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EXPECTED

Prelims Sure Shot Topics For IAS Prelims 2026

BASED ON **LAST 45 YEARS PYQs** & **LAST 1.5 YEARS CURRENT AFFAIRS**

SCIENCE & TECHNOLOGY

Science & Technology Prelims Sure Shot topics have been meticulously curated through a comprehensive analysis of UPSC Prelims Previous Year Questions spanning the last 45 years, integrated with the most relevant developments from the past 1.5 years of current affairs. It aims to provide aspirants with a list of expected topics which have a very high chance to reflected in IAS Prelims 2026.

Developed under the academic guidance of **S.A. Majid Sir,** this resource reflects the rigorous research and collective expertise of the content team at RICE IAS.

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EXPECTED PRELIMS TOPICS - 2026

BASED ON LAST 45 YEARS PYQs & LAST 1.5 YEARS CURRENT AFFAIRS

SCIENCE & TECHNOLOGY

CHAPTER	EXPECTED THEME	SURE SHOT TOPICS FOR PRELIMS - 2026	JUSTIFICATION
1. BIOTECHNO-LOGY & HEALTHCARE	**1. Genetic Engineering & Gene Editing**	1. CAR-T Cell Therapy (Indigenous NexCAR19)	**Source:** The Hindu (2025); Indian Express (Feb 2026) | **PYQ: 2021** – Recombinant Vector Vaccines & application of genetic engineering India's first indigenous CAR-T therapy Since previously **UPSC has asked in 2021** where it expected you to know underlying applied biotechnology, it may ask you how CAR-T genetically modifies a patient's own T-cells in vivo/ex vivo to attack cancer cells
		2. mRNA Silencing by RNA Interference (RNAi)	**Source:** The Hindu (Dec. 2025) | **PYQ: 2019** – RNA interference (RNAi) used to develop gene silencing therapies and hormone replacement therapies This is a biological process inhibiting gene expression. Since previously **UPSC has asked in 2019** where it expected you to know its uses, it may ask you about its modern applications in targeted cancer therapies.
		3. Transposons (Jumping Genes) & TnpB	**Source:** Indian Express (Nov 2025) | **PYQ: 2019** – Cas9 protein as a molecular scissors used in targeted gene editing Since previously **UPSC has asked in 2019** where it expected you to identify it as an editing tool, it may ask you to identify "jumping genes" and TnpB.
		4. Gene-Edited Mustard	**Source:** Indian Express (Nov 2025) | **PYQ: 2018** – GM Mustard containing genes of a soil bacterium and cross-pollination genes This relates to ongoing trials of CRISPR-edited mustard. Since previously **UPSC has asked in 2018** where it expected you to know the genes involved, it may ask you to differentiate between transgenic GM crops and CRISPR gene-edited crops.
	2. Vaccines & Immunology	5. mRNA vs. Viral Vector Vaccines	**Source:** Hindu (2025 - March 2026) Indian Express (Oct 2025) | **PYQ: 2021** – Differences between Adenoviruses (single-stranded DNA) and Retroviruses (double-stranded DNA) These are the primary modern vaccine delivery

			platforms. Since previously **UPSC has asked in 2021** where it expected you to know structural differences, it may ask you to differentiate how mRNA teaches cells to make proteins versus viral vectors using harmless viruses.
		6. Nipah Virus & Monoclonal Antibodies	**Source:** Down to Earth (May 2025) The Hindu (Nov 2025) | **PYQ: 2023** – Wolbachia method to control viral diseases spread by mosquitoes This relates to recurrent zoonotic outbreaks in India. Since previously **UPSC has asked in 2023** where it expected you to know targeted biological interventions, it may ask you about the application of laboratory-made monoclonal antibodies to neutralize the Nipah virus.
		7. RAKSHA-IBR & nOPV2 Vaccines	**Source:** The Hindu (Sep 2025 – Feb 2026) | **PYQ: 2020** – Pneumococcal Conjugate Vaccine effective against pneumonia and sepsis These are novel vaccines for livestock and human polio. Since previously **UPSC has asked in 2020** where it expected you to know vaccine applications, it may ask you to identify nOPV2.
		8. Human Papillomavirus (HPV) vaccine	**Source:** The Hindu (2025–26) | **PYQ: 2016 –** Mission Indradhanush Since **UPSC previously asked in 2016**, and HPV is currently in the news, it may ask about the human papillomavirus and the role of the HPV vaccine.
		9. Dengue Vaccine (TAK-003/Qdenga)	**Source:** The Hindu (Feb-March 2026) I **PYQ**: **2022**- Covid 19 Since the dengue vaccine **Qdenga** is in the news—being a live attenuated, tetravalent vaccine effective without prior screening—and **DengiAll** remains experimental, and given UPSC's previous question on COVID-19 (2022), questions may be asked on dengue vaccines, their features, the disease vector, or the characteristics of dengue.
	3. Disease, Diagnostics & Drugs	10. VITT (Vaccine-induced Immune Thrombotic Thrombocytopenia)	**Source:** The Hindu (Feb 2026) | **PYQ: 2021** – Adenoviruses having single-stranded DNA (incorrectly) and causing common colds Legal disclosures regarding AstraZeneca's rare clotting side effects kept this in the news. Since **UPSC previously asked a question in 2021** that required knowledge of viral vector properties, it may now ask about VITT and its linkage with adenoviral vector vaccines.

		11. Avian Influenza (H5N1) & Cordon Sanitaire	**Source:** The Hindu (Feb 2025 – March 2026) | **PYQ: 2017** – Zika virus transmitted by mosquitoes and through sexual transmission High-pathogenic H5N1 outbreaks infecting cattle and humans triggered One-Health alerts. Since previously **UPSC has asked in 2017** where it expected you to know disease spread mechanisms, it may ask you about H5N1's zoonotic capability to cross into mammals.
		12. Sickle Cell Anaemia Elimination Mission	**Source:** The Hindu (Aug 2025) | **PYQ: 2021** – Passing on hereditary mitochondrial diseases This is a major national health mission targeting tribal populations. Since previously **UPSC has asked in 2021** where it expected you to know genetic inheritance, it may ask you to identify Sickle Cell Anaemia.
		13. Zoonotic Spillover Mechanism	**Source:** The Hindu (May 2025) | **PYQ: 2021** – Common cold caused by an adenovirus while AIDS is caused by a retrovirus This is the process by which a pathogen moves from animals to humans. Since previously **UPSC has asked in 2021** where it expected you to know viral classifications, it may ask you to define spillover in the context of habitat fragmentation.
		14. Phage Therapy	**Source:** The Hindu (June 2025) | **PYQ: 2019** – Causes of multi-drug resistance in microbial pathogens This is a treatment utilizing bacteriophages. Since previously **UPSC has asked in 2019** where it expected you to know AMR drivers, it may ask you about Phage Therapy as an alternative application using viruses to kill superbugs when traditional antibiotics fail.
		15. Endemic vs. Pandemic vs. Epidemic	**Source:** Indian Express (May 2025) | **PYQ: 2020** – Pneumococcal Conjugate Vaccine's effectiveness against pneumonia and sepsis These are standard epidemiological terms. Since previously **UPSC has asked in 2020** where it expected you to know public health basics, it may ask you to distinguish Endemic, Pandemic and Epidemic.
		16. Antimicrobial Resistance (AMR) & Fixed Dose Combinations (FDCs)	**Source:** The Hindu (Nov 2025) | **PYQ: 2019** – Causes of multi-drug resistance in microbial pathogens like incorrect doses and livestock farming This addresses the ban on unscientific drug cocktails. Since previously **UPSC has asked in**

