1. What is herd immunity? How does it get developed? How does it provide protection from viral infections? Illustrate. (GS Paper 3, S&T)

Demand of the question:

It expects students to write about the concept of herd immunity and ways in which it get developed. Students should also write about the working of herd immunity against the viral infections.

Introduction:

Banking on developing herd immunity to fight corona virus is too large a risk for any nation and only timely interventions can mitigate the spread of Covid-19, according to head of India's premier research and development organisation, CSIR.

Body:

Concept of Herd Immunity:

- The concept of herd immunity is generally used for calculating how many people will need to be vaccinated in a population in order to protect those who are not vaccinated.
- According to John Hopkins University, herd immunity means when a population is immune to an infectious disease, it provides indirect protection to those who are not immune. Also known as herd protection.

Development of herd immunity:

- Herd immunity can be achieved in two ways. A large population either gets infected or gets a protective vaccine. With some diseases, people sometimes expose themselves intentionally as a way of achieving immunity.
- Based on estimates, at least 70% of the population needs to be immune to have herd protection. For less severe diseases, this approach could be achievable. But for COVID-19, the situation is different as the virus carries a much higher risk of severe disease and even causes death.
- The percentage of people that must have immunity to safely slow or stop an infectious disease is called the "herd immunity threshold."

Science of herd immunity:

- When a large percentage of the population becomes immune to a disease, the spread of that disease slows down or stops.
- Many viral and bacterial infections spread from person to person. This chain is broken when most people don't get or transmit the infection.
- This helps protect people who aren't vaccinated or who have low functioning immune systems and may develop an infection more easily, such as: older adults, babies, young children, pregnant women, people with weakened immune systems and people with certain health conditions.

- Herd immunity does work for some illnesses. People in Norway successfully developed at least partial herd immunity to the H1N1 virus (swine flu) through vaccinations and natural immunity.

However, it doesn't always guarantee protection against any disease.

- It was mistakenly assumed that as this disease spreads across the world, only the severe cases become apparent while most people would indeed be infected as reflected in sero epidemiology results. Greater proportion of people getting infected would mean that the pandemic will be over soon and people can go back to normal business.
- But the preliminary results from in sero epidemiology studies are showing the opposite. The proportion of people with significant clinical illnesses is a higher proportion of all those who have been infected. This is because the number of people infected in the total population is probably much lower than we expected as per World Health Organisation.
- Other challenges like some people do not seem to develop a humoral immune response, relationship between antibody response and clinical improvement is still not clear, mild infections can resolve even before detectable antibodies are produced, how long neutralising antibodies against the virus would last is currently not known.

Conclusion:

Only well-designed longitudinal studies involving those who have recovered from COVID-19 for recurrent illness can help provide the much-needed information about reinfection and the duration of protection by the antibodies. Until then herd immunity by natural infection remains dangerous option.

2. What do you understand by blockchain technology? Why is it important to regulate the usage of blockchain technology? Substantiate your arguments. (GS Paper 3, S&T)

Demand of the question:

It expects students to write about the blockchain technology and reasons behind need to regulate usage of blockchain technology with substantial arguments.

Introduction:

Blockchain technology has the potential to revolutionize interactions between governments, businesses and citizens in a manner that was unfathomable just a decade ago. Unlike other technologies, blockchain has the potential to revamp currently existing processes to unlock new sources of efficiency and value.

Body:

Blockchain Technology:

- Blockchain is a series of data linked together. Every single transaction is linked to the chain using cryptographic principles in batches, making blocks. The blocks are connected to each other and have unique identifier codes (called hashes) that connect them to the previous and the subsequent blocks.
- This forms a blockchain, usually in the form of a continuous ledger of transactions. It isn't owned by any one individual. The series is managed and stored across several computer systems. Each ledger is shared, copied and stored on every computer connected in the system.
- This decentralised nature of storage provides security, since changing the details of one record will cause the hash of that block to change, disconnecting it from the next one and causing the latter's hash to change, and further such disruptions.
- Since the data is stored on multiple systems, any person looking to change the details on one system will have to do it for every other system as well.
- Blockchain technology has been the backbone of bitcoin and other crypto currencies. The transparency and the security offered by the technology are some of the main reasons why crypto currency has become so popular.
- This technology is increasingly being adopted in the retail, manufacturing and banking sectors due to its benefits, like eliminating middlemen, providing data security, reducing corruption and improving the speed of service delivery.
- It can be particularly useful in maintaining government data related to public transactions. For instance, if all land records are moved on a blockchain, with each subsequent buying and selling of a property being recorded as a block that can be publicly accessed, corruption can be arrested and governing will be made so much easier. Similarly, hallmarked gold jewellery can be moved on an open-source blockchain ledger, which can be maintained by jewellers and viewed by consumers.

