National Mission on Interdisciplinary Cyber-Physical System

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In News: Recently, the Indian Institute of Technology (IIT) Ropar, Punjab is setting up a Sectoral Application Hub in Technologies for Agriculture and Water.

About National Mission on Interdisciplinary Cyber-Physical Systems (NMICSP)

- The hub is being set up under the National Mission on Interdisciplinary Cyber Physical Systems (NMICPS) and is granted by the Union Government's Science and Engineering Research Board.
- It will **bring solutions for stubble management, water quality improvement and mapping of hazardous substances in water.**
- It aims at carrying out translational research and work with concerned departments to develop prototypes, products and implementations.
- It was **launched in 2018 and is implemented by the Department of Science & Technology for a period of five years.**
- **It covers the entire India which includes Central Ministries, State Governments, Industry and Academia.**

Implementation:

- The Mission aims at establishment
  - 15 numbers of Technology Innovation Hubs (TIH),
  - 6 numbers of Application Innovation Hubs (AIH)
  - 4 numbers of Technology Translation Research Parks (TTRP).

- These Hubs & TTRPs will connect to Academics, Industry, Central Ministries and State Government in developing solutions at reputed academic, R&D and other organizations across the country in a hub and spoke model.

The mission implementation would develop and bring:

Cyber Physical Systems (CPS) and associated technologies within reach in the country,

- Adoption of CPS technologies to address India specific National / Regional issues,
- Produce Next Generation skilled manpower in CPS,
- Catalyze Translational Research,
- Accelerate entrepreneurship and start-up ecosystem development in CPS,
- Give impetus to advanced research in CPS, Technology development and higher education in Science, Technology and Engineering disciplines, and
- Place India at par with other advanced countries and derive several direct and indirect benefits.

Objectives are:

- It is a comprehensive mission which would address technology development, application development, human resource development & skill enhancement, entrepreneurship and start-up development in Cyber-Physical System (CPS) and associated technologies.
- The mission aims at establishing 15 Technology Innovation Hubs (TIH), six Application Innovation Hubs (AIH) and four Technology Translation Research Parks (TTRP).
- They have four focused areas namely:
    - Technology Development.
    - HRD & Skill Development.
    - Innovation, Entrepreneurship & Start-ups Ecosystem

Development.
- International Collaborations.

Significance of Mission

- It will support other missions of the government, providing industrial and economic competitiveness.
- It would act as an engine of growth that would benefit national initiatives in health, education, energy, environment, agriculture, strategic cum security, and industrial sectors, Industry 4.0, SMART Cities, Sustainable Development Goals (SDGs) etc.
- It will bring a paradigm shift in entire skill sets, requirements and job opportunities.
- It is aimed to give impetus to advanced research in Cyber-Physical Systems , technology development and higher education in science, technology and engineering disciplines, and place India at par with other advanced countries and derive several direct and indirect benefits.

What is the Cyber-physical system (CPS) ?

- Cyber-Physical Systems is an interdisciplinary field that deals with the deployment of computer-based systems that do things in the physical world. It integrates sensing, computation, control and networking into physical objects and infrastructure, connecting them to the Internet and to each other.
- Examples of cyber physical systems are Smart Grid Networks, Smart Transportation System, Enterprise Cloud Infrastructure, Utility Service Infrastructure for Smart Cities, etc.

Cyber-physical system and its associated technologies, like:-

- Artificial Intelligence (Al),
- Internet of Things (loT),
- Machine Learning (ML),

- Deep Learning (DP),
- Big Data Analytics,
- Robotics,
- Quantum Computing,
- Quantum Communication,
- Quantum encryption (Quantum Key Distribution),
- Data Science & Predictive analytics,
- Cyber Security for physical infrastructure and

Advantages of Cyber-physical system technologies

- **Enhanced security capabilities:** It can play a role in expediting design and delivery of trustworthy, adaptable and affordable systems, operations in cyberspace and autonomous systems to augment security operations.
- **Disaster Management:** Cyber-Physical Systems technologies including next generation public safety communications, sensor networks, and response robotics can dramatically increase the situational awareness of emergency responders and enable optimized response through all phases of disaster events.
- **Energy:** They are essential for the creation of energy infrastructure, optimization and management of resources and facilities and allowing consumers to control and manage their energy consumption patterns like smart meters.
- **Healthcare:** Cyber-Physical Systems correct-by-construction design methodologies are needed to design cost-effective, easy-to-certify, and safe products.
- **Transportation**: They can (potentially) eliminate accidents caused by human error, Congestion control, traffic-based grid jams.
- Agriculture: They will play a key role in helping to increase efficiency throughout the value chain, improving environmental footprint and creating opportunities for a skilled and semi-skilled workforce.