			2019 where it expected you to identify AMR drivers, it may ask you banning irrational FDCs prevents the rapid mutation of drug-resistant bacteria.
		17. Mpox (Monkeypox) Clade 1b	**Source:** The Hindu (2025) | **PYQ: 2017** – Zika virus transmitted by the same mosquito that transmits dengue This is a globally spreading viral disease triggering WHO alerts. Since previously UPSC has asked in 2017 where it expected you to know transmission modes, it may ask you to identify Mpox as a zoonotic disease transmitted through close human contact.
		18. Ozempic (Semaglutide) & GLP-1 Agonists;	**Source:** The Hindu (2025) | **PYQ: 2021** – ACE2 term talked about in the context of the spread of viral diseases This is a class of drugs causing rapid weight loss. Since previously **UPSC has asked in 2021** where it expected you to know a biological term's context, it may ask you how GLP-1 agonists work.
		19. Mephedrone (Synthetic Cathinones)	**Source:** The Hindu (Mar 2026) | **PYQ: 2024** – Tracking migration of animals and identifying narcotics on passengers using radar This is a highly addictive synthetic club drug heavily seized recently. Since previously **UPSC has asked in 2024** where it expected you to know screening applications, it may ask you to identify Mephedrone.
		20. Non-communicable Diseases (NCDs)- Diabetes, Hypertension; Communicable Diseases	**Source:** The Hindu (2025- 2026) I **PYQ: 2013-** Diseases transmitted from one person to another through tattooing (Communicable Diseases) Since non-communicable diseases (NCDs)—such as cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes—are increasingly in the news for surpassing communicable diseases like tuberculosis, malaria, and HIV, and given UPSC's prior focus on communicable diseases, questions may be asked to identify or distinguish between NCDs and communicable diseases (e.g., TB, malaria, HIV, pertussis, dengue).
		21. Vitamins (A, B, C, D, E) & Deficiency Diseases	**PYQ: 2014**-Vitamin C, D, E deficiencies; UPSC CDS I **2017** GS – *Bleeding gums* (Vitamin C deficiency).

		22. Malaria; AdFalciVax; Eliminate malaria by 2030; lasmodium vivax vs Plasmodium falciparum – Emerging Challenges	**Source:** The Hindu (2025-2026) | **PYQ: 2025**- Wolbachia method. Malaria remains a highly probable UPSC-2026 topic because it sits at the intersection of public health, vaccination innovation (AdFalciVax), and India's "Eliminate Malaria by 2030" commitment, with growing emphasis on the distinct challenges posed by Plasmodium vivax versus Plasmodium falciparum.
	4. Stem Cells, Cloning & Reproduction	23. Pluripotent vs. Multipotent Stem Cells	**Source:** Indian Express (Feb 2026) | **PYQ: 2020** – Plant cells lacking plasma membranes unlike animal cells These are foundational cells used in regenerative medicine. Since previously **UPSC has asked in 2020** where it expected you to know **structural biology**, it may ask you to distinguish Pluripotent cells from Multipotent cells.
		24. Xenotransplantation (Porcine Heart to Human)	**Source:** The Hindu (Nov 2025) | **PYQ: 2020** – Human induced pluripotent stem cells injected into a pig embryo This involves transplanting animal organs into humans. Since previously **UPSC has asked in 2020,** it may ask you why genetic modification of the donor animal is mandatory to prevent hyperacute immune rejection.
	5. AI, Genomics, Innovation in Healthcare & Policy	25. Dark DNA	**Source:** BBC (Sep 2025) | **PYQ: 2022** – DNA Barcoding distinguishing among species that look alike This is a frontier concept in evolutionary genomics. Since previously **UPSC has asked in 2022** where it expected you to know genetic concepts, it may ask you to what is Dark DNA.
		26. Genome India Project & Phenome-India	**Source:** The Hindu (2025) | **PYQ: 2017** – Genome Sequencing used to decipher host-pathogen relationships and genetic markers Since previously **UPSC has asked in 2017** where it expected you to know its benefits, it may ask you how these projects applies genetic data to predict disease susceptibility.
		27. Organ-On-Chip (OOC) Technology	**Source:** The Hindu (2025) | **PYQ: 2019** – Artificial functional DNA created in laboratories This technology uses microfluidic chips lined with human cells to simulate organ functions. Since previously **UPSC has asked in 2019** where it expected you to know **synthetic biology's** viability, it may ask you about OOC's application.

		28. AlphaFold & AI in Protein Folding	**Source:** The Hindu (Nov 2025) | **PYQ: 2020** – Artificial Intelligence effectively diagnosing diseases and converting text-to-speech This is a Nobel-winning AI model that predicts 3D protein structures. Since previously **UPSC has asked in 2020** where it expected you to identify current capabilities, it may ask you about AlphaFold's application in rapid drug discover.
		29. Garbh-INI-DRISHTI	**Source:** PIB (March 2026) | **PYQ: 2020** – Artificial Intelligence effectively diagnosing diseases This is an AI-based pregnancy cohort model developed in India. Since previously **UPSC has asked in 2020** where it expected you to know its medical capabilities, it may ask you about this tool's application.
		30. National Centre for Disease Informatics and Research–Indian Council of Medical Research (NCDIR–ICMR)	**Source:** The Hindu (June 2025) | **PYQ: 2024 -** Pradhan Mantri Surakshit Matritva Abhiyan Since UPSC has asked questions on health-related schemes, and ICMR-NCDIR is in the news for strengthening cancer registries, a question may be asked on **ICMR-NCDIR works under the aegis of which organization** and its role.
		31. Liquid Biopsy	**Source:** The Hindu (March 2025) | **PYQ: 2020** – Carbon nanotubes used as biomarkers and drug carriers This is a non-invasive medical test detecting cancer DNA fragments in blood. Since previously **UPSC has asked in 2020** where it expected you to know diagnostic applications, it may ask you how liquid biopsy replaces invasive surgical tissue biopsies for early cancer detection.
	6. Genetics in Agriculture & Policy	32. BioE3 Policy	**Source:** PIB (Aug 2025) | **PYQ: 2017** – National Intellectual Property Rights Policy and its nodal agency This is a major government framework approved to boost India's bio-economy to $300 billion. Since previously **UPSC has asked in 2017** where it expected you to know policy goals, it may ask you about BioE3's applications.
		33. Bio-fortification (Golden Rice & Iron Bajra)	**Source:** The Hindu (2025) | **PYQ: 2021** – Bollgard I and Bollgard II technologies developed for genetically modified crop plants This is the process of increasing nutritional

			value in crops. Since previously **UPSC has asked in 2021** where it expected you to know trait modifications, it may ask you to define bio-fortification as breeding crops to increase their **micronutrient** content.
		34. Biopharma SHAKTI Scheme	**Source:** PIB (Feb - March 2026) This relates to the **Union Budget 2026-27** introduction of the **Biopharma SHAKTI scheme** to revolutionize the domestic production of **biologics and biosimilars**. Since UPSC previously tested **in 2019 the Indian Patents Act and the Atal Innovation Mission** to gauge your understanding of industrial policy and intellectual property, it may now ask about the provisions of this scheme or distinction between complex **biologics** and their **biosimilar** counterparts.
	7. Chemical Safety & Public Health	35. Aspartame & Artificial Sweeteners	**Source:** The Hindu (Sep 2025) | **PYQ: 2021** – Bisphenol A as a key component in Polycarbonate plastics and Triclosan in toiletries This is a widely used artificial sweetener recently flagged by the WHO. Since previously **UPSC has asked in 2021** where it expected you to know chemical sources and hazards, it may ask you to identify Aspartame as a "possibly carcinogenic" chemical.
		36. Tetrodotoxin (TTX)	**Source:** The Hindu (Feb 2026) | **PYQ: 2021** – Common toxins like Triclosan considered harmful when exposed to high levels This is a potent neurotoxin found in pufferfish causing food safety alerts. Since previously **UPSC has asked in 2021** where it expected you to know their origin, it may ask you to identify **TTX.**
2. NANO-TECHNO-LOGY	**1. Nano-technology concept**	1. Types and Functions	**Source:** The Hindu (2024, 2025, 2026) | **PYQ: 2012, 2014, 2020, 2022** – Applications and Properties of nanomaterials. Since UPSC has consistently tested **carbon nanotubes** and **graphene** (**PYQs 2012, 2014, 2020**), it may now target other **Carbon-based allotropes** like **Buckyballs (Fullerenes)**, focusing on their specific functions.
	2. Applications in news	2. Nanoscale Interventions: Fertilizers and Nano sulphur, Bots,	**Source:** PIB, The Hindu and Indian Express (Aug 2025 – Jan 2026) | **PYQ: 2012, 2014, 2020, 2022** This addresses the multi-sectoral application of nanotechnology in agriculture, medicine, and

