BYJU'S

Gist of YOJANA

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Innovation in Education

Transforming Education

The Vice President on **Science Education and Innovation**

In Conversation with **Dr. K Sivan**

Artificial Intelligence: Challenges and Opportunities for India

Innovation in Higher Educational Institutions

INCREDIBLE RESULTS

CSE 2018 Results

11 Ranks in Top 50 | **28 Ranks in Top 100** | **183 Ranks in the Final List**


Rank 11
Pujya 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
Avdhesh 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
Udita Singh

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INNOVATION IN EDUCATION

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Chapter 1: Transforming Education

Education is a virtue which stays with an individual throughout life. Collectively, educated masses are the think tanks, growth drivers as well as the conscience keepers of any nation. It is the education in multiple streams which brings together a multi-faceted society with a vast spectrum of expertise among its people. Innovation brings novelty in learning methods and the way education is structured. This also brings better employability and future prospects. Nelson Mandela has called education as the "most powerful weapon which you can use to change the world." It is the key to eliminating gender inequality, to reducing poverty, to creating a sustainable planet to fostering peace, and to preventing needless deaths and illnesses.

Indian Education System:

- Technology is bringing the much-needed innovation in Indian education system.
- Moving ahead from the conventional chalk and talk model of learning to modern digital learning and from passive learning to hands-on experience is the way forward.
- Innovative education fosters sustained learning at an early stage which has the potential to shape the future generations. The possibilities are immense when education is teamed up with innovation.
- From the Right to Education to Samagra Shiksha, education has always been a priority area in devising schemes and initiatives. The Government has also launched several new schemes in higher education to boost research and innovation culture in the country.
- The public schools and universities are mandated to provide quality education to all.
- Subsidised education works as an enabler for many with marginalised backgrounds giving wings to their aspirations.

New Education Policy:

- The Committee for Draft National Education Policy chaired by Dr. K. Kasturirangan has submitted its report proposing an education policy.
- It seeks to address the challenges of access, equity, quality, affordability and accountability faced by the current education system.
- The draft Policy provides for reforms at all levels of education from school to higher education.
- It seeks to increase the focus on early childhood care, reform the current exam system, strengthen teacher training and restructure the education regulatory framework.
- It also seeks to set up a National Education Commission, increase public investment in education, strengthen the use of technology and increase focus on vocational and adult education, among others.

India has been an important seat of learning since ancient times with institutes like Nalanda and Takshila. India's demographic dividend can be utilised with the right opportunities in education providing the youth, the skill set and experience to aspire big. In India, innovation is the key to this transformation in the education sector.

Chapter 2: The Vice President on Science Education and Innovation

Addressing the 27th edition of the National Children's Science Congress (30 December, 2019) in Thiruvananthapuram, the Vice President of India called for inculcating scientific temper and nurturing the spirit of inquisitiveness among the children from a young age as science provides answers to challenging problems and contributes to the technological progress of a nation.

- National Children's Science Congress is the flagship programme of the National Council for Science and Technology Communication (NCSTC), Department of Science.
- Theme for 2019 – "Science Technology and Innovation for a Clean, Green and Healthy Nation".

Achievements of India

- Historically, India has been a lighthouse of knowledge. Our Ayurveda system of medicine can be traced back to 5000 BCE.
- The Indus Valley Civilization had irrigation and sewerage systems as far back as 2500 BCE.
- By 200 BCE, South India was making high quality wrought iron.
- The invention of zero and India's contribution to astronomy are well known.
- Aryabhatta's 'Aryabhattiyam' is considered a seminal work.
- Equally pioneering work is Panchasidhhantika of Varahamihira.
- Charaka and Sushruta are known as Fathers of Surgery.
- Rishi Kanad first spoke of "anu" (atom) as an indestructible particle of matter in Kanada Sutra while Patanjali is considered as the Father of Yoga.
- In early 20th century, Prof. Satyendranath Bose's 'Boson', Prof. Subramanian Chandrasekhar's 'Chandrasekhar limit', Sir C. V. Raman's 'Raman Effect', and Prof. Jagadish Chandra Bose's 'wireless communication' have earned global recognition.

Chapter 3: In Conversation with Dr. K Sivan

"Today Science and Technology are the essential components in development of any country and they play a major role for improving the quality, safety and security of life of humans. Thus providing help for inculcating scientific temper in the students assumes added significance".

– Dr. K. Sivan

Satellite Instructional Television Experiment (SITE):

- SITE was the largest sociological experiment in the world.
- This satellite communications experiment was performed for one year during 1975-76 by ISRO.
- During SITE, TV programmes on subjects such as health, hygiene, family planning and agriculture were beamed through American ATS-6 satellite revolving around the Earth in the 36,000 km high geostationary orbit.
- SITE experience enabled the evolution of the INSAT system for rapid expansion of the country's telecommunication, TV broadcasting and weather monitoring infrastructure.

