

(a) Highlight the characteristics and applications of Cyber Physical Systems. Also enumerate the various objectives of the Cyber Physical Systems programme recently launched by the government.

Ans 1) A Cyber Physical System (CPS) is a co-engineered interacting network of physical and computational components. It depends upon the seamless integration of the two components. CPS merges trans-disciplinary approaches such as theory of cybernetics, design and process science, mechatronics etc.

Its characteristics include:-

- * Communication :- cyber capability and communication mechanisms in every physical component, networked at multiple scales.
- * Productivity :- Constituent elements are coupled logically and physically.
- * Adaptability :- High degree of automation, control loops closed at many scales.

Some applications of CPS include :-

- * Smart Cities :- In areas like smart water management and smart electricity commission.
- * Health care :- Emergency care through smart ambulances, SOS alarm triggers etc.
- * Transportation and aviation sectors :- Fields include unmanned vehicles, aircraft navigation systems, automated cars, intelligent highways etc.
- * Infrastructure Management :- Internet-of-Things based CPS can provide technology for condition monitoring and predictive maintenance of infrastructural elements like bridges, roads, railways etc.
- * Other applications include defence system, agriculture,

robotics systems, process control, energy sector among others.

Its objectives include -

- * Developing centres of Excellence for R & D in this emerging field, at universities and other institutes.
- * Introducing dedicated courses on the subject in higher education institutes such as IITs.
- * Encouraging synergies between university scientist and industry and breaking the silos in academia.

CPS provides an opportunity to develop workforce of the future by leveraging India's demographic advantage. However, before large scale adoption of CPS, associated challenges such as system-level management, safety and security of CPS, control of hybrid systems, data and privacy issues need to be curbed, using interdisciplinary approach for policy making and execution.

Q2) Explaining the rationale behind Geographical Indication (GI) protection, highlight the issues in harnessing the potential commercial benefits of GI in India.

Ans 3) A Geographical indication (GI) is a name/sign used on products that have a specific geographical origin and possess qualities/reputation that are due to that origin.

Rationale behind GI:-

- * Support and protect local production.
- * Generate local employment originating in villages or small towns.
- * Help producers to build a reputation and goodwill around their products.
- * Protect the traditional and indigenous knowledge.
- * Protect consumers from deception.
- * Provide domestic and international market access to such products.

However there are various issues associated with harnessing the potential of GI in India such as:-

- * Lack of marketing and branding strategies.
- * Lack of academic research and systematic assessment.
- * Lack of focus on GI in Make in India campaign.
- * GI producer bodies lack funding for enforcement and marketing.

In order to address the above issues, multi-layered quality control systems for GI registration, protection and promotion are required to not only ensure quality but also exceed consumer expectations.

Q3)

Explaining the significance of RCEP, discuss various aspects of India's engagement in this initiative. Approach.

Ans)

RCEP is a comprehensive free trade agreement, which is being negotiated between ten ASEAN member states and ASEAN's six FTA partners i.e. India, Australia, China, Japan, South Korea and New Zealand. RCEP has immense potential for economic development of an Asia-Pacific region.

- * It can provide impetus to India's Act East policy by effectively integrating trade in the east and South-east Asia.
 - * It can open up new markets for India where it has competitive edge such as ICT, IT-enabled services, health care, education services etc.
 - * Competition and exposure to enhanced standards would provide an opportunity for India to improve its regulatory environment.
- However, India, an early enthusiast to the pact, has registered reservations about few provisions:-
- * India not keen on dismantling import duties pushed by ASEAN countries. For India, it would mean unhindered access to Chinese products.
 - * It will expose India's agriculture and industry to indiscriminate competition.
 - * India is unwilling to cater demands from some RCEP countries to open up the public procurement segment.
 - * Several members have been pushing provisions that go beyond TRIPS, with serious adverse consequences for access to generic medicines manufactured in India.