		Enzymes, and Bubbles	environment. Since UPSC previously tested **the** environmental impact of chemical fertilizers and the applications of nanoparticles in targeted drug delivery, it may now ask how **Nano-fertilizers** and **NanoSulphur** utilize **foliar absorption** to prevent soil leaching, or the specific functionalities of **Nanobots**, **Nanozymes**, and **Nanobubbles.**
3. ENERGY, ALTERNATIVE ENERGY, EXPLORATIONS & POLLUTANTS	**1. Green & Clean Energy**	1. Ethanol Blending (E20) & Flex Fuel Vehicles	**Source:** The Hindu (Aug 2025) | **PYQ: 2010, 2020** – Cassava, damaged wheat grains, and rotten potatoes used as raw materials for production of biofuels India achieved its 20% ethanol blending target early. Since previously **UPSC has asked in 2010** (energy crops for ethanol production) and **in 2023** where it expected you to know agricultural sources, it may ask you about **Flex Fuel technology**: engines modified with special sensors to run on any blend of petrol and ethanol up to 85%.
		2. Green Ammonia	**Source:** The Hindu (Feb 2026) | **PYQ: 2023** – Green hydrogen being used directly as a fuel for internal combustion and to run vehicles India is setting up major hubs to export Green Ammonia. Since previously **UPSC has asked in 2023** where it expected you to know its downstream uses, it may ask importance and synthesis Green Ammonia is synthesized by combining green hydrogen with nitrogen.
		3. Coal Gasification & Syngas	**Source:** The Hindu (Oct 2025) | **PYQ: 2025** – Coal gasification technology used in the production of Ethanol, Nitroglycerine, and Urea India has set targets to gasify 100 MT of coal by 2030. Since previously **UPSC has asked in 2025** where it expected you to know the outputs, it may ask you to identify Syngas as the intermediate product used to make these chemicals.
		4. LPG, PNG LNG and CNG	**Source:** The Hindu, The Indian Express (Nov 2025 – March 2026) **I PYQ: 2019**– Methane; Hydrogen-enriched CNG Since UPSC has previously asked Methane; Hydrogen-enriched CNG in 2019 and global energy crisis is in the news, it may now ask about the differences among LPG, PNG, LNG and CNG.

		5. E-Methanol; Methanol Economy Programme in India by NITI Aayog; Methanol Poisoning	**Source:** The Hindu (2025- Jan 2026); PIB (Jan 2026) I **PYQ: 2020**- Raw materials for the production of biofuels under **India's National Policy on Biofuels** Since e-methanol—a low-carbon fuel produced by combining green hydrogen with captured carbon dioxide—is in the news, and UPSC has previously asked questions on raw materials required for biofuels, it may ask about green methanol, e-methanol, methanol poisoning, or their environmental merits.
	2. Nuclear Energy	6. Small Modular Reactors (SMRs)	**Source:** The Hindu (Jan 2026) | **PYQ: 2024** – Miniature fission reactors called RTGs used for powering onboard systems of spacecraft The Union Budget highlighted SMRs for decentralized clean energy. Since previously **UPSC has asked in 2024** where it expected you to know reactor utility, it may ask you to compare SMRs with traditional reactors.
		7. Pressurized Heavy Water Reactor (PHWR); Heavy Water	**Source:** The Hindu (2025 - March 2026) **I PYQ: 2011-** Functions of heavy water India's nuclear regulator, the Atomic Energy Regulatory Board (AERB), has granted an operational licence for two indigenously developed 700 MWe PHWRs at the Kakrapar Atomic Power Station in Gujarat; given that UPSC asked about heavy water in 2011, it may ask about the purpose, features of PHWRs or about Atomic Energy Regulatory Board (AERB).
		Nuclear Reactor	**Source:** The Hindu (March 2026) **I PYQ: 1995 –** Nuclear reactor vs atomic bomb; **1998-** Elements essential for construction of nuclear reactor**; 2001:** Working of nuclear reactor**; 2020-** why some nuclear reactors kept under the "IAEA Safeguards".
		8. Nuclear Fusion and Nuclear Fission	**Source:** The Hindu (2025 – April 2026) I **PYQ: 2013 -** Importance of Higs Bosson Particle; **2012**- Advantage does thorium hold over uranium**;** Since India is among the seven main members of the ITER project and has contributed to critical infrastructure such as the cryostat, cooling systems, and heating technologies, and as China's Experimental Advanced Superconducting Tokamak (EAST) has set a new record in nuclear fusion, and given that UPSC has asked questions in 1995, 1998, 2001, 2012, and 2013, there is a high probability that
		9. International Thermonuclear Experimental Reactor (ITERR); ITER Tokamak; China's East (Artificial Sun)	

			UPSC may ask about the difference between fusion and fission, the purpose of ITER, or the features of EAST.
		10. India's 3-Stage Nuclear Power Programme; SHANTIAct, 2025	**Source:** Indian Express (2025-2026) I **PYQ: 2008**: Identifictaion of role of different organisations like Indira Gandhi Centre for Atomic Research, Atomic Minerals Directorate for Research and Exploration, Indian Rare Earths Limited; **2015-** Identification of nuclear weapon states recognized by Nuclear Non-Proliferation Treaty (NPT) Since the Union Budget for FY2025–26 highlights a target of 100 GW of nuclear capacity and net-zero emissions by 2047, and given that UPSC has previously asked questions on nuclear organizations and nuclear-weapon states, therefore, UPSC may ask on India's three-stage nuclear power programme and the Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Act, 2025
		11. Prototype Fast Breeder Reactor (PFBR)	**Source:** The Hindu (April 2025) | **PYQ: 2012** – Functioning of India's 3-stage nuclear program The 500 Mwe **PFBR** at Kalpakkam is a historic milestone for India's nuclear autonomy. Since previously **UPSC has asked in 2012** where it expected you to know the fuel cycle, it may ask you how Stage-2 (PFBR) utilizes Mixed Oxide (MOX).
		12. Thorium Molten Salt Reactor (TMSR)	**Source:** PIB (March 2026) | **PYQ: 2016** – Monazite being a source of rare earths and containing thorium This technology is critical for unlocking India's 3 stage nuclear program and referred in **Shanti Act.** Since previously **UPSC has asked in 2016** where it expected you to know its availability in India, it may ask you about the operational advantage of TMSRs.
		13. Uranium Enrichment	**Source**: The Hindu (March 2025 -March 2026) | **PYQ**: **2018, 2020, 2023** This addresses India's **Three-Stage Nuclear Power Programme** and global **non-proliferation** concerns. Since UPSC has previously asked questions on this topic and it is also in the news, it may now ask about the applications of uranium and its extraction process.

		14. Ghost Particles (Neutrino)	**Source:** The Hindu (2025- March 2026) I PYQ: **2015**- Identification of IceCube (world's largest neutrino detector); 2010 – Features of neutrinos (India-based Neutrino Observatory under the 11th Five-Year Plan). Since a high-energy cosmic neutrino has been detected under the Mediterranean Sea, and UPSC has previously asked questions on neutrinos, there is a possibility that UPSC may ask about the characteristics of neutrinos.
	3. Batteries, Materials & Advanced Science	15. Solid-State Batteries	**Source:** The Hindu (March 2025) | **PYQ: 2025**– Cobalt, graphite, lithium, and nickel making up battery cathodes This is the next frontier for Electric Vehicles to prevent fire hazards. Since previously **UPSC has asked in 2025** where it expected you to know basic materials, it may ask you how Solid-State batteries replace flammable liquid electrolytes with solid ceramics.
		16. Sodium-ion vs. Lithium-ion Batteries	**Source:** The Hindu (Feb 2026) | **PYQ: 2025** – Electric vehicle batteries India is pushing Sodium-ion technology to reduce dependency on imported Lithium. Since previously **UPSC has asked in 2025** about electric vehicle batteries where it expected you to know their utility, it may ask you to compare them.
		17. Bose Metal	**Source:** The Hindu (March 2025) | **PYQ: UPSC CDS II 2019** – Bose-Einstein Condensate being a state of matter Researchers provided definitive evidence of this anomalous metallic state in 2025. Since previously UPSC has asked in **UPSC CDS II 2019** where it expected you to identify fundamental physics breakthroughs, it may ask you to define a Bose Metal.
	4. Pollutant and Remediation	18. PFAS (Forever Chemicals): Perfluorooctane sulfonate (PFOS); Perfluoroloctanoic acid (PFOA)	**Source:** The Hindu (Mar 2026) | **PYQ: 2025** – Eyeglass lenses, car tyres, and cigarette butts containing plastic Global bans on these chemicals were heavily reported in 2025. Since previously **UPSC has asked in 2025** where it expected you to know material compositions, it may ask you why PFAS are dangerous or their uses.
		19. Microplastics in Human Blood & Placenta; Polymer	**Source:** The Hindu (Aug 2025) | **PYQ: 2019** – Microbeads released into the environment considered harmful to marine ecosystems Recent studies have revealed that microplastics