EDUSAT Programme:

- EDUSAT programme was conceived based on the rich experience gained through the pioneering SITE programme, Ariane Passenger Payload Experiment (APPLE) and Indian National Satellite System (INSAT) utilisation programme.
- During this programme, GSAT-3 or EDUSAT, a dedicated satellite for the educational field, was launched by Geo-synchronous Satellite Launch Vehicle (GSLV) and utilized for enhancing the outreach as well as the quality of the formal as well as informal education sectors.
- They were mainly intended for semi-urban and rural students.

DHRUV:

- DHRUV, the Pradhan Mantri Innovative Learning Programme, is a unique initiative.
- It was started to identify and encourage talented children to enrich their skills and knowledge.
- Gifted children are mentored and nurtured by renowned experts in different areas in centres of excellence across the country, so that they can reach their full potential.
- DHRUV acts as a platform to explore the talent of meritorious students, and help them achieve excellence in their specific areas of interest. The talent of the students will not only utilise its full potential, but also contribute to the society in a big way.
- With children drawn from all over the country, the DHRUV programme reflects the true spirit of Ek Bharat Shrestha Bharat.

Role of Space Technology in Imparting Informal Education to Farmers:

- All along, ISRO has been striving to develop and utilise space technology for the benefit of the common man including farmers.
- During SITE programme, TV documentaries on agriculture made in vernacular languages were beamed to farmers on improving agricultural practices.
- Later during APPLE and INSAT utilization programmes, TV documentaries specific to various subjects on agriculture were made and telecast through satellites and they have been continuing.
- Weather monitoring satellites like Kalpana and INSAT – 3D have become instrumental in the accurate weather prediction.
- Remote sensing satellites have enabled our agricultural scientists to detect crop diseases, accurately estimate crop acreage, crop yield, soil quality, which ultimately will bring benefits to the farmers.

Young Scientist Programme (Yuvika):

- Yuvika is primarily aimed at imparting basic knowledge on space technology and its applications as well as space science to the younger ones with the intent of arousing their interest in the emerging areas of space activities.

- The two week long residential training programme involves invited talks and experience sharing by the eminent scientists, facility and lab visits, hands on training, exclusive sessions for discussions with experts and more importantly, a feedback session.

Samwad with Students:

- It was launched by ISRO as part of its enhanced outreach programme. The interaction of scientists with students goes a long way in awakening the curiosity and creativity lying inside the student community.
- With this in mind, as well as with the intention of making our young students proud of their country's achievements in space through the narrative of ISRO scientists themselves, 'Samwad with Students' programme was launched.

Contribution of tools and education in science and technology in facilitating India's target of being a $5 trillion economy by 2024-25:

- Science and technology act as catalysts in the economic development of a country.
- In this regard, space technology has already proven its worth by facilitating the rapid development of our telecommunications, TV broadcasting, weather monitoring, educational, healthcare, transportation and banking infrastructure as well as in the planning, implementation and review of various developmental tasks.
- Now, it is even contributing to governance.
- In the future, with more broadband communication satellites, more capable earth observation satellites as well as navigation satellites, the potential for more significant development definitely exists.
- Science and technology education provides the necessary skilled manpower for these tasks and enables the indigenous development of potent tools of science and technology as well as their utilisation.
- Thus, the role of science and technology education in enabling the proper, adequate and sustainable capacity building is very important indeed.

Salient Features of forthcoming programmes of ISRO:

- ISRO aims at launching many communication and earth observation satellites to ensure the continuity of the services provided by such satellites already serving from their orbital home.
- In the near future, it aims at realising Chandrayaan-3 mission with a lander and a rover.
- Plans are also in the offing to launch Aditya-1 satellite for studying the Sun.
- ISRO has also taken up the challenge to realise the Indian Human Spaceflight Programme Gaganyaan by 2022.

Chapter 4: Artificial Intelligence: Challenges and Opportunities for India

The recent developments in Artificial Intelligence (AI) offer the potential for significant opportunities for industry, governments and society.

What is Artificial Intelligence (AI)?

- AI can be described as a system's ability to learn and interpret external data via software/algorithms or machines/devices for problem solving by performing specific roles and tasks currently executed by humans.
- The term AI has been used interchangeably with other closely related terms such as expert systems, decision-support system, knowledge-based systems, machine learning, natural language processing, neural networks, pattern recognition, recommender systems and text mining.

