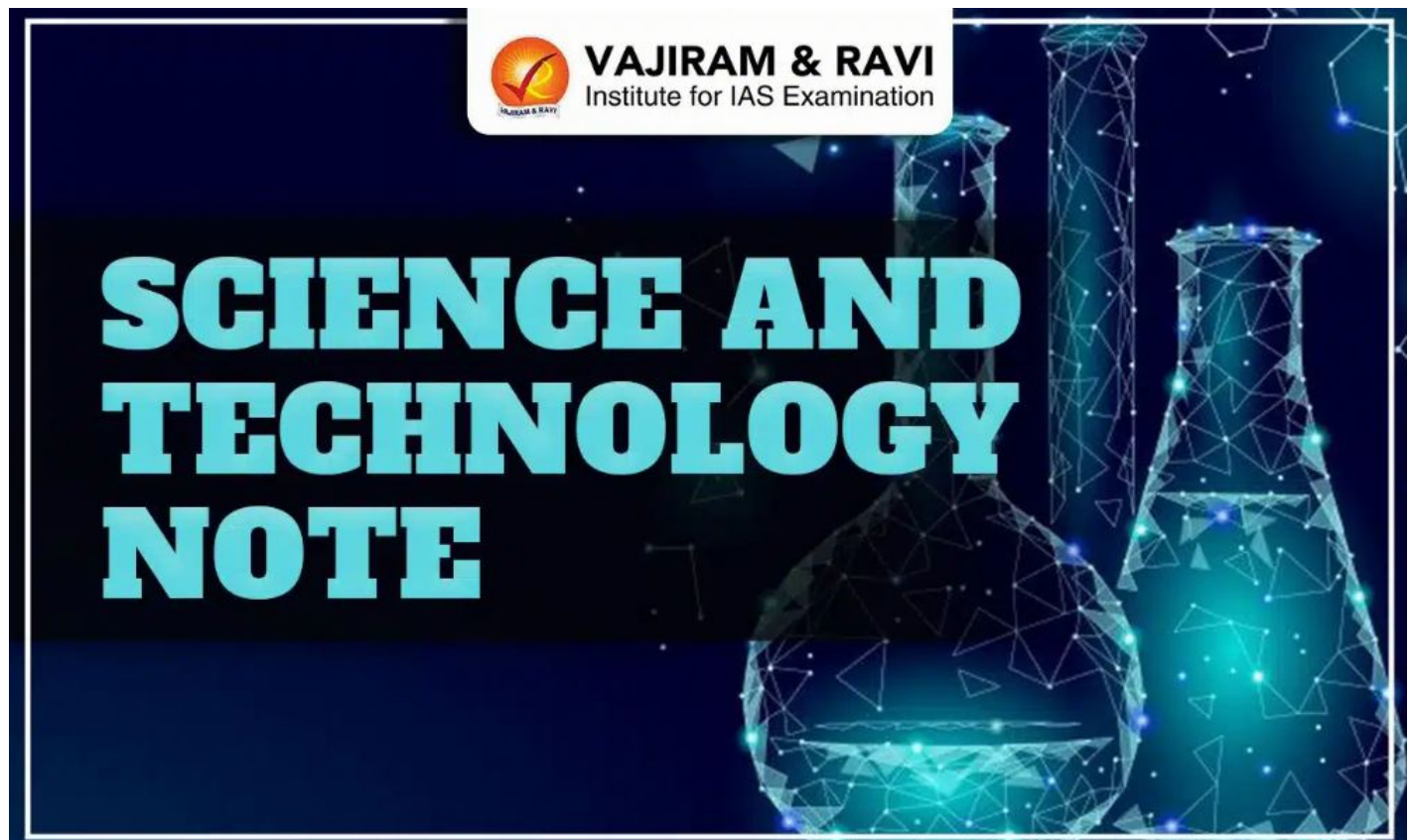


UPSC Science and Technology Notes 2026, Topic wise, Download PDF

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The importance of Science and Technology Notes for UPSC Exam 2026 cannot be overstated which provide a comprehensive overview of the entire Science and Technology syllabus, ensuring that you cover all the necessary topics and help integrate current developments in science and technology with the static part of the syllabus, which is essential for the UPSC Exam 2026. A strong foundation in science and technology enhances one's ability to approach questions holistically. This article covers all the important Science and Technology Notes for UPSC for both Civil Services Prelims and Mains Exam.