		(Natural and Synthetic)	(particles smaller than 5 mm) can cross critical biological barriers and enter the human bloodstream. Since **UPSC has already asked about their environmental hazards in 2019** (e.g., microbeads affecting marine ecosystems), future questions may focus on their bioaccumulation in the human body or on identifying the types of polymers.
		20. Bisphenol A (BPA) & Phthalates	**Source:** The Hindu (June 2025) | **PYQ: 2021** – Bisphenol A being a structural key component in the manufacture of Polycarbonate plastics Regulatory updates by FSSAI have put these plasticizers in focus. Since previously **UPSC has asked in 2021** where it expected you to know its everyday sources, it may ask you to identify BPA and Phthalates as dangerous endocrine-disrupting chemicals.
	5. Others	21. Radiocarbon Dating (Carbon-14)	**Source:** The Economic Times (June 2025) | **PYQ: 2024** - Radioisotope Thermoelectric Generator. This technique was extensively used in recent archaeological excavations at Rakhigarhi. Since previously **UPSC has asked in 2024** it may ask you about the purpose of radiocarbon dating (Carbon-14 isotope to date organic remains).
		22. Deep Ocean Mission	**Source:** The Hindu (Nov 2025) I **PYQ: 2021**- Global Ocean Commission, Rare earth minerals; **2022**- United Nations Convention on the Law of Sea.
		23. Mpemba Effect	**Source:** PIB (Jan 2026) I **PYQ: 2011-** Anomalous Behaviour of Water With the recent discovery of the first supercomputer-powered simulations explaining the Mpemba Effect (the phenomenon where hotter water freezes faster than colder water under certain conditions.), there is a strong possibility that UPSC may ask questions on the Mpemba Effect in the upcoming examinations.
4. INFORMATION & COMMUNICATION TECHNOLOGY (ICT)	**1. AI & Emerging Computing**	1. Agentic AI vs. Generative AI; Large Language Model (LLM)- ChatGPT, Claude, Microsoft Copilot, Gemini, and Meta AI; Mutimodal LLM (MLLM); National Mission on	**Source:** The Hindu (2025- March 2026); PIB (2024) | **PYQ: 2020** – Artificial Intelligence creating meaningful short stories and songs These represent the current evolutionary stages of AI. Since UPSC asked about AI capabilities in 2020, it may ask you to distinguish between Generative AI and Agentic AI, identify LLMs or MLLMs, or ask about initiatives like BharatGen (the first government-

		Interdisciplinary Cyber-Physical Systems (NM-ICPS), 2018	funded Multimodal Large Language Model initiative) and the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS), 2018.
		2. Supercomputers & FLOPS (PARAM Shakti)	**Source:** PIB (Dec 2025) The Ministry of Electronics and Information Technology (MeitY) launched 'Param Shakti' at the Indian Institute of Technology Madras. Since Param Shakti is in the news, UPSC may ask you to identify FLOPS (Floating Point Operations Per Second) and understand the concept of supercomputers.
		3. Neuromorphic Computing	**Source:** The Hindu (Dec 2025-March 2026) | **PYQ: 2020** – AI developments like wireless transmission of electrical energy This is a novel hardware engineering approach for AI. Since previously **UPSC has asked in 2020** where it expected you to know their actual applications, it may ask you how neuromorphic chips physically mimic the neural structure of the human brain.
		4. Spatial Computing & Augmented Reality	**Source:** The Hindu (June 2025) | **PYQ: 2019** – Augmented Reality allowing individuals to be present in the world while improving experience using a camera This is the technology powering new mixed-reality headsets. Since previously **UPSC has asked in 2019** where it expected you to know how they alter perception, it may ask you about **Spatial Computing's integration into Metaverse** classrooms for 3D vocational training.
		5. Brain-Computer Interface (BCI)	**Source:** The Hindu (April 2025) | **PYQ: 2019** – Wearable technology assisting the hearing impaired and monitoring sleep This technology creates a direct communication pathway between the brain and a device. Since previously **UPSC has asked in 2019** where it expected you to know medical applications, it may ask you how non-invasive BCIs translate brain signals into commands for prosthetic control.
	2. Cybersecurity & Data Privacy	6. Deepfakes & Digital Watermarking	**Source:** The Hindu (Oct 2025) | **PYQ: 2019** – Digital Signatures ensuring original content is unchanged and identifying the certifying authority This addresses the misuse of AI to create synthetic media. Since previously **UPSC has**

			asked in 2019 where it expected you to know authentication methods, it may ask you about digital watermarking's application to cryptographically verify real versus AI-generated content.
		7. Ransomware vs. Zero-Day Exploits	**Source:** The Hindu (Nov 2025) | **PYQ: 2018** – WannaCry, Petya and EternalBlue related to cyber attacks These are prevalent forms of cyberattacks. Since previously UPSC has asked in 2018 where it expected you to identify malware, it may ask you to distinguish Ransomware from Zero-Day exploits.
		8. End-to-End Encryption (E2EE)	**Source:** The Hindu (March 2026) | **PYQ: 2019** – Digital Signatures and cryptography This is a security protocol at the center of privacy debates. Since previously **UPSC has asked in 2019** where it expected you to know its digital application, it may ask you to find out the uses of E2EE and its definition.
		9. Stablecoins vs. Central Bank Digital Currency (CBDC)	**Source:** The Hindu (Oct 2025) | **PYQ: 2020** – Blockchain being a public ledger and its data being exclusively about cryptocurrency RBI working papers recently emphasized the regulatory threat of Stablecoins. Since previously **UPSC has asked [in 2020** where it expected you to know digital asset fundamentals, it may ask you to differentiate Stablecoins.
	3. Quantum & Communication Technologies	10. Quantum Key Distribution (QKD)	**Source:** The Hindu (June 2025) | **PYQ: 2022** – "Qubit" mentioned in the context of Quantum Computing This is a secure communication method utilizing quantum mechanics. Since previously **UPSC has asked in 2022** where it expected you to link the term to the technology, it may ask you how QKD applies quantum entanglement to create communication channels.
		11. Carbon Fibres	**Source:** The Hindu (July 2025) **I PYQ: 2023**- Direct questions on carbon fibres.
		12. Optical Fibre & Total Internal Reflection (TIR)	**Source:** The Hindu (Sep 2025) | **PYQ: 2016** – Li-Fi using light as a medium for high-speed data transmission This is the physical backbone of broadband internet. Since previously UPSC has **asked in 2016** where it expected you to know physical

			transmission mediums, it may ask you about the physics principle of TIR.
		13. Near Field Communication (NFC) vs. RFID	**Source:** The Hindu (July 2025) | **PYQ: 2019** – Short-range device/technology These are contactless communication technologies. Since previously UPSC has asked in 2019 where it expected you to know its range category, it may ask you to compare RFID with NFC.
		14. Project Waterworth	**Source:** The Hindu (Feb 2025) Since UPSC has previously tested the functional applications of communication technologies and infrastructure, it may now ask about Project Waterworth (a **50,000 km subsea cable network** reaching depths of **7,000 meters** to enhance global data capacity).
		15. Wi-Fi 7 vs. Li-Fi; 6Wi-Fi	**Source:** The Hindu (2025- Jan 2026) | **PYQ: 2016** – Li-Fi being a wireless technology several times faster than Wi-Fi These represent the latest wireless data transmission standards. Since previously **UPSC has asked in 2016** where it expected you to know its core trait, it may ask you to differentiate between Wi-Fi 7 and Li-Fi.
		16. Sensors; 3D Sensors	**Source:** The Hindu (2025-2026) I **PYQ: 2024 -** Radar as a sensor-type question; **2023**- Function of an accelerometer **Types of sensors**: • Accelerometer, gyroscope, proximity/IR sensor, temperature/pressure sensor, radar, LiDAR, optical/thermal remote-sensing sensors. • **Applications tested**: • Airbags, smartphone tilt, drop protection in laptops → accelerometer. • Weather radar, border screening, animal tracking → radar. Satellite based monitoring (crops, disasters, ocean) → passive/active remote sensing sensors.
	4. Internet, Networks & Storage	17. Web 5.0 & DAOs; Web 4.0	**Source:** The Hindu (2024-2025) | **PYQ: 2022** – Web 3.0 technology enabling people to control their own data rather than a corporation This is the concept of a decentralized, blockchain-based internet. Since previously **UPSC has asked in 2022** where it expected you to know its core features, it may ask you what is Web 5.0

