

Science and Technology

Syllabus:

- Science and Technology- developments and their applications and effects in everyday life
- Achievements of Indians in science & technology; indigenization of technology and developing new technology.
- Awareness in the fields of IT, Space, Computers, robotics, nano-technology, bio- technology and issues relating to intellectual property rights.

Year – 2013

1. What do you understand by fixed dose drug combinations (FDCs)? Discuss their merits and demerits.
2. How does the 3D printing technology work? List out the advantages and disadvantages of the technology.
3. Bring out the circumstances in 2005 which forced amendment to section 3(d) in the Indian Patent Law, 1970. Discuss how it has been utilized by Supreme Court in its judgment rejecting Novartis patent application for Glivec. Discuss briefly the pros and cons of the decision.
4. What is an FRP composite material? How are they manufactured? Discuss their applications in aviation and automobile industry.
5. What do you understand by Umpire decision review in cricket? Discuss its various components. Explain how silicon tape on the edge of a bat may fool the system?

Year – 2014

1. In a globalised world, intellectual property rights assume significance and are a source of litigation. Broadly distinguish between the terms – copyrights, patents and trade secrets.
2. Can overuse and the availability of antibiotics without doctor's prescription, the contributors to the emergence of drug-resistant diseases in India? What are the available mechanisms for monitoring and control? Critically discuss the various issues involved.
3. Scientific research in Indian universities is declining, because a career in science is not as attractive as our business operations, engineering or administration, and the universities are becoming consumer oriented. Critically comment.

Year – 2015

1. What are the areas of prohibitive labour that can be sustainably managed by robots? Discuss the initiatives that can propel research in premier research institutes for substantive and gainful innovation.
2. India's Traditional Knowledge Digital Library (TKDL) which has a database containing formatted information on more than 2 million medicinal formulations is proving a powerful weapon in the country's fight against erroneous patents. Discuss the pros and cons making this database publicly available under open-source licensing.
3. What do you understand by Standard Positioning Systems and Protection Positioning Systems in the GPS era? Discuss the advantages India perceives from its ambitious IRNSS programme employing just seven satellites.

Year – 2016

1. Why is nanotechnology one of the key technologies of the 21st century? Describe the salient features of Indian Government's Mission on Nanoscience and Technology and the scope of its application in the development process of the country.
2. Discuss India's achievements in the field of Space Science and Technology. How the application of this technology has helped India in its socio-economic development?

Year – 2017

1. Stem cell therapy is gaining popularity in India to treat a wide variety of medical conditions including leukaemia, Thalassemia, damaged cornea and several burns. Describe briefly what stem cell therapy is and what advantages it has over other treatments?
2. India has achieved remarkable successes in unmanned space missions including the Chandrayaan and Mars Orbiter Mission, but has not ventured into manned space mission, both in terms of technology and logistics? Explain critically
3. Give an account of the growth and development of nuclear science and technology in India. What is the advantage of fast breeder reactor programme in India?

Year-2018

1. Why is there so much activity in the field of biotechnology in our country? How has this activity benefitted the field of biopharma?
2. Discuss the work of Bose-Einstein Statistics done by Prof. Satyendra Nath Bose and show how it revolutionized the field of Physics.

Year 2019

1. How can biotechnology help to improve the living standards of farmers?
2. What is India's plan to have its own space station and how will it benefit our space programme?

Year 2020

1. What do you understand by nanotechnology and how is it helping in health sector? (Answer in 150 words)
2. How is science interwoven deeply with our lives? What are the striking changes in agriculture triggered off by science-based technologies? (Answer in 150 words)
3. COVID-19 pandemic has caused unprecedented devastation worldwide. However, technological advancements are being availed readily to win over the crises. Give an account of how technology was sought to aid management of the Pandemic. (Answer in 250 words)
4. Describe the benefits of deriving electric energy from sunlight in contrast to the conventional energy generation. What are the initiatives offered by our government for this purpose? (Answer in 250 words)

Year 2021

1. How is S-400 air defence system technically superior to any other system presently available in the world?
2. What are the research and developmental achievements in applied biotechnology? How will these achievements help to uplift the poorer sections of the society?
3. The Nobel Prize in Physics of 2014 was jointly awarded to Akasaki, Amano and Nakamura for the invention of Blue LEDs in 1990s. How has this invention impacted the everyday life of human beings?

Year 2022

1. Launched on 25th December, 2021, James Webb Space Telescope has been much in the news since then. What are its unique features which make it superior to its predecessor Space Telescopes? What are the key goals of this mission? What potential benefits does it hold for the human race?
2. What is the basic principle behind vaccine development? How do vaccines work? What approaches were adopted by the Indian vaccine manufacturers to produce COVID-19 vaccines?

Year 2023

1. Introduce the concept of Artificial Intelligence (AI). How does AI help clinical diagnosis? Do you perceive any threat to privacy of the individual in the use of AI in healthcare?
2. Discuss several ways in which microorganisms can help in meeting the current fuel shortage.
3. What is the main task of India's third moon mission which could not be achieved in its earlier mission? List the countries that have achieved this task. Introduce the subsystems in the spacecraft launched and explain the role of the "Virtual Launch Control Centre" at the Vikram Sarabhai Space Centre which contributed to the successful launch from Sriharikota.