Science and Technology Notes for UPSC

Science and Technology (S&T) play a crucial role in contemporary issues and developments worldwide. Staying updated on technological advancements, scientific breakthroughs, and their applications is essential for tackling current affairs questions in the UPSC Exam 2026.

Our Science and Technology Notes are regularly updated, well-organized, and tailored to the UPSC Exam Pattern 2026. They not only help you understand the subject matter but also enable you to apply your knowledge to answer

questions effectively in the exam.

UPSC Science and Technology

Preparing for the Science and Technology section of the UPSC Exam 2026 requires a strategic approach. These notes will help aspirants cover all necessary topics efficiently. Here is a list of important Science and Technology Notes for UPSC:

Achievements of India in Science and Technology

India's legacy in science spans ancient pioneers like Aryabhatta to modern innovators like Homi Bhabha and M.S. Swaminathan. Discover contributions in physics, agriculture, and research, highlighting renowned scientists, women in science, and groundbreaking achievements across centuries.

- **Achievements of India in Science and Technology**
 - **Science and Technology in Ancient India**
 - **Aryabhatta**
 - **Sushruta - Father of Surgery in India**
 - **"Indian Physicists - Top 10 Indian Physicists and their Contributions"**
 - **Sir CV Raman and his Contributions**
 - **Acharya Jagadish Chandra Bose - Father of Radio Science**
 - **S Chandrasekhar - Chandrasekhar Limit**
 - **Satyendra Nath Bose**
 - **Famous Chemistry Scientists of India and Their Contributions**
 - **Shanti Swarup Bhatnagar Award**
 - **CNR Rao**
 - **Har Gobind Khorana**
 - **India's Achievements in Nuclear Sciences**
 - **Homi Bhabha - Education, Biography, Inventions and Discoveries**
 - **Sir M Visvesvaraya**
 - **Contributions of Indians to Agriculture**
 - **MS Swaminathan**
 - **Verghese Kurien - Milkman of India**
 - **Women in Science - Famous Women Scientists in India and their Roles**
 - **Research Institutes in India**
 - **Indian Neutrino Observatory (INO)**
 - **LIGO India**
 - **Anusandhan National Research Foundation**
 - **Indian Mathematicians**
 - **Srinivasa Ramanujan - The Man Who Knew Infinity**

Information and Communication Technology

ICT is transforming global connectivity and innovation. Explore advancements like 5G and 6G technology, as well as their features, advantages, and applications. The Starlink project, space internet, WiFi, and supercomputers are revolutionizing communication, while LAN, WAN, and MAN networks support diverse data exchange systems.

- **Information and Communication Technology**
 - **5G Technology - Features, Advantages, Disadvantages, Applications**
 - **6G Technology**
 - **Space Internet**
 - **Starlink Project**
 - **Supercomputers - Uses, Examples, Supercomputers in India**
 - **WiFi Technology**
 - **Difference between LAN, MAN and WAN**

Space Technology

Space technology encompasses orbits, satellite types, and missions like Gaganyaan, Chandrayaan 3, and Mangalyaan. It also includes advancements in rocket propulsion and cryogenic engines, ISRO innovations like NAVIC, global space agencies, and challenges like space debris and anti-satellite tests.