Opportunities and Applications:

- AI has the ability to overcome some of the computationally intensive, intellectual and perhaps creative limitations of humans.
- It opens up new application domains within manufacturing, law, medicine, healthcare, education, government, agriculture, marketing, sales, finance, operations and supply chain management, public service delivery and cyber security.
- Within the education sector, AI can be deployed to improve teacher effectiveness and student engagement by offering capabilities such as intelligent game-based learning environments, tutoring systems and intelligent narrative technologies.
- AI technology can be used within several other sectors for enhancing both efficiency and effectiveness.

AI and Education sector:

AI can impact education in three ways:

- AI enabled hyper-personalization helps in developing student-specific learning profile and in developing customized learning environments based on ability, preferred mode of learning and experience.
- The use of smart assistants (Amazon Alexa, Google Home, etc.) and associated technologies offer significant potential to help students.
- AI systems can assist educators with secondary tasks such as grading activities, providing personalized response to students, etc.

AI and Sustainable Development Goals (SDG):

- AI-based systems can help in achieving UN Sustainable Development Goals. It can be utilized for conducting remote diagnosis supporting doctors to help improve health service delivery.
- It can also help achieve "Zero Poverty and Zero Hunger" (SDG 2) by assisting in resource allocation for predicting adverse environmental conditions, diagnose crop diseases and identify pests in a timely manner to mitigate the risk of catastrophic agricultural events.
- Similarly, AI based systems can be used to predict energy and utility demand to help in achieving SDGs such as "Clean water, sanitation" and "Affordable clean energy".

Application of AI in India:

- India has 0.8 per thousand doctor-to-patient ratio (UK – 2.8, Australia – 5, China – Approx. 4). In India, doctors spend just 2 minutes per patient, whereas in the US it is close to 20 minutes.
    - AI could be a valuable assistive tool for doctors in helping to reduce their workload and assisting in diagnosis.
- The per hectare cereal productivity in India is almost half that of China and the UK (3000 kg/ha vs. over 6000 kg/ha). There is a significant loss of productivity due to pests and diseases.
    - AI-based agricultural pest and disease identification systems are helping farmers in identifying the disease and advising the remedial measures.
- India has about 50% less teachers per thousand students when compared with developed countries (India 2.4/thousand vs. UK 6.3/thousand).

    - In this scenario, AI can help in providing education in remote areas.
- India has 1.18 billion mobile phone users with 600 million internet users and 374 million smartphone users. It has one of the cheapest data rates in the world ($0.24/GB) and an average data speed of 6 MBPS.
    - These factors open up huge potential for the adoption of AI technology in India.

Case study:

- The Tamil Nadu e-Governance Agency has partnered with Anna University to launch a Tamil smart assistant called “Anil”.
- The TN government has been one of the pioneers in using AI for public service delivery.
    - The agency has recently launched an AI-based agricultural pest and disease identification system and made it available to over half a million farmer families through a mobile app.
- The Tamil Nadu Govt. is implementing an innovative use of AI through face recognition for recording attendance.
    - The system is saving more than 45 minutes per day and is freeing up extra time for core educational activities in schools.
- Within healthcare, AI solutions such as radiographic diagnostics like "detection of internal bleeding in brain from CT scans" are being tried to assist doctors and increase their reach to serve remote areas of India.

Challenges and Shortcomings:

- Lack of explainability: Generally AI operates effectively as a black-box-based system that does not transparently provide the reasoning behind a particular decision, classification or forecast made by the systems.
- Lack of contextual awareness and inability to learn: AI based systems have major limitations in terms of making decisions where context plays a critical role.
- Lack of Standardisation: AI based systems are increasingly being embedded in a variety of products and services. This poses a critical question: how can the inferences delivered by different AI components be integrated coherently when they may be based on different data and subject to different ecosystem conventions?
- Organisations face challenges on how to ensure AI and humans work together successfully.
- Job Losses: Increasing automation will lead to significant job losses particularly at operational and lower skill levels for repetitive tasks.
    - This emphasizes the need for a strategic management of AI transition requiring organisations to carefully consider a number of challenges: how to select tasks for automation; how to select the level of automation for each task; how to manage the impact of AI-enabled automation on human performance and how to manage AI-enabled automation errors.
- Lack of competency and need for re-skilling and up-skilling workers.
- Lack of trust and resistance to change: Due to the above mentioned issues and negative media coverage on the consequences of AI, people are generally apprehensive about its implementation.

Public Policy Challenges of AI:

Public policy is facing unprecedented uncertainty and challenges in this dynamic world of Artificial Intelligence. The velocity and scale of impact of Al is so high that it creates interesting dynamics in terms of the need to predict its impact and inability to draw boundaries. Following are the key public policy challenges of AI.