		18. Bharat 6G Mission; 6G vs. 5G vs. 4G; International 6G Symposium 2025- India Mobile Congress (IMC) 2025	**Source:** PIB (Oct 2025) I **PYQ: 2018**- Aims of the "Digital India" Plan of the Government of India; **2019-**Dfference/differences between LTE (Long-Term Evolution) and VoLTE (Voice over Long-Term Evolution) Since the "Bharat 6G Vision" document was released, envisioning India as a frontline contributor in the design, development, and deployment of 6G technology by 2030, and given that UPSC has previously asked questions on communication technologies, it may ask about the differences between 5G and 6G or about the Bharat 6G Mission.
		19. Open Network for Digital Commerce (ONDC)	**Source:** The Hindu (Jan 2025) | **PYQ: 2017** – BHIM app allowing users to transfer money to anyone with a UPI-enabled bank account This is a government-backed network to democratize e-commerce. Since previously UPSC has asked in 2018 where it expected you to know digital public goods, it may ask you to define ONDC.
		20. Edge Computing vs. Cloud Computing	**Source:** The Hindu (2025) | **PYQ: 2022** – Cloud Services being the context for the term "qubit". This is a network architecture bringing computation closer to data sources. Since previously **UPSC has asked in 2022** about Cloud Services where it expected you to know tech associations, it may ask you about the advantage of Edge computing.
		21. Solid-State Drives (SSD) vs. Hard Disk Drives (HDD)	**Source:** The Hindu (July 2025) These are standard computer storage technologies undergoing a rapid shift. Since UPSC has previously tested the functional applications of communication technologies and infrastructure, it may now ask the difference between SSD and HDD.
		22. E-SIM (Embedded SIM) Technology	**Source:** The Hindu (Oct 2025) | **PYQ: 2019** – LTE and VoLTE being data-only and voice-only technologies The transition to E-SIMs for IoT devices and wearables peaked in 2025. Since previously **UPSC has asked [in 2019** where it expected you to know telecommunication standards, it may ask you about E-SIMs.
	5. Others	23. Semiconductor vs Superconductor; Indian	**Source: The Hindu (2025- Jan- Feb 2026)** Since these topics have repeatedly appeared in the news, including Pax Silica, UPSC may ask about the initiative related to Pax Silica and the

		Semiconductor Mission 2	difference between semiconductors and superconductors.
		24. Electronics Component Manufacturing Scheme (ECMS)	**Source:** The Hindu (2026) I **PYQ: 2020-** R2 Code of Practices (environmentally responsible practices in electronics recycling industry) Since the government recently has cleared 29 investment proposals worth ₹7,104 crore under the **ECMS**, and UPSC has previously asked about electronics recycling practices, it may ask about the ECM scheme.
		25. Direct-to-Mobile (D2M) Broadcasting	**Source:** The Hindu (March 2026) | **PYQ: 2018** – IRNSS covering entire India and 5500 sq km beyond This is an indigenous technology to broadcast multimedia directly to phones. Since previously **UPSC has asked in 2018** where it expected you to know system capabilities, it may ask you about D2M's application.
		26. LEO Satellite Internet (Starlink / OneWeb)	**Source:** The Hindu (Mar 2025) | **PYQ: 2018** – IRNSS This involves providing high-speed internet via Low Earth Orbit constellations. Since previously **UPSC has asked in 2018** where it expected you to know orbital altitudes, it may ask you why LEO satellites provide much lower latency for internet services
		27. Industrial Revolution 5.0; Industrial Revolution 4.0	**Source:** The Hindu (Sep 2025- March 2026) Since the World Economic Forum (WEF) has decided to establish five new Centres for the Fourth Industrial Revolution, including one in Andhra Pradesh, India, UPSC may ask to identify the **Fourth** and **Fifth Industrial Revolutions.**
		28. Bharat Tech Triump Program	**Source:** The Hindu (2026) This program has been launched to support digital and online gaming in India.
5. SPACE TECHNOLOGIES AND MISSIONS	**1. Missions, Satellites & Space Science**	1. NISAR Mission (NASA-ISRO)	**Source:** The Hindu (July 2025) | **PYQ: 2016** – Astrosat observatory placed at 1650 km above Earth This is a landmark joint Earth-observation satellite. Since previously UPSC has asked in 2016 where it expected you to know observational capabilities, it may ask you about NISAR's application.
		2. Gaganyaan Mission; Gaganyaan Orbital Module & Re-entry	**Source:** The Hindu (2025-March 2026) | **PYQ: 2022** – Spacecraft orbital motions in the Fractional Orbital Bombardment System India is finalizing hardware for its first crewed

			spaceflight. Since previously **UPSC has asked in 2022** where it expected you to understand orbital mechanics, it may ask you about the function of the **Crew Escape** System or challenges of atmospheric re-entry heating for the Orbital Module or
		3. Aditya L1 & Lagrange Points	**Source:** The Hindu (March 2025) | **PYQ: 2022** – Solar flares and coronal mass ejections damaging power grids This is India's solar observatory positioned at L1. Since previously **UPSC has asked in 2022** where it expected you to know solar phenomena, it may ask about the Lagrange point L1.
		4. Chandrayaan-3 (Sample Return Architecture); Chandrayaan-4	**Source:** The Hindu (March 2025- March 2026) | **PYQ: 2016** –Mangalyaan Mission This is the approved follow-up mission to bring lunar soil back to Earth. Since previously **UPSC has asked in 2024,** it may ask you to identify architecture of Chandrayaan-3.
		5. PSLV-C61/EOS-09 Mission	**Source:** The Hindu (May 2025) | **PYQ: 2018** Since UPSC previously asked in 2018 the differences between **PSLV** and **GSLV**, it may now ask about the specific payload capabilities of EOS-09 and Sun-Synchronous Polar Orbit (SSPO) placement.
		6. Bharatiya Antariksh Station (BAS)	**Source:** The Hindu (Jan 2026) This is India's planned indigenous space station. Since the topic is in news repeatedly, it may ask about the purpose of BAS and **Low Earth Orbit** (LEO, ~400km).
		7. Small Satellite Launch Vehicle (SSLV)	**Source:** PIB (Dec 2025) | **PYQ: 2018** – PSLVs launching Earth resources satellites and GSLV III launching communication satellites This is ISRO's newly commercialized launch vehicle. Since previously UPSC has asked in 2018 it may ask you to distinguish SSLV.
		8. X-ray Polarimeter Satellite (XPoSat)	**Source:** ISRO (Jan 2025) The Hindu (2025) | **PYQ: 2019** – Merger of giant blackholes confirming gravitational waves; **2017**- purpose of 'evolved Laser Interferometer Space Antenna (eLISA)' This is a dedicated mission to study extreme celestial bodies. Since previously UPSC has asked in 2019 and 2017, it may ask you about XPoSat's application.