- **Space Technology in India & Its Applications**
 - **Types of Orbit**
 - **Lagrangian Point**
 - **Low Earth Orbit**
 - **Sun Synchronous Orbit**
 - **Types of Satellite**
 - **Difference between Geosynchronous and Geostationary Orbit**
 - **Anti-Satellite Missile Test (ASAT) - Mission Shakti**
 - **Space Debris - Issues, Challenges and Removal**
 - **Geospatial Technology**
 - **Remote Sensing**
 - **Satellite Launch Vehicles**
 - **Rocket Propulsion - Types, Principles, Diagram, Elements**
 - **Cryogenic Technology - Cryogenic Engine and its Significance**
 - **Reusable Launch Vehicles**
 - **Ramjet Vs Scramjet**
 - **Vikas Engine**
 - **PSLV - Polar Satellite Launch Vehicle**
 - **GSLV - Geosynchronous Satellite Launch Vehicle**
 - **LVM3 - GSLV Mk3**
 - **Indian Space Research Organisation (ISRO) - History, Challenges, Achievements**
 - **Vikram Sarabhai**
 - **APJ Abdul Kalam, Biography, Full Name, Contributions, Awards**
 - **GAGAN**

- **NAVIC - IRNSS: Indian Regional Navigation Satellite System**
- Rocket Launching Stations in India
- **Indian Space Program**
 - **Gaganyaan Mission**
 - **Mangalyaan**
 - **Shukrayaan 1**
 - **NISAR (NASA-ISRO Synthetic Aperture Radar Mission)**
 - **Aditya-L1: India's First Dedicated Solar Mission**
 - **Chandrayaan 3**
- Top Space Agencies in the World
 - **Hubble Space Telescope**
 - **James Webb Space Telescope (JWST)**
 - **New Horizon Mission**
 - **International Space Station**

Robotics

Robotics involves the design and application of robots for various tasks. In warfare, robots enhance precision and safety, while in agriculture, robotics improves efficiency through automated planting, harvesting, and monitoring, advancing productivity and sustainability in both fields.

- **Robotics**
 - **Robotics in Warfare**
 - **Robotics in Agriculture**

Nanotechnology

Nanotechnology involves manipulating matter at the atomic level for diverse applications. In medicine, it enables targeted drug delivery and diagnostics, while in manufacturing, agriculture, energy, and environmental conservation, it enhances efficiency and sustainability. Key innovations include nanoparticles, carbon nanotubes, and graphene.

- **Nanotechnology**
 - **Nanotechnology in Medicine**
 - **Applications of Nanotechnology in Manufacturing Industry**
 - **Nanotechnology in Agriculture**
 - **Nanotechnology in Energy and Environmental Conservation**
 - **Nanoparticles**
 - **Carbon Nanotubes**
 - **Graphene**

Biotechnology

Biotechnology harnesses biological systems for advancements in medicine, agriculture, and industry. Key areas include genetic engineering, genome sequencing, and RNA interference technology. Innovations like gene therapy, CAR T-cell therapy, GM crops (e.g., BT cotton), and bioinformatics are transforming healthcare, agriculture, and environmental sustainability.

- **Biotechnology, Meaning, Applications, Challenges, Methods**
 - **Genetic Engineering**
 - **Genome Sequencing**
 - **Polymerase Chain Reaction - RT-PCR, principles, mechanisms and applications**
 - **Recombinant DNA Technology - Tools, Process, Applications**
 - **RNA Interference Technology - Mechanism, Steps, Applications of RNA Interference Technology**
 - **DNA Barcoding**
 - **DNA Fingerprinting**
 - **Applications of Biotechnology in Medicine**
 - **Car T Cell Therapy**
 - **Gene Therapy**
 - **Biofilms**
 - **Agricultural Biotechnology** - Application of Biotechnology in Agriculture
 - **Environmental Biotechnology** - Applications of Biotechnology in Environment
 - Applications of Biotechnology in Industry
 - **GM Crops - Genetically Modified Crops**
 - **BT Cotton**
 - **BT Brinjal**
 - **GM Mustard**
 - **Bioinformatics**

Defence Technology

India's defence technology includes advanced systems like Agni and Brahmos missiles, the S-400 air defence, Rafale aircraft, nuclear submarines (INS Arihant), and the nuclear triad. DRDO, HAL, and defence corridors promote indigenous capabilities for enhanced security.