Ethics:

There are two dimensions of ethics in AI:

1. **Privacy and Data Protection**: It is the top most concern while using AI systems. Users' sensitive and highly granular data is likely to be stored and shared across the AI network.
2. **Human and Environmental Values** – Any AI system has to conform to human value systems. An important aspect which needs to be built into AI systems is the overall cost of their decisions on the society.

Transparency and Audit:

- The technology providers must explain the decision-making process to the user so that the AI system doesn't remain a black box. There exists a legal need to explain the decision taken by such systems in case of litigation.
- These AI systems must provide an audit trail of decisions made not only to meet the legal needs but also for us to learn and make improvements over past decisions.

Digital Divide and Data Deficit:

- Since the entire AI revolution has data at its foundation, there is a **real danger of societies being left behind**.
- Countries and governments having good quality granular data are likely to derive maximum benefit out of this disruption.

Fairness and Equity:

- AI can disrupt social order which could damage the social fabric exposing people lower in the bargaining hierarchy with a real threat of exploitation and unfair treatment.
- An AI system designed with equity as a priority would ensure that no one gets left behind in this world.
- Also, the AI system must exhibit fairness.
- They must not exhibit any gender or racial bias and they must be designed to stay away from 'social profiling' (especially in law enforcement, fraud detection and crime prevention areas).

Accountability and Legal Issues:

- Without AI, any system designed by a human is only a machine under the control of the operator.
- Once machines are equipped with AI and they take autonomous decisions, the question of accountability becomes very hard to answer, more so when the algorithms are unknown to the designer.

Misuse Protection:

- The question as to how to insulate every new technology to prevent it from being twisted for achieving destructive goals is the toughest one.
- Autonomous AI systems must be designed for misuse protection. It cannot be an afterthought.

Conclusion:

- AI as a technology holds tremendous potential for a country like India, which is data rich and has the requisite technological capability to create AI solutions for many of its problems.
- States like Tamil Nadu have already started deploying AI systems at scale for addressing some of the key challenges in health, education and agriculture sectors.
- An effective public policy framework for AI along with a practical scorecard would be needed to make this AI revolution work towards an equitable prosperity.

Chapter 6: Innovation in Higher Educational Institutions

Premier higher educational institutes in India have always been a gateway to a secure and prosperous life for many. However, over the last decade a cultural change has begun in these institutes. These institutes have been transforming themselves to produce the next generation leaders who are willing to take up entrepreneurship, foregoing assured income; thereby creating multiple jobs for the society. At the root of this transformation is the culture of innovation.

Catalysing Student Innovation and Entrepreneurship:

- It is now being recognised that a maker space is an integral part of learning.
- The Atal Innovation Mission under the aegis of NITI Aayog is promoting the formation of Atal Tinkering Labs (ATL) in schools to promote innovation.
- At IIT Madras (IITM), an after-class activity called the Centre for Innovation (CFI) transformed the students from passive listeners to active learners.
    - CFI was set up to provide an outlet for the students to try-out their passion without the burden of grades or exams.
    - The centre was set up with the motto "walk in with an idea and walk out with a product".
    - Few achievements: Recently, the CFI team "Aavishkar" became the only Asian team to qualify and was placed within the top 25 in the hyperloop competition held at SpaceX.
- Similarly, there are many student formula racing car teams in the country (such as the IITM Raftar) that routinely participate and win in competitions across the world.

Innovation as a Catalyst:

- These innovation centres also foster team spirit and the ability to work beyond classroom lectures.
- It prepares the students to take collective ownership of outcomes and work on multi-generational products.
- Innovation comes to life when the inventions are developed further in the context of societal needs and wants.
- The National Centre for Combustion Research and Development (NCCRD), originally set up with interdisciplinary faculty to promote advanced research in the domain of combustion, has already started producing niche start-ups in areas like micro-gas turbine, emission sensors, electric planes, etc.

Innovation Eco-system:

The innovation ecosystem **can be divided in to four buckets**: 1. Ideate 2. Pre-incubate 3. Incubate 4. Support

- Among these, the incubation and the support ecosystem are highly instrumental.
- Society for Innovation and Entrepreneurship (SINE) in IIT Bombay is one of the earliest incubators in an academic setting in India supporting tech start-ups and socially relevant projects.
- IIT Madras established India's first university based research park, collocating established companies with start-ups.

Challenges:

- The challenge for our higher educational institutions is to enable routine transformation of these intellectually stimulated individuals to deep tech entrepreneurs and innovators solving societal problems of today and tomorrow.
- It is often very hard to take a step back from a narrowly defined academic problem definition to identify broad opportunities where the research or technology developed might meet a market need.

Way Forward:

A rapid pace of deep tech innovation can be seen in India. Institutions in India will have to imbibe the spirit of entrepreneurial thinking, which includes rapid adaptation to the societal needs, developing and scaling in resource constrained environments and serving as focal points or nodes of innovation and entrepreneurship, to reach our national goal of a $5 trillion economy.