		9. NavIC (NVS-01) & Rubidium Atomic Clocks	**Source:** The Hindu (March 2026) | **PYQ: 2018** – IRNSS. India is upgrading its regional navigation system. Since previously **UPSC has asked in 2018** it may ask you about the indigenous Rubidium atomic clocks.
		10. Axiom 4	**Source:** The Hindu (2025 June) | **PYQ: 2016:** Mangalyaan Mission This relates to the landmark collaboration between **ISRO and Axiom Space** to send an Indian Gaganyatri to the **International Space Station (ISS)**. Since UPSC previously asked question on Mangalyaan mission, it may ask on Axiom 4.
		11. Artemis II	**Source:** The Hindu (Jan-April 2026) I **PYQ: 2020, 2019, 2018, NDA 2020**: Questions on Moon; **2016, 2023**: Mission related to moon exploration (Artemis I was in option) Since **Artemis II** is in the news, and UPSC has frequently asked questions on Moon missions and their characteristics, there is a high possibility that UPSC may ask a question on the Artemis II mission.
		12. Space X Falcon 9 (GSAT-N2 (GSAT-20) satellite)	**Source:** The Hindu (2024-2025) I **PYQ**: **2018**- India's satellite launch vehicles; **2016-** Mangalyaan Mission Recently, India's **GSAT-N2 (GSAT-20)** communication satellite was successfully launched into a **Geosynchronous Transfer Orbit (GTO)** aboard **SpaceX's Falcon-9**—a reusable, two-stage rocket—marking India's first collaboration with Elon Musk's SpaceX; given UPSC's prior focus on satellite navigation systems, there is a strong possibility of questions on **Falcon-9**, **GTO**, reusability concepts, or the key features of GSAT-20.
		13. GSLV MK III/LVM3 (heavy lift rocket); ISRO's LVM3-M5/CMS03 (Indian Navy's GSAT-7R: heaviest Communication Satellite)	**Source:** The Hindu and Indian Express (Nov 2025) **I PYQ: 2018 -** India's satellite launch vehicles (PSLV and GSLV MK III); **2018 -** Indian Regional Navigation Satellite System (IRNSS) Since **LVM3** (**GSLV Mk III**), India's most powerful launch vehicle capable of placing **~4,000 kg** in **GTO** and **~8,000 kg** in **LEO**, is in the news for launching the heaviest indigenous communication satellite **CMS-03** from **Satish Dhawan Space Centre (Sriharikota)** and given UPSC's past focus on space missions (2016, 2018), a question on ISRO's **LVM3-**

			M5/CMSO3 and their characteristics are highly likely.
		14. GSAT-11	**Source: The Hindu I PYQ: 2018 -** India's satellite launch vehicles (PSLV and GSLV MK III); **2018 -** Indian Regional Navigation Satellite System (IRNSS) Indian Space Research Organisation's (ISRO) heaviest communication satellite, GSAT-11, was launched aboard the European Space Agency's (ESA) Ariane-5 rocket from the Guiana Space Centre, French Guiana, and is designed to enable high-speed data connectivity of up to 100 Gbps under the Digital India Mission; it is the third in a series of four such satellites.
		15. Reusable Launch Vehicle-TD (RLV-TD); Next Generation Launch Vehicle (NGLV)	**Source:** RLV-TD (The Hindu – Jan 2026); Project Soorya or NGLV (PIB/The Hindu 2024) With UPSC having previously asked questions on launch vehicles in 2018, topics like **RLV-TD** and **NGLV (Project Surya)** with 10-tonne GTO capacity using green propulsion are highly probable areas for upcoming questions in 2026.
		16. Earth Observation Satellites (HySIS, Cartosat-3, RISAT-2B, and EOS-07); Indian Remote Sensing Satellite	**Source:** The Hindu (2025-2026) **I PYQ: 2010**- Bhuvan satellite; **2015 -** Indian Remote Sensing (IRS) Satellites **2019 -** Remote Sensing Since these topics have been repeatedly in the news over the last 12 months and have also been asked by UPSC, it may ask about EOS functions or to identify satellites as EOS/remote sensing satellites.
	2. Space Phenomena & Cosmology	17. Dark Matter vs. Dark Energy	**Source:** The Hindu (2025) | **PYQ: 2018** – Light being affected by gravity and the universe expanding as predictions of Einstein's General Theory of Relativity These are fundamental cosmological concepts discussed in recent space telescope data. Since previously **UPSC has asked in 2018,** it may ask you to distinguish Dark Matter (providing gravity) from Dark Energy (accelerating expansion).
		18. Aerobraking Technique	**Source:** Global Times (March 2026) | **PYQ: 2022** – A spacecraft landing on another planet after making several orbital motions This is a critical maneuver planned for ISRO's planetary missions like **Shukrayaan-1**. Since previously **UPSC has asked in 2022,** it may ask

			you how aerobraking uses a planet's atmospheric drag to slow down a spacecraft, drastically saving rocket fuel.
		19. Einstein Ring	**Source:** The Hindu (Feb 2025) | **PYQ: 2018**– Matter warping its surrounding space-time as a prediction of General Relativity New stunning images of this phenomenon were captured by space telescopes. Since previously UPSC has asked in 2018, it may ask you to define an Einstein Ring.
		20. Kessler Syndrome & Mission Drishti	**Source:** The Hindu (Oct 2025) Overcrowding in Low Earth Orbit is a critical global concern. Since the topic is in the news and UPSC has previously asked questions on missions, it may ask you about Mission Drishti's role in space situational awareness to prevent Kessler Syndrome (a chain reaction of satellite collision).
		21. High Altitude Pseudo Satellites (HAPS)	**Source:** PIB (May 2025) | **PYQ: 2016** – Project Loon using balloons for wireless communication These are solar-powered UAVs successfully tested in India. Since previously UPSC has asked in 2016 it may ask you how HAPS fly in the stratosphere for months to act as temporary telecom towers for remote disaster zones.
		22. Gravitational Microlensing; Gravitational Waves	**Source:** The Hindu (2024- 2025) I **PYQ:** UPSC CAPF I **2016 General Studies Paper-** Gravitational Waves; **2018- L**ight bending due to gravity Since gravitational microlensing is in the news, and UPSC has previously asked questions on astronomical phenomena, it may ask about the concept, working principle, or applications of gravitational microlensing.
6. DEFENCE	**1. Defense Technology and Defence R&D**	1. Nuclear-Powered Submarines: Nuclear-Powered Attack Submarine (SSN) vs. Arihant-class nuclear-powered ballistic missile submarines (SSBN)	**Source:** Indian Express (Dec 2025) | **PYQ: 2023** – Agni-V being a ballistic missile and BrahMos being a cruise missile India is actively expanding its nuclear naval fleet. Since previously UPSC has asked in 2023 it may ask you to differentiate SSBNs from SSNs.
		2. Hypersonic Glide Vehicles – HGV (Oreshnik Missile);	**Source:** The Hindu (Jan 2026) | **PYQ: 2023** – Ballistic missiles flying at subsonic speeds This is a disruptive missile technology used in

		Hypersonic Cruise Missiles - HCM	recent geopolitical conflicts. Since UPSC asked about it in 2023, it may ask how Hypersonic Glide Vehicles (HGVs) differ from traditional ballistic missiles or to distinguish between HGVs and Hypersonic Cruise Missiles (HCMs).
		3. Project KUSHA	**Source:** The Hindu (Aug 2025) | **PYQ: 2018** – THAAD being an American anti-missile system Air defense systems are highly relevant due to global conflicts. Since previously **UPSC has asked in 2018,** it may ask you to compare it with India's Project KUSHA.
		4. Project 75I & Air Independent Propulsion (AIP)	**Source:** The Hindu (Jan 2025) | **PYQ: 2022** – Fractional Orbital Bombardment System This is a major indigenous submarine building program. Since previously UPSC has asked in 2022, it may ask you about AIP application.
		5. Laser Directed Energy Weapons (DEW) – MK-II(A)	**Source:** The Hindu (April 2025) | **PYQ: 2014, 2018** India successfully tested the MK-II(A) against drone swarms. Since previously UPSC has asked in 2014 (Agni IV); 2018 (THAAD), it may ask you how DEWs use highly focused electromagnetic energy (lasers/microwaves) to damage targets.
		6. MIRV Technology (Agni-5/ Mission Divyastra)	**Source:** The Hindu (Aug 2025) | **PYQ: 2023** – Agni-V being a medium-range supersonic cruise missile This represents a massive strategic leap in India's nuclear delivery capabilities. Since previously UPSC has asked in 2023 it may ask you about the application of Multiple Independently Targetable Re-entry Vehicle (MIRV) technology.
		7. Fiber-Optic Drones (Wire-guided UAVs)	**Source:** The Hindu (June 2025) | **PYQ: 2016** – LiFi using light as a medium for high-speed data transmission Their deployment in recent global conflicts (Russia-Ukraine) has revolutionized drone warfare. Since previously UPSC has asked in 2016 it may ask you how fiber-optic drones apply a physical wire spool to transmit video feeds and commands.
		8. Akashteer	**Source:** PIB (May 2025) | **PYQ: 2014, 2018** This relates to the digitalization of the **Indian Army's Air Defence** for real-time engagement. Since the topic is in news, UPSC may now ask about **Akashteer's** role in integrating sensors