- **Defence Technology, Conventional and Emerging, Challenges**
 - **Type of Missiles of India**
 - **Agni Missile**
 - **Brahmos**
 - **Indian Ballistic Missile Defence Programme**
 - **Integrated Guided Missile Development Programme**
 - **Defence Indigenisation**
 - **Defence Research and Development Organisation (DRDO)**
 - **HAL**
 - **Defence Industrial Corridors**

- SIPRI - India's Arm Imports
 - **S-400 Air Defence System**
 - **Rafale Aircraft**
- **Submarines in India**
 - **Nuclear Submarines**
 - **Project 75i**
 - **INS Arihant**
- **Nuclear Triad**
- **Weapons of Mass Destruction**

Nuclear Technology

Nuclear technology involves harnessing fission and fusion for energy production. In India, nuclear energy plays a significant role in meeting power demands. Key developments include Tokamak, the International Thermonuclear Experimental Reactor (ITER), and Small Modular Reactors (SMRs) for sustainable energy.

- **Nuclear Technology, Advantages, Applications, Challenges**
 - **Difference between Nuclear Fission and Fusion**
 - **Nuclear Energy in India**
 - **Tokamak**
 - **International Thermonuclear Experimental Reactor**
 - **Small Modular Reactors**

Emerging Technologies

Emerging technologies are transforming various sectors. Web 3.0, 4.0, and 5.0 enhance internet capabilities, while AI, machine learning, deep learning, and quantum technologies offer breakthroughs in computation and communication. Key innovations like blockchain, cryptocurrency, IoT, AR, VR, drones, and cloud computing revolutionize industries and shape the future.

- **Emerging Technologies**
 - Web 3.0
 - Web 4.0
 - **Web 5.0**
 - **LiFi**
 - **3D printing**
 - **Artificial Intelligence**
 - **Machine Learning**
 - **Deep Learning**
 - **Artificial Neural Networks**
 - **Quantum Technology**
 - **Quantum Entanglement**
 - **Quantum Supremacy**

- **Quantum Computing**
- **Quantum Communication**
- **Qubit**
- **Big Data**
- **Cloud Computing**
- **Blockchain Technology**
 - **Cryptocurrency**
- **Augmented Reality**
- **Virtual Reality**
- **Metaverse - Meaning, Working, Applications and Future**
- **Internet of Things - IoT, its features, applications and limitations**
 - **Smart Grid**
- **Drone Technology - Drones and UAVs**
- **Edge Computing**

Clean Technology

Clean technologies aim to reduce environmental impact while promoting sustainability. Innovations include fuel cells (hydrogen, microbial), green hydrogen, and the National Green Hydrogen Mission. Solar technologies (photovoltaic vs. thermal), lithium-ion batteries, solid-state batteries, and biofuels support clean energy solutions.

- **Clean Technology**
 - **Fuel Cell - Advantages, Applications, Types, Diagram**
 - **Hydrogen Fuel Cells**
 - **Microbial Fuel Cell**
 - **Green Hydrogen**
 - **National Green Hydrogen Mission**
 - **Blue Hydrogen**
 - **Solar Technology - Solar Photovoltaic vs Solar Thermal**
 - **Lithium-ion battery**
 - **Solid State Battery**
 - **Biofuels**

Intellectual Property Rights - Meaning, Types, Importance, Objectives

IPR protects creators' innovations and creations. Key types include patents, copyrights, trademarks, and geographical indications (GI). The National IPR Policy promotes innovation, while concepts like compulsory licensing and evergreening of patents regulate access and protection. The Indian Patents Act of 1970 is a cornerstone of India's IPR framework.