Chapter 6: Education and Technology for the Blind

With holistic schemes like ‘Samagra Shiksha’ providing education to children with special needs, India has witnessed a sea change in inclusive education. However, the country has to go a long way to achieve parity between the visually impaired and sighted children in the area of quality education.

A Chronology of Educational Services for the Blind:

- 1887 – A facility for the blind was launched in Amritsar

- 1944 – Lt. Col. Sir Clutha Mackenzie played a major role in writing the Government of India report on blindness
- 1947 – A unit for the visually impaired was established in the Ministry of Education
- 1951 – India adopted the uniform Braille codes for various Indian languages
- 1952 – First ever Braille printing plant of India was established in Dehradun
- 1954 – Braille appliances manufacturing unit was set up
- 1959 – Govt. set up its first school for blind children in Dehradun
- 1960 – Four regional Centres for teachers of blind were set up
- 1974 – India launched the Integrated Education for Disabled Children (IEDC)
- 1981 – Observance of International Year of Disabled Persons
- 1983-92 – The UN Decade for the Disabled
- 2016 – Rights of Persons with Disabilities (RPD) Act enacted
    - Rights of Persons with Disabilities (RDP) Act 2016 provides for another category among the blind called 'Low Vision'.

India has seen good progress in this field but there is still a lot more to be done in terms of achieving parity between the visually challenged and the rest of the society. The parity is certainly desirable for visually impaired individuals and their families but is even more desirable to make our society inclusive.

Chapter 7: Quality Education for Weaker Section and Disadvantaged Groups

The Right of Children to Free and Compulsory Education (RTE) Act, 2009, entitles every child of the age 6 to 14 years to a right to free and compulsory education in a neighbourhood school till the completion of elementary education. Section 12(1)(c) of RTE Act provides that all specified category schools and unaided schools shall admit at least 25% children belonging to weaker sections.

Steps Taken to ensure Education of Children with Disability:

- Samagra Siksha, an overarching programme for school education sector extending from preschool to class XII, aims to ensure inclusive and equitable quality education at all levels.
    - It envisages the school as a continuum from pre-school, primary, upper primary, secondary to senior secondary levels.
    - Entitlements include free uniform, books, special training of out-of school children, provision for inclusive education of Children With Special Needs (CWSN) and vocational education among others.
- The 'Padhe Bharat Badhe Bharat' is a sub-programme of the erstwhile Sarva Siksha Abhiyan (SSA) which is continued under the new integrated scheme Samagra Siksha to ensure quality at the foundational years of schooling.
    - The objectives of the programme are to promote early reading and writing with comprehension skills in children, and also basic numeracy skills.
- The Navodaya Vidyalaya Scheme provides for the opening of one Jawahar Navodaya Vidyalaya (JNV) in each district of the country to bring out the best rural talent.
- The government has recognised the need for spreading vocational education throughout the country including backward regions.
    - The government has taken steps to align the content of existing skill courses with the National Skill Qualification Framework (NSQF).
- The Draft National Education Policy 2019 is presently under consideration. The revision of curriculum, syllabi and textbooks for school education would depend on the finalization and approval of the New Education Policy.

Chapter 8: Key Initiatives in Education

In pursuance of the Government's vision for 'Transforming India', MHRD took a leap forward in transforming the education sector. The Department of Higher Education of the Ministry has released a five-year vision plan named Education Quality Upgradation and Inclusive Programme (EQUIP). SWAYAM 2.0, Deeksharambh and PARAMARSH are some of the major schemes of this department.

Key Reforms in School Education:

NISHTHA:

- A National Mission to improve learning outcomes at the elementary level through an Integrated Teacher Training Programme called NISHTHA – National Initiative for School Heads' and Teachers' Holistic Advancement was launched.

DHRUV:

- The Pradhan Mantri Innovative Learning Program (DHRUV) was launched to identify and encourage talented children to enrich their skills and knowledge.
- It will act as a platform to explore the talent of outshining and meritorious students, and help them achieve excellence in their specific area of interest may it be science, creative writing, performing arts, etc.

Shagun:

- One of the world's largest Integrated Online Junction for – School Education 'Shagun' is an overarching initiative to improve school education system by creating a junction for all online portals and websites relating to various activities of the Department of School Education and Literacy.
- Report cards of 15 lakh schools all over the country will be available on the newly created junction.
- Portal seeks to connect approximately 92 lakh teachers and 26 crore students.
- Common people can directly give their feedback about schools which will further increase public participation and will ensure accountability and transparency.