			and weapons into a unified network to eliminate manual delays.
		9. K-4 Missile	**Source:** India Today (Dec 2025) **|** PYQ: **2023**
		10. Rudrastra Drone	**Source:** India Today (June 2025) **PYQ: 2014, 2018** This relates to asymmetric warfare and the rise of Unmanned Aerial Vehicles (UAVs). UPSC may now ask about the precision strike capabilities of **Rudrastra** and the use of **Soft Kill (jamming)** vs **Hard Kill (laser)** technologies in indigenous **Anti-Drone** systems
		11. Anti Drone; Cold Start	**Source:** The Hindu (Sep – Nov 2025; Indian Express April 2026) **PYQ: 2014, 2018**
		12. ALH Dhruv MK III; ALH Dhruv-NH	**PYQ**: UPSC CDS I 2014 General Studies paper**; 2008:** Dhruv Since topics related to defence helicopters are frequently in the news (**The Hindu in 2025–26**) and questions on helicopters had appeared in the **UPSC CDS I 2014 General Studies paper**, UPSC may now ask about the technical differences between the indigenous ALH Dhruv, ALH Dhruv-NG and the US-made MH-60R Seahawk in naval operations.
		13. MH-60R Seahawk Helicoptor	
		14. INS Vaghsheer 15. INS Kaundinya 16. INS Nistar	**Source:** PIB/The Hindu (Oct 2025 – Feb 2026) **PYQ: 2016 -** INS Astradharini. Previously, UPSC has asked questions on defence platforms in 2024. It may now ask about the stealth features of the Scorpene-class submarine INS Vagsheer, or the specialized roles of INS Nistar and INSV Kaundinya in deep-sea rescue operations involving the Deep Submergence Rescue Vehicle (DSRV)
		17. Scramjet; Ramjet vs. Scramjet	**Source:** The Hindu (Aug 2025)	**PYQ: 2023** – Ballistic missiles being jet-propelled at subsonic speeds ISRO and DRDO are testing this for hypersonic flight. Since previously UPSC has asked in 2023 it may ask you about the Scramjet and Ramjet principles.
		18. SWaDeS	**Source:** DRDO (2026) Since the Defence Research and Development Organisation (DRDO) has recently developed a hand-operated Sea Water Desalination System (SWaDeS) to provide potable water for

			soldiers in remote, coastal, and high-altitude regions, UPSC may ask to identify SWaDeS as a new technology.
		19. Integrated Guided Missile Development Programme (Agni, Prithvi, Akash, Trishul, and Nag)	**Source:** The Hindu (2025 – 2026) I **PYQ: 2014-**Agni-IV Missile; **2017-** Ballistic Missile, Agni V Missile and BrahMos Missile
		20. Project Varsha & INS Varsha (Nuclear Submarine Base)	**Source:** Business Standard / The Hindu (April 2025 – 2026) | **PYQ: 2023** (SSBNs/SSNs), **2016** (INS Astradharini) Since UPSC asked about SSBNs in 2023, it may now ask about INS Varsha's role in India's **second-strike nuclear capability**, or distinguish it from **Project Seabird** (western seaboard counterpart at Karwar).
		21. Advanced Medium Combat Aircraft (AMCA) & Tejas Mk2	**Source:** The Hindu / Indian Express (Jan–March 2026) | **PYQ: 2014** (Agni-IV), **2022** (indigenous platforms) Since UPSC has tested indigenous aviation platforms before, it may now ask to **distinguish Tejas Mk1A, Mk2, and AMCA** by generation (4th / 4.5th / 5th gen stealth), engine (F404 / F414 / 120 kN indigenous), and the significance of the **GE F414 Transfer of Technology (ToT)** deal.
		22. Operation Sindoor & Loitering Munitions (One-Way Attack Drones)	**Source:** The Hindu (May–June 2025) | **PYQ: 2014, 2018** (UAVs, asymmetric warfare) Operation Sindoor, launched by India in May 2025 to dismantle terror infrastructure in Pakistan, underscored the transformative role of unmanned aerial systems, with India's precision loitering munitions striking high-value targets and crippling enemy radars. Unlike conventional UAVs that return to base, loitering munitions are built to travel great distances and detonate upon reaching their target. UPSC may ask to **distinguish loitering munitions from conventional UAVs**, or test the doctrinal shift toward drone-centric warfare post-Sindoor.
		23. Sheshnaag-150 – AI-Powered Swarm Drone	**Source:** Business Standard (March 2026) | **PYQ: 2016** (non-conventional data transmission); **2014, 2018** (UAVs) The Sheshnaag-150, developed by Bengaluru-based Newspace Research Technologies, is a long-range swarming attack drone with a range exceeding 1,000 km, gaining urgency

			post-Operation Sindoor. Its core innovation is a **"mother-code"** enabling decentralised swarm intelligence.Since UPSC asked about UAVs in 2014 and 2018, it may now ask to distinguish Sheshnaag-150 from Iran's Shahed-136 or test concepts of **swarm autonomy and GNSS-denial countermeasures**.
		24. Integrated Theatre Commands	**Source:** The Hindu (2025–2026) | **PYQ: 2017** (jointness in armed forces), **2021** (Chief of Defence Staff) Since the **Chief of Defence Staff (CDS)** was a PYQ topic in 2021 and theaterisation has been accelerated post-Sindoor, UPSC may now ask about the **difference between existing functional commands (Western, Eastern, Southern) and proposed theatre commands**, or the role of CDS in driving tri-service integration.
		25. Pinaka LRGR (Long Range Guided Rocket)	**Source:** The Hindu / DRDO (2025–2026) | **PYQ: 2019** (multi-barrel rocket launcher systems), **2023** (Agni-V ballistic characteristics) The **Pinaka system** has evolved from an unguided 40 km MBRL into a family of precision-guided munitions — Pinaka Mk-I (40 km), Mk-II (60 km), LRGR-120 (120 km), and upcoming 300–450 km variants with GPS/INS guidance. UPSC may ask to **distinguish Pinaka from BrahMos** (rocket artillery vs cruise missile), or test knowledge of its role in **saturating enemy air defences** and its comparison with China's PHL-03 or Russia's BM-30 Smerch.
		26. iDEX (Innovations for Defence Excellence) & Defence Indigenisation	**Source:** Budget 2026-27; PIB (2025–2026) | **PYQ: 2022** (Make in India in Defence) iDEX (launched under the Defence Innovation Organisation) funds startups and MSMEs for cutting-edge defence technologies through challenges, providing grants .up to ₹1.5 crore per startup under the **DISC (Defence India Start-up Challenge)** framework. UPSC may ask about the **organisational structure of iDEX** (under DIO, under MoD), its difference from DRDO and DPSU procurement, or its role in enabling private sector companies like Newspace Research

			Technologies (Sheshnaag-150) and VEM Technologies (Chaser drone).
		27. S-400 Triumf Air Defence System (Sudarshan Chakra); S-500	**Source:** The Hindu / Indian Express (2025–2026) | **PYQ: 2018** (THAAD); **2019** (S-400 procurement controversy) The S-400 is a **long-range surface-to-air missile (SAM) system** capable of engaging targets up to 400 km away across multiple threat tiers simultaneously, distinguishing it from shorter-range systems like Akash. UPSC may ask to **compare S-400 (imported, multi-layered, 400 km) with Project KUSHA / ERADS (indigenous, under development)**, or test why India invoked a CAATSA waiver to procure S-400 from Russia despite US sanctions pressure — a unique geopolitical-strategic convergence point.
		28. S-500 Prometey	**Source:** The Hindu / Indian Express (2025–2026) | **PYQ:** 2018 (THAAD); **2019** (S-400 procurement); **2023** (hypersonic missile systems) Since UPSC asked about THAAD in 2018 and S-400 in 2019, it may now ask to **distinguish S-400 from S-500** (range, altitude, anti-hypersonic/anti-satellite capability), or test the **CAATSA sanctions dimension** — the same legal hurdle India faced with the S-400 procurement. The **re-export clause** in Russia's G2G proposal and its strategic implications for India's defence export ambitions is also a likely MCQ trigger.
		29. Pralay Tactical Ballistic Missile (TBMs)	**Source:** DRDO, PIB, The Hindu (October 2025 – February 2026) | **PYQ: 2023** – Agni-V as a ballistic missile; **2014** – Agni-IV Pralay is an **indigenous road-mobile tactical ballistic missile (TBM)** with a range of **about 150–500 km**, meant for **rapid, high-precision strikes against selected enemy-battlefield-targets** (airfields, command-centres, logistics hubs).
		30. Long-Range Anti-Ship Hypersonic Missile (LR-AShM)	**Source:** DD News (January 2026) | **PYQ: 2023** – Hypersonic / cruise-vs-ballistic-missile India has publicly showcased the Long-Range Anti-Ship Hypersonic Missile (LR-AShM), a hypersonic glide-vehicle (HGV)-based anti-ship missile designed to fly at Mach-5+ along a quasi-ballistic or lofted trajectory before maneuvering in the terminal phase to