While India remains committed to RCEP as part of its engagements with ASEAN, it also has held on to the position that external trade agreements must be supportive of domestic commitments like Make in India. For RCEP to achieve its potential, India is a key actor and a deal of such magnitude must address the sensitiveness and aspirations of all participants.

Q4) From ancient to medieval India, the land grants implied more than the transfer of lands. Illustrate. (250 words, 15 marks)

Ans 4) Land grant are the legal documents recording the land donations. While the earlier land grants were made to the Vedic Priest (Brahmadeya), from the 5th to 13th CE, such grants were made to the temple (Devadana), Buddhist Sanghas and Jain Basadis and for secular purposes like to schools (Shalabhoga), to state officers in lieu of salaries.

Objective behind the grants :-

1. Religious merit :- There was universal belief that donating the land and also receiving the same is pious and sacred act bringing merit to both the donor and the donee destroying their sins, both in heaven and on earth. This was substantiated by Smritis, Puranas and Dharmashastra.

2. Economic context

- * To bring virgin soil under cultivation :- Ex. Sri Kalahasti inscription.
- * Emergence of self sufficient economic units and general decline of trade :- Dhenkanal plates inscription of Tribhuvana Mahadevi.
- * Development of local trade and commerce around the temples :- Brihadeswara Temple of Tanjore gave impetus to settlement of weavers, bell metal crafters etc.

3. Social Significance :-

- * Brahmanisation and acculturation of the tribal people
- * It reinforced caste hierarchy as the beneficiaries were mainly Brahmins.

- 4) Political importance :- The Brahmanas who received the land grants helped the kings in ideological legitimization of King's authority.
- 5. Administrative significance :- King appears to have transferred the right of punishing offenders and right to collect the revenue to donees along with land grants.
- 6. Historical Importance:- The Puranas prescribed the recording of the land grants in copper plate inscription.
- 7. Cultural Significance :- The Devadasi system that flourished in the temples (Ex: Brihadeswara Temple) is at the root of preservation of Bharatnatyam.
- * The landed aristocracy are supposed to have brought about the fragmentation of political power, subjection and degradation of the artisans etc.
- * R.S. Sharma suggests that the origin & development of Political Feudalism is to be sought in the land grants made to Brahmanas from the first AD onwards.

Thus, Land grants have played a very vital role in the socio-economic history of ancient and medieval India and has been assigned a key role in historical transformation from ancient to the medieval period.

Q5

What are orphan drugs? Examine the significance of putting in place a policy framework for such drugs in a developing country such as India.

Ans5)

Orphan drugs are medicinal products intended for diagnosis, prevention or treatment of rare diseases; for e.g. hemophilia, thalassemia etc.

These drugs are called 'orphan' because under normal market conditions, pharmaceutical companies have little interest in developing and marketing products for a smaller number of patients as this becomes extremely costly and the profits recovered by expected sales is meagre.

In developed countries such as USA, Japan, Australia and EU, laws exist to stimulate research in treatment of diseases that have been largely ignored by pharmaceutical industry. They offer incentives such as shorter clinical trials, extended exclusivity, tax breaks and high rates of regulatory success, making it commercially attractive for pharmaceutical companies to invest in R&D.

In this regard, few steps have been taken:-

- * Formulation of National Policy for Treatment of Rare Diseases which entails provisions such as drug development and measures for controlling prices of orphan drugs.
- * Waiver of local clinical trial for approval of new drugs, which have already been approved outside India.
- * Pharmaceutical export promotion council conducts regular seminars and promotes awareness regarding opportunities for orphan drugs in India.

- * ICMR is inviting R & D projects for orphan diseases.
- * The National Health Policy 2017 also underscores the need for management of rare/orphan diseases.

Further steps :-

- * PPP in R & D and sponsoring treatment as CSR activity for rare diseases.
- * Enacting statute to allow for tax breaks, funding and exclusive marketing rights as incentives for orphan drug discovery.
- * Inclusion of rare disease under insurance cover at reasonable premiums.