Unified District Information System for Education Plus (UDISE+):

- To ensure quality, credibility and timely availability of information from all the schools in the country, the revamped UDISE+ has been launched.
- The Data Analytics portal gives information about the aggregated position of the school.

Digital Infrastructure for Knowledge Sharing (DIKSHA) 2.0:

- It was launched in 2017 for providing digital platform to teachers giving them an opportunity to learn and train themselves and connect with the teacher community.

Operation Digital Board (ODB)

- The aim is to provide by March 2023, two smart classrooms for every Secondary/Senior Secondary school.

Key Reforms in Higher Education:

Five-year vision plan 'Education Quality Upgradation and Inclusion Programme' (EQUIP)

- EQUIP is a vision plan aiming at ushering transformation in India's higher education system by implementing strategic interventions in the sector over five years (2019-24).

Institution of Eminence (IoE)

- Ten institutions in public sector and 10 institutions in private sector have to be declared as IoE.
- Each IoE will be eligible to receive Rs. 1000 crore during next 5 years.

SWAYAM 2.0

- It is initiated with enhanced features and facilities to offer online degree programmes through SWAYAM by top ranking universities.

SWAYAM PRABHA – DTH Educational Channels

- It is a project to telecast high-quality educational programs through 32 DTH channels on 24/7 basis to reach out to students/learners of India with wide reach and minimal cost.
- It also aims to provide dedicated channels 'IITPAL' to assist the students of XI and XII standards aspiring to join premier educational institutions in the country.

Implementation of Quality Improvement Programme

- Deeksharambh – A guide to Student Induction Programme has been launched.
- Learning outcomes based curriculum framework (LOCF) revision – New Curriculum in 16 subjects which is based on LOCF has been uploaded on UGC website to facilitate universities to revise the curriculum.
- ICT based learning tools are being used for effective teaching-learning process.
- Scheme for Trans-disciplinary Research for India's Developing Economy (STRIDE) – Launched for promoting quality research by faculty and creation of new knowledge.
- PARAMARSH – A scheme to mentor institutions seeking National Assessment and Accreditation Council accreditation.

Chapter 9: Open & Distance Learning: A Futuristic Approach

There are rapid technological developments with a focus on the provision of life-long and flexible learning pattern in the recent times. Open and Distance Learning is one such development which can be made more interactive through the use of technology taking it to the last mile.

- Open & Distance Learning (ODL) is distinct because of its teaching methodology.
- In ODL, the presence of learners is not mandatory except in practical-based programmes and ultimately communication takes place in one way, leading to dropouts in a number of cases.

- In Distance Education, teaching is done with a variety of "mediating process" used to transmit content, to provide tuition and to conduct assessment or measure outcomes.
- ODL can be made more interactive through the use of technology like managing the virtual classroom with the use of internet, development of web-based hypermedia, use of interactive teleconferencing and radio counselling, etc.
- In the virtual classroom, the learners and the teachers meet in the cyberspace, a question and answer session follows.
- The web-based study helps the learners and teachers to access the information at their own choice of time and convenience.
- In addition, regular interactive teleconferencing, which is one-way video and two-way audio, satellite-based learning facility and radio counselling sessions may be used for the learners.

Importance of Information Technology:

- Technology will help in meeting the challenges of ODL education.
- IT can promote the opportunities of restructuring the teaching-learning process and transform it by offering alternatives to the teacher in providing information, access to virtually unlimited resources, and opportunities for real world communication, collaboration and competition.
- The Web can enrich the learning resources and help institutions refocus from teaching to learning, from teacher to learner.
- It can create learning environment throughout the world by networked learning communities.
- Networks may create educative environments embedded in the democratic philosophy of instruction and helping learners learn.
- ICT is a potentially powerful tool for extending educational opportunities, both formal and non-formal. For developing countries, ICT has the potential for increasing access to and improving the relevance and quality of education.
- The use of computers in ODL has provided new pedagogical strategies in distance learning as well as giving more autonomy to the distance leaners.
- The main advantages of using technologies in distance education are cost effectiveness, independence of time and place, quality of education access resulting from the mass production of course materials, teaching a lot of students simultaneously, and finding a lot of educational resources.

Way Forward:

- Rapid advances in ICT pose new opportunities as well as challenges for every society.
- In the education sector, IT has enormous potential to help organisations address issues of access to learning, quality of the teaching-learning process and management of education systems.
- In order to ensure the quality of education, the distance education institutions must be careful about the use of proper technologies and media.
- In using technology which can be integrated into the distance education system, the following factors should be considered: accessibility, cost effectiveness, human acceptance, and pedagogical suitability.
- Certain skills and capabilities of using different information technologies are necessary for the students and teachers.
- The uses of media and technology must be thought about in regard to appropriateness and acceptability in the society as well as on the ability of the institution offering the programme.
- The socio-economic and cultural background of a person influences their ability to learn from different media technology.
- In order to evolve a fully-articulated education system in India and for the success of distance education, ODL must be seen as an equally responsible medium complementing the formal learning system.
- Teaching organisations are adopting ICT, especially computers.
- Effective combination of media and technology is necessary for assuring effectiveness of the open and distance learning system.

