UPSC with Saurabh Kaushik

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GS-III: SCIENCE

Previous Year Questions

UPSC Mains 2013 – 2024

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Science & Technology

01. Science and Technology – Developments and Their Applications and Effects in Everyday Life

Sub-Theme	UPSC PYQs (GS-III Science)	Year	Marks
Medical & Health Technologies: Vaccines, Drugs & Stem Cells	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.	2014	**12.5**
	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?	2017	**10**
	What do you understand by fixed dose drug combinations (FDCs)? Discuss their merits and demerits.	2013	**10**
	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?	2022	**15**
Innovative Technologies, Material Science & Nobel Prizes	How does the 3D printing technology work? List out the advantages and disadvantages of the technology.	2013	**5**
	What is digital signature? What does its authentication mean? Giver various salient built in features of a digital signature.	2013	**5**
	What is an FRP composite material? How are they manufactured? Discuss their applications in aviation and automobile industry	2013	**5**
	The Nobel Prize in Physics of 2014 was jointly awarded to a Akasaki, Amano and Nakamura for the invention of Blue LEDs in1990s. How has this invention impacted the everyday life of human beings?	2021	**15**
Technology in Crisis, Daily Life & Natural Sciences	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?	2013	**10**
	COVID-19 pandemic has caused unprecedented devastation worldwide. However, technological advancements are being availed readily to win over the crisis. Give an account of how technology was sought to aid management to the pandemic.	2020	**15**
	The world is facing an acute shortage of clean and safe freshwater. What are the alternative technologies which can solve this crisis? Briefly discuss any three such technologies citing their key merits and demerits.	2024	**15**
	How is science interwoven deeply with our lives? What are the striking changes in agriculture triggered off by the science-based technologies?	2020	**10**
	What is the technology being employed for electronic toll collection on highways? What are its advantages	2024	**10**

	and limitations? What are the proposed changes that will make this process seamless? Would this transition carry any potential hazards?		
	Each year a large amount of plant material, cellulose, is deposited on the surface of Planet Earth. What are the natural processes this cellulose undergoes before yielding carbon dioxide, water and other end products?	2022	**10**

Science & Technology

02. Achievements of Indians in S&T; Indigenisation of Technology & Developing New Technology

Sub-Theme	UPSC PYQs (GS-III Science)	Year	Marks
Indian Scientists, Scientific Research & Indigeni- sation	Discuss the work of 'Bose-Einstein Statistics' done by Prof. Satyendra Nath Bose and show how it revolutionized the field of Physics.	2018	**10**
	How was India benefited from the contributions of Sir M.Visvesvaraya and Dr. M. S. Swaminathan in the fields of water engineering and agricultural science respectively?	2019	**10**
	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.	2014	**12.5**
	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?	2017	**15**

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03. Awareness in the Fields of IT, Space, Computers, Robotics, Nano-technology, Bio-technology and Issues Relating to Intellectual Property Rights

Sub-Theme	UPSC PYQs (GS-III Science)	Year	Marks
Artificial Intelligence, IT & Robotics	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 the healthcare?	2023	10
	Discuss the advantage and security implications of cloud hosting of servers vis-a-vis in-house machine-based hosting for government businesses.	2015	12.5
	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.	2015	12.5
Biotechnology: Agriculture, Biopharma & Biofuels	Discuss several ways in which microorganisms can help in meeting the current fuel shortage.	2023	10
	How can biotechnology improve the living standards of farmers?	2019	15
	What are the research and developmental achievements in applied biotechnology? How will these achievements help to uplift the poor sections of the society?	2021	15
	Why is there so much activity in the field of biotechnology in our country? How has this activity benefitted the field of biopharma?	2018	15
Intellectual Property Rights, TKDL & Patent Law	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.	2013	10
	How is the government of India protecting traditional knowledge of medicine from patenting by pharmaceutical companies?	2019	15
	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.	2014	12.5
	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	2015	12.5
	What is the present world scenario of intellectual property rights with respect to life materials? Although, India is second in the world to file patents, still only a few have been commercialized. Explain the reasons behind this less commercialization.	2024	10

Nanotechnology & Defence Technology	What do you understand by nanotechnology and how is it helping in health sector?	2020	**10**
	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.	2016	**12.5**
	How is S-400 air defence system technically superior to any other system presently available in the world?	2021	**10**
Space Technology: ISRO, Missions & Deep Space Exploration	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?	2016	**12.5**
	India has achieved remarkable successes in unmanned space missions including the Chandrayaan and Mars Orbitter Mission, but has not ventured into manned space mission, both in terms of technology and logistics? Explain critically.	2017	**10**
	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?	2022	**15**
	What are asteroids? How real is the threat of them causing extinction of life? What strategies have been developed to prevent such a catastrophe?	2024	**15**
	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.	2015	**12.5**
	What is India's plan to have its own space station and how will it benefit our space programme?	2019	**10**
	What is the main task of India's third mood 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	2023	**15**