide financial assistance to these industries without any third party guarantee/or collateral.
- The Revamped Scheme of Fund for Regeneration of Traditional Industries (SFURTI) launched clusters (including coir) with coverage of 44,500 artisans (approx) in the first phase, has further been infused with Rs 125 crore in 2018-19 budget.

Conclusion

- The efforts of the Government have started bearing positive results and showing remarkable improvement and India has succeeded in attaining 57th rank in 2018 Global Innovation Index.

Transforming Public Transport Sector

Introduction:

- Given the rapidly changing demography of urban space, the cities need an innovative public transport system that operates on non-pollutant resources and meets the specific mobility needs of large populations.
- The Metro Rail which offers solutions to the issues that are not dealt by the traditional transport systems could be the perfect choice of public transport.

Delhi Metro - Technology Survey

- Since the inception of its operations in 2002, the DMRC has been continuously improving the quality of services and added several new features to the equipments used for day-to-day operations.
- For instance, the trains used by Delhi Metro in its Phase-III expansion are equipped with unattended train operation mode, which enables the possibility of operating trains without drivers.
- The Delhi Metro introduced the highly sophisticated 'Communication Based Train Control (CBTC)' system which enables headway improvement to about 90 seconds.
- In simple words, the CBTC system facilitates higher frequency of train operation, which subsequently helps transporting more people in busy hours.
- Other effective innovations include the installation of automatic screen doors on platforms which help maintain better crowd management.
- The LED screens installed inside the train coaches help commuters identify the destinations easily.

New features

- There is a change in the look of the front cab of the train.
- LED based lighting is used inside the trains.
- The display panels inside the trains are LED based, where graphics, public information messages and advertisements also will be aired if necessary.
- The dynamic route maps have been changed to LCD technology for better understanding.
- The noise levels inside the trains have been reduced further from the present limit of 68 dB to 65 dB.
- Higher number of grab rails and grab handles have been provided for the convenience of the standing passengers.
- Broader gangways between the coaches provide more convenience to the commuters.

Energy Efficient Techniques

- According to a study conducted by Central Road Research Institute, around 3,90,971 vehicles were taken off the roads after Metro started operating in Delhi.
- This in turn helped reduce around 5,53,203 tonnes of CO₂ from environment every year.
- In fact, DMRC became the first railway project in the world to win carbon credits.
- In order to bring down the energy consumption levels, the Delhi Metro developed its own solar power generation plants on rooftops of stations and depots. Currently, the DMRC is producing around 25 Megawatts of solar power annually and is aiming to raise the capacity to 50 Megawatts in future.

Creating awareness

- Numerous social campaigns to raise awareness on use of escalators, lifts, automatic fare collection (AFC) gates and usage of smart cards were carried out.
- DMRC also organised community interaction programmes to engage the residents near construction sites and to listen to their grievances and suggestions.

Conclusion

- Unlike other public transport systems, the Delhi Metro is highly punctual. On average, 99 percent of the train trips are recorded on time and redefined the punctuality norms to 59 seconds. In future, we are going to see more successful metro projects like Delhi Metro.

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