Chapter 10: Cybersecurity: Issues and Challenges

The world we live in is highly connected and digitally exhaustive. Today, social networks have become one of the main communication channels. Within a short period of time, social media has empowered people and connected them. But, at the same time, they have also provided platforms for some decidedly unhealthy and destructive behaviour. There are many problems like bullying, cybercrime, copyright issues, security threats and social unawareness among others.

- In this era, skills are needed for surviving the digital environment.
- The importance of digital literacy cannot be emphasised enough. It empowers people with the ability to use information and communication technologies to find, evaluate, create and communicate information requiring both cognitive and technical skills.

Issues:

- In the year 2016, there were a total of 758 million online attacks worldwide, which amounts to around 2 million in a single day.
- Every organization, be it big or small, has been the victim of cyber-attacks.

Cyber Attacks:

Bots:

- Bots and fake followers are a big concern in the social media environment.
- Bot programs target specific hashtags and work by auto-commenting and auto-liking in order to attract followers who are mostly fake bot accounts.
- Bots were developed primarily for companies to engage with their users automatically for increasing customer engagement.
- However, bots are now being used much beyond their harmless cause and are misused for manipulating a conversation to creating a mirage of someone's personality and much more.
- In this age of misinformation, bots possess the power to hijack a conversation, troll someone, promote propaganda and even cause security issues.

Terrorist Attacks:

- Terrorists have always sought attention and this is what they receive from social media.
- Social media spread the horror far and wide and unknowingly amplify the chaos that the terrorists intend to spread. Extremists use social media to make an impact.
- They even use it to recruit, propagate and to connect.
- The rapid spread of false information through social media is among the emerging risks identified in the Global Risks Report.
- Social media sites have now initiated reporting procedures that allow users to flag any kind of content that supports terrorism which can be then removed.
- Also, the social networking sites today are playing an important role in counter-terrorism operations. For example, the Assam State Police opened a cell to monitor social media and keep track of the spread of rumours.

Cyber Security Challenges:

- Some new threats have also come up like organized cybercrime, cybercrime trading, smishing (phishing with SMS), hacktivism (hacker with activism), etc.
- Another type of attack that is rising recently is distributed denial of service (DDoS) attacks.
    - Here the intruder is not interested in actually stealing one's information but in bombarding his/her server with unnecessary traffic thereby crashing it.
- Any device that can be connected to the internet can be breached.

Mobile Technologies:

- There are different types of personal information on one's mobile.
- This raises an important question – what if a hacker is able to build one's digital profile by collecting all these censored information and the data from the third-party apps and use it against that person?
- The data can be used to execute large scale phishing attacks.
- Internet of Things (IoT) is another such challenge posed by the new technology whereby every object we use is equipped with the capabilities to identify, locate, sense its surrounding, compute and communicate.

Ransomware:

- Ransomware is a type of malware from cryptovirology that threatens to publish the victim's data or perpetually block access to it unless a ransom is paid.
- Once it gets into the computer, it starts to encrypt all the files thereby rendering them useless.
- The only way to unlock the files is to get a secret key from the hacker by paying a ransom.

Big Data:

- We are actually living in exponential data times.
- In just 60 seconds, 149,513 emails can be sent, 3.3 million FB posts can be made, 3.8 million Google searches can be performed.
- As a result, it has become a lot easier to hack people using social engineering techniques and make them reveal information rather than using tools and technology.

Conclusion:

- Digital literacy is a broader concept that consists of developing new skills and knowledge which provides awareness and advanced level thinking skills.
- It is extremely essential to be digitally literate for the appropriate utilization of digital information resources.
- It is the responsibility of each one of us to understand and use the cyberspace sensibly and responsibly.
- This will definitely ensure that the netizens are not only techno-savvy and socially existent, but also digitally safe.

Chapter 11: Global Synergy in Higher Education

India enjoys a demographic dividend where the population of its working class is larger than its non-working population. It is the world's youngest country with an average age of 29. This comes at a time, when the rest of the world is ageing. The outflow of Indian students for education abroad is more than 15 times the inflow of international students to India. The draft National Education Policy, 2019 proposes to invite the top 200 global universities to establish foreign branch campuses in India.

- India aims to become a five trillion dollar economy by 2024-25; the realisation of this goal is incumbent upon the capability of its education and training institutions to equip young Indians with knowledge and skills relevant to evolving job markets.
- It needs quality, excellence, innovation and constant upgradation.