However, there is need of regulation and must be adopted in a gradual manner. Scalability, transaction speed and data protection are key technological hurdles, along with the difficulty of integrating the technology into existing financial systems. Many legal and regulatory challenges are also involved.

Importance of regulation of blockchain technology:

- Bitcoin and other crypto currencies have seen wild fluctuations in value, due to the lack of regulatory supervision. The open nature of the technology implies that anyone can adopt it, which is partly why the government is hesitant to go ahead and use it.
- Issue of jurisdiction in legal framework: Decentralization can bring benefits, it also poses a legal and regulatory challenge if there is no central party that is responsible and can be held accountable. As the nodes of a decentralized ledger can span multiple locations around the world, it is often difficult to establish which jurisdictions' laws and regulations apply to a given application.

- Privacy concerns: The issue of privacy and blockchain technology has been intensely debated. Many practitioners and academic commentators have claimed that blockchain technology is incompatible with privacy laws such as the EU General Data Protection Regulation, or GDPR.
- Data security: In permission less public blockchain system, no single party takes responsibility for the availability or security of a particular blockchain network, and all users of the system may have access to the data on the network. These attributes conflict with the thrust of privacy laws, which require the party controlling personal data of an individual to safeguard the security and privacy of that data on behalf of the individual or "data subject."
- Risk of cyber attack: The benefit of using a 'tamper proof' technology is negated if the information stored on the ledger is compromised to begin with. This type of attack is not aimed at the blockchain itself, but at external systems such as crypto currency wallets. There is a risk that individuals might target the data input point (rather than the ledger itself), leading to the dissemination of inaccurate information.

Conclusion:

Regardless of the model adopted by those seeking to use blockchain technology, it is important that regulators remain flexible in their approach to this emerging technology and avoid viewing it through a lens designed for more traditional, centralized platforms.

3. Though, the Nisarga cyclone affected parts of Maharashtra, tropical cyclones usually don't occur along the western coast of India. Why? What was then exceptional about Nisarga? (GS paper 1, Geography)

Demand of the question:

It expects students to write about the reasons behind lesser frequency of tropical cyclones on the western coast of India along with the exceptional case of cyclone Nisarga.

Introduction:

The Indian subcontinent is the most affected region in the world with regard to tropical cyclones — the country has a coastline of 7,516 km and gets hit by over 10 per cent of all the world's tropical cyclones. This figure, however, is skewed in favour of the country's eastern coast, which not only witnesses more cyclones but is also battered by the more intense ones.

Body:

NCRMP-National cyclone risk mitigation project data show that about 58 percent of the cyclones that are formed in the Bay of Bengal hit and cross the eastern coast

while only 25 percent of the cyclones developing in the Arabian Sea are seen approaching the western coast of India as most cyclones formed along the western coast of the country veer towards Oman.

Reasons behind lesser cyclone frequency on west coast:

- The temperature and humidity of the sea surface are the most important factor for the formation of cyclones.
- The country's western coast is helped by mountains in East Africa that tend to direct a lot of wind towards the Arabian Peninsula, dissipating heat much more efficiently throughout the Arabian Sea. As a result, this part of the ocean remains relatively cool and produces lesser cyclones.
- This subtropical ridge forms during pre-monsoon season along western coasts, including Mumbai, and prevents cyclones from invading the landmass. Cyclones, on the other hand, tend to follow the ridge, and as a matter of rule bypass western coast of Maharashtra.
- Normally, Arabian Sea cyclones originate in the east-central or southeast portions. This means the natural tendency of Arabian Sea cyclones is to head towards the Arabian Peninsula.

Exceptional case of Cyclone Nisarga:

- As per IMD's Cyclone E-Atlas, a repository that tracks tropical cyclones and weather depressions over the north Indian Ocean since 1891, no weather system has turned into a cyclone and made landfall near Mumbai or along the Maharashtra coast during June.
- Only two depressions, in 1948 and 1980, have come close but never turned into a tropical cyclone during June, indicate records.
- It is second tropical cyclone to hit India within span of fortnight after cyclone Amphan hit India on eastern coast.
- Cyclone Nisarga is being viewed as further proof for climate change and global warming. Wind patterns are changing in the Arabian Sea. This is why it had five cyclones in 2019, equalling a 1902 record. Scientists have attributed this to a rise in temperature in the Arabian Sea on account of climate change.

Conclusion:

There is need to protect natural defences of mangroves to fight cyclones. In Mumbai, a 66 square km of mangrove cover cushions the city's coastline, but it is under continuous threat from the consequences of rapid urbanisation and population surge.