			strike enemy warships. Given that UPSC has already tested the basic distinction between ballistic and cruise missiles and the general concept of hypersonic flight in 2023-style questions, a 2026 question may straightforwardly ask which missile uses a hypersonic glide-vehicle to attack naval vessels or which system serves as a long-range, hypersonic, sea-denial weapon, making the LR-AShM a highly probable question.
		31. PARAMA-VIDYUT – High- Energy-Power-Systems for Directed- Energy- W eapons and Railguns	**Source:** The Hindu (Oct 2025 – Mar 2026) | **PYQ: 2014** – Laser-based DEW-principles; **2022** –Fractional – orbital – bombardment – system - type hardware concepts. Since UPSC has already tested **laser-based directed-energy-principles and high-energy-weapon-concepts**, a 2026 question may ask you to **identify PARAMA-VIDYUT as the project developing high-energy-power-systems for DEWs and railguns** or to recognize that it underpins the next-generation directed-energy and electromagnetic-launch-technology for India's defence forces.
		32. NAVAL-KAVACH – Integrated Anti-Missile and Anti-Drone Defence for Warships	**Source:** The Hindu (Oct 2025 – Mar 2026) | **PYQ: 2016** – INS Astradharini; **2022** – submarine-based systems and naval-platforms **NAVAL-KAVACH** is an **indigenous close-in-air-defence (CIAD)** system for Indian Navy warships, integrating **short-range surface-to-air missiles (SR-SAM), CIWS-type guns, and laser-based anti-drone systems** under a single fire-control-and-command-architecture. Since UPSC has tested **naval-platforms and missile-defence concepts**, a 2026 question may ask you to **identify NAVAL-KAVACH** or to explain how it provides layered protection against multiple-axis threats.
		33. AERO-SENTINEL – Multi-Spectral Air-Defence Sensor Network	**Source:** The Hindu (2026) **| PYQ:** 2**018** – THAAD; **2023** – air-defence-radar and missile-flight-profile PYQs Project AERO-SENTINEL is a multi-spectral air-defence sensor

			network combining X-band, Ku-band, and millimetre-wave radars with electro-optical and IR-surveillance towers along sensitive borders and high-altitude-areas. Since UPSC has asked about **air-defence-radar types and missile-defence**, a 2026 question may ask you to **identify AERO-SENTINEL** or to explain how it complements conventional radar-layers by covering low-altitude and drone-type threats.
		34. SWIFT (Seamless Weapon-Initiated Firing Technology) for Helicopter-Mounted Missiles	**Source:** The Hindu (Nov 2025 – Feb 2026) | **PYQ: 2016** – Dhruv helicopter questions**; 2014** – Agni-IV / DRDO-tech-integration **Project SWIFT** (Seamless Weapon-Initiated Firing Technology) is a **DRDO-developed fire-control system** that enables **indigenous helicopters like ALH-Dhruv-NG and future LCH-based gunships** to launch guided missiles and rockets with high accuracy in all-weather conditions. Since UPSC has already tested **helicopter-based weapon-systems and DRDO-tech-integration**, a 2026 question may ask you to **identify SWIFT as the fire-control-technology for helicopter-launched guided-weapons** or to recognize that it allows helicopters to engage targets precisely while flying at high speed.
		35. Astra Mk-II / Astra- Extended- Ran ge (Astra-ER) – long-range Beyond Visual Range Air-to-Air Missile (BVRAAM)	**Source:** DRDO, The Hindu (May–June 2025 – early 2026) | **PYQ: 2014** – Agni-IV / DRDO-tech-integration; **2016** – Dhruv Astra Mk-II / Astra-Extended-Range is an indigenous beyond-visual-range (BVR) air-to-air missile with a range of about 160 km, developed by DRDO to arm Su-30MKI, Tejas Mk-1A, and future AMCA-class fighters.
		36. MARUDHEERA – Indigenous High – Altitude-Parachute-Recovery System (HAPS-like) for Airborne Operations	**Source:** The Hindu (Oct 2025 – Feb 2026) | **PYQ: 2014** – DRDO-indigenous-system; **2018** – tactical-air-operations-related PYQ
		37. Agni-Prime (Agni-P) – Rail-Mobile Ballistic Missile	**Source:** DRDO / The Hindu (January 2026) | **PYQ: 2014, 2018** (DEW); **2016** (electromagnetic spectrum)

			Unlike the **laser-based MK-II(A) DEW** (which burns/destroys a drone physically), the HPM system **fries onboard electronics** of multiple drones simultaneously using pulsed microwave energy in the S-band — giving it an advantage against **drone swarms**. Since UPSC has asked about DEW in 2014 and 2018, it may now ask to **distinguish Laser DEW (MK-IIA/Sahastra Shakti) from Microwave DEW (HPM)** in terms of mechanism, range, and counter-swarm effectiveness.
		38. Kamikaze / Loitering Munitions (Swarm-Type Attack Drones)	**Source:** The Hindu (2025) I **PYQ: 2025-** Unmanned Aerial Vehicles (UAVs**); 2020**: Question on applications of drones (spraying pesticides, inspecting volcanoes, collecting whale samples). There is a high probability in 2026 of questions on Kamikaze drones / Loitering Munitions, especially regarding their identification, working, and role in asymmetric & hybrid warfare.
		39. Very Short-Range Air Defence System (VSHORADS)	**Source:** The Hindu (2025-2026) **| PYQ: 2018 –** THAAD; **2014 –** air defence systems With global drone/swarm threats rising and prior UPSC focus on layered air defence (THAAD, Akash), it may ask about VSHORADS vs MANPADS, soft-kill vs hard-kill, or its role in the integrated air defence network alongside Akashteer.
		40. Man Portable Anti-Tank Guided Missile (MPATGM)	**Source**: The Hindu (Jan 2026) | **PYQ: 2014** – Nag missile / anti-tank systems MPATGM: Third-generation "fire-and-forget" anti-tank missile with top-attack mode against moving targets.
		41. Integrated Air Defence Weapon System (IADWS)	**Source:** Indian Express (Aug 202**5) | PYQ: 2018 –** THAAD**; 2014** – air defence interceptors Given repeated PYQs on air defence and recent global conflicts, UPSC may ask how IADWS achieves multi-layer, multi-threat engagement or its role in India's evolving integrated air defence architecture.
		42. HAMMER (Air-to-Ground Precision Weapon); AGM-158 Joint Air-to-Surface Standoff	**Source:** The Hindu (2025-2026) | **PYQ:** 2018 – THAAD; 2014 – air-defence interceptors HAMMER (Highly Agile and Modular Munition Extended Range) is a French-developed, precision-guided modular air-to-ground weapon system designed by Safran. Given the

		Missile (JASSM); Rampage Missile	recent **India-France Annual Defence Dialogue (2026)** and the landmark MoU between **Safran and Bharat Electronics Limited (BEL)** for domestic co-production, UPSC may focus on HAMMER's role in **"Atmanirbhar Bharat"** and its technical edge as a stand-off precision-guided weapon.

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Tests Details:

SIMULATOR TEST DATE	DAY	9:30 A.M- 11:30 A.M	2:30 P.M- 4:30 PM
11th April 2026	Saturday	General Studies	CSAT
19th April 2026	Sunday	General Studies	CSAT
26th April 2026	Sunday	General Studies	CSAT
3rd May 2026	Sunday	General Studies	CSAT
10th May 2026	Sunday	General Studies	CSAT

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