- India's draft National Education Policy aims at increasing the gross enrolment ratio (GER) in higher education to at least 50% by 2035, which would mean that one in four graduates in the world would be a product of the Indian higher education system.
- The current GER stands at just 26.3%, and doubling it in the next 15 years will require significant reforms both at planning and execution levels. India's GER is lower than the global average of 36.7%.

Higher Education – Critical Challenges for India

- India enjoys a demographic dividend. The average working age in the US is 40, Western Europe is 46 and Japan is 47 years.
- Thus, India will not only have a young workforce to fulfil its domestic needs, it also has the opportunity to be the global hub for skilled workforce.
- If India fails to create a suitable environment, this dividend will be converted into a demographic burden.
- Market forces have played a major role in the higher education landscape.
- Of the 993 universities in India, nearly 39% are privately managed. Of the 39,931 colleges, 78% are from the private sector.
- Private colleges cater to 66.4% of the total enrolment in higher education, which means that a mere 22% of government colleges are catering to a disproportionately large number of students who could not afford to seek higher education in private Higher Education Institutions (HEIs).
- Increasing social aspirations have made the education divide between urban and rural centres more obvious.
- The college density (per one hundred thousand eligible population) is 28 nationally, it varies from 7 in Bihar to 53 in Karnataka.
- The opportunity cost of higher education (commute, hostel fees, etc.) for the disadvantaged section is often too high and hinders the education process.
- Low employability of graduates, poor quality of teaching, weak governance, insufficient funding, and complex regulatory norms continue to affect the Indian higher education sector.
- The number of international students is generally a reliable indicator of the quality and robustness of a higher education system.
- As of 2018-19, only 47,427 foreign students were enrolled in the Indian higher education system (China – more than 4,00,000, Germany – more than 3,00,000).
- Globally, India caters to less than one per cent of all international students.
- Indian institutes have failed to feature in the top 100 of world university rankings published by reputed ranking frameworks.
- As mentioned before, the outflow of Indian students for education abroad is itself more than 15 times the inflow of international students to India.

Global Synergy scenario:

- India's recently released draft National Education Policy 2019 proposes inviting the top 200 global universities to establish foreign branch campus in India.
- The MHRD developed a five-year action plan named EQUIP (Education Quality Upgradation and Inclusion Programme). The initiative is made to bring transformation in the higher education system in the upcoming 5 years.
- NITI Aayog has more recently favoured the development of Exclusive Education Zones (EEZs) akin to SEZs in a few select cities in Bengaluru, Hyderabad, Ahmedabad, Pune, Chandigarh and parts of Sikkim, to boost growth in the flow of foreign students.

Opportunity for Deeper Engagement

- International education is Australia's third largest export industry.

- As a world class provider of education and training, Australia is well positioned to partner with India in the higher education sector.
- Linkages between HEIs and industries with diversified course offerings can prepare students for the job market.
- Global education institutes may also consider looking at building partnerships, beyond HEIs in metro cities of tier 2 and tier 3 cities and regional/state institutions, which offered tremendous possibilities because of large number of students with untapped potential and lack foreign collaborations currently.
- The joint student-academic mobility programmes, joint research, international collaborations boost rankings.
- India is also seeking to attract international faculty into the country for short-term research and teaching visits.
- Indian government initiatives like the Global Initiative of Academic Networks (GIAN), which provides funding for teaching at selected Indian higher education institutions and Scheme for Promotion of Academic and Research Collaboration (SPARC) are opportunities to be explored.
- However, a lack of knowledge of India's higher education sector, including how to address regulatory issues, contributes to low faculty participation in mobility schemes.

Way Forward:

- Partnership may look beyond silos and into areas where Australia has an advantage and India has a need, for instance, in mining safety, bio engineering, signal processing, AI, cyber security, climate change, etc.
- Increasing the level of mutual cultural understanding and developing a strong knowledge base for India and Australia can further bolster these relations.
- English language teaching and training, use of technology for experiential learning and equipping and training teachers can be explored for building capacities where Australia has major strength, including partnership with various government initiatives like Rashtriya Uchhatar Shiksha Abhiyan (RUSA).
- Increased focus on vocational and professional-led education can help India find ways to up-skill 400 million workers by 2022.
- However, what is needed is targeted and granular advice from governments to assist providers to identify, from the mass of possibilities, viable opportunities that match Australian strengths with Indian needs.
- Also, Indian students' expectations around cost and employment outcomes need to be understood carefully.
- Educational outreach in India must be a true partnership that is beneficial to both partner countries driven by multiple policy dialogues, institutional partnerships, research collaborations, capacity building initiatives and student enrolments.

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