- **Intellectual Property Rights - Meaning, Types, Importance, Objectives**
 - **Traditional Knowledge**
 - **National IPR Policy**

- Evergreening of Patents
- **Compulsory Licensing**
- **GI Tag**
- Indian Patents Act 1970

Nobel Prize (Annual Updation)

The Nobel Prize recognizes outstanding achievements in various fields. In 2021, 2022, and 2023, Nobel laureates were honored across categories like Peace, Literature, and Science. Notable Indian Nobel Prize winners include Rabindranath Tagore, C. N. R. Rao, and Abhijit Banerjee. Updates on the 2024 Nobel Prize will follow soon.

- **Nobel Prize (Annual Updation)**
 - **Nobel Prize 2021**
 - **Nobel Prize 2022**
 - **Nobel Prize 2023**
 - **Indian Nobel Prize Winners**
 - **Nobel Prize 2024**
 - **Nobel Prize 2025**

General Science

General science encompasses particle physics, astronomy, and fundamental forces, exploring topics like the Standard Model, Big Bang Theory, light, sound, heat, thermodynamics, and electromagnetism. It also covers states of matter, atoms, molecules, and their real-world applications.

- General Science
 - **Standard Model of Particle Physics**
 - **Sub-Atomic Particles**
 - **Large Hadron Collider**
 - **Electromagnetic Spectrum**
 - RADAR Technology
 - Light - Light Waves, their properties and application
 - LiDAR
 - Sound - Sound Waves, their types, properties and application
 - SONAR Technology
 - **Heat and Thermodynamics**
 - **Electricity and Magnetism**
 - **Fundamental forces in nature**
 - Astronomy
 - **Universe**
 - **Big Bang Theory**
 - **Star Formation**
 - **Black Hole**

- **Dark Matter and Dark Energy**
- **Gravitational Waves**
- Physics in Daily Life
- Atoms and Molecules
- **States of Matter**
- **Elements, Compounds and Mixtures**
 - **Rare Earth Elements**
- **Solutions - Types, Properties and Examples**

Biology for UPSC

Biology for UPSC includes topics such as biological classification, plant and animal kingdom, and cellular biology. Key concepts like photosynthesis, DNA, RNA, diseases (communicable/non-communicable), vaccines, immunity, and virus-related diseases (e.g., COVID-19, Zika, Nipah) are essential for the exam.

- **Biology Notes for UPSC**
 - **Biological Classification - Five Kingdoms, Taxonomy, Characteristics and Examples**
 - **Plant Kingdom - Classification, Characteristics and Examples**
 - **Photosynthesis**
 - **Animal Kingdom - Classification, Characteristics and Examples**
 - **Virus - Structure, Classification and Examples**
 - **Bacteria - Structure, Classification and Examples**
 - **Fungi - Structure, Classification and Examples**
 - **Cell and its Organelles - Diagram, Structure, Functions and Types**
 - **DNA (Deoxyribonucleic Acid) - Types, Structure, Functions**
 - **RNA (Ribonucleic Acid) - Types, Structure, and Functions**
 - Difference between DNA and RNA
 - **Plant cell vs Animal cell**
 - Diseases - Types, Symptoms, Prevention and Treatment
 - **Communicable Diseases**
 - **Non-Communicable Diseases**
 - **Nipah Virus - Symptoms, Causes, Transmission and Treatment**
 - **Zika Virus - Symptoms, Causes, Transmission and Treatment**
 - **Covid19 - Symptoms, Causes, Transmission and Treatment**
 - **Monkeypox - Symptoms, Causes, Transmission and Treatment**
 - **Organ Transplantation**
 - **Immunity - Immune System and its functioning**
 - **Vaccine - Types, Working, Significance and Challenges**
 - **Covid-19 Vaccines**

Materials and Display Technology

Materials and display technology encompasses advancements like LED and LCDs, and superconductors. It also includes health-related topics like Malaria, TB, HIV, Monkeypox, Diabetes, Cancer, and Antimicrobial Resistance (AMR), which impact public health globally.

- Materials and Display Technology

- **LED**
- **LCD**
- **Superconductors**
- Dark Web
 - **Malaria**
 - **TB**
 - HIV
 - **Monkeypox**
 - **Diabetes**
 - **Cancer**
 - AMR

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