

IR/Diplomacy (1)

• The Squadron Where Officers Learn the Sea

Body: The deployment: **First Training Squadron (ITS)** — **INS Tir**, **INS Sujata** and **ICGS Sarathi** — at **Port Victoria, Seychelles**, **12 to 15 October 2026**.

The squadron's role: sea training of officers under training, after the academy stage. **INS Tir** is a purpose-built cadet training ship; **INS Sujata** is a **Sukanya-class** offshore patrol vessel in the training role; **ICGS Sarathi** is a **Coast Guard** ship sailing with a Navy squadron.

Engagements: call on **Maj Gen Michael Rosette**, **Chief of Defence Forces, Seychelles Defence Force**; **firefighting and small-arms training** for SDF personnel; **PASSEX with SCGS Andromache** (joint patrolling, communication drills, coordinated manoeuvres); medical camp, supplies at the **Point La Rue** elderly home, schoolchildren's visit and a **Navy Band** performance.

PASSEX: a short, opportunistic Passage Exercise establishing that two units can communicate, manoeuvre in company and coordinate — distinct from a planned, named bilateral exercise.

MAHASAGAR: Mutual and Holistic Advancement for Security and Growth Across Regions, succeeding **SAGAR** (Security and Growth for All in the Region) — wider geography, reciprocal framing.

Exam hook: **Why Seychelles:** a Western Indian Ocean island state with a large EEZ and a small defence force, where maritime domain awareness and patrol capacity are the central security needs.

Defence (7)

• 82.67 mmHg at 18,000 Feet

Body: **What:** Union Health Minister **J.P. Nadda** laid the foundation stone of the **ICMR Centre for High Altitude Medicine and Public Health Research** at **Keylong, Lahaul and Spiti**, Himachal Pradesh, on **12 October 2026**; altitude about **3,080 m**.

Partners: **ICMR, Armed Forces Medical Services (AFMS), AIIMS Bilaspur**, the Government of Himachal Pradesh; **MoS Sanjay Seth** on developing solutions for extreme-altitude conditions.

Scope: low oxygen, extreme cold, changing climate, tribal lifestyles; joint research on **soldiers and border communities**; **drone-enabled medicine delivery**, digital health and **AI** for remote access.

The core concept: air remains about **21% oxygen** at all altitudes.

Barometric pressure falls, so the **partial pressure of oxygen** falls — **hypobaric hypoxia**. **Siachen** at 18,000 ft reports a **PO₂** of about **82.67 mmHg** against roughly **150 mmHg** at sea level.

The three illnesses: **AMS** (headache, nausea, fatigue; risk above about **2,500 m**, possible from **2,000 m**); **HACE** (AMS plus **ataxia, confusion, altered mental status**); **HAPE** (pulmonary fluid; the **commonest cause of death** at altitude).

HAPE mechanism: hypoxia → widespread, uneven **hypoxic pulmonary vasoconstriction** → raised capillary pressure → fluid into alveoli → worsening hypoxia.

Acclimatisation: hyperventilation, shifted oxygen release, and **erythropoiesis** over days to weeks — but **acclimatisation is incomplete** and **HAPE** occurs in the acclimatised.

Definitive treatment: descent, with oxygen and drugs as support.

Military significance (as reported in medical reviews): in Kashmir-sector fighting at **5,185–5,490 m**, about **80% of casualties** were attributed to environmental conditions; 1960s Indian Army **HAPE** incidence up to **15.5%** among fresh inductees moved rapidly to **3,355–5,490 m**; **HAPE** mortality up to **44%** without descent or oxygen.

Existing institution: **DIPAS** (Defence Institute of Physiology and Allied Sciences, DRDO) and its High Altitude Physiology Group.

Exam hook: **Exam hook:** at extreme altitude the environment causes more casualties than the enemy, which makes high-altitude medicine a **combat multiplier** rather than a welfare measure.

• 2 or 3 Places a Year in London, and Why India Built Its Own

Body: **What:** Faculty and course members of the **66th National Defence College Course** called on **President Droupadi Murmu** at Rashtrapati Bhavan on **13 October 2026**.

The NDC: established **1960**, New Delhi; the **highest seat of strategic learning** for Defence Service and Civil Service officers; course in **National Security and Strategic Studies** of about **47 weeks**; graduates awarded an **M.Phil** via Madras University; also functions as a **think tank**.

Composition: about **80** course members, drawn from the three Services at roughly **Brigadier-equivalent rank** and **from the civil services**; about **25%** of places reserved for officers of **friendly foreign countries**.

Why it was founded: before 1960 India had only about **two or three** places a year at the UK's **Imperial Defence College**.

The address — four propositions:

Modern warfare extends into **cyber security, space technology and biotechnology**, so **fast decision-making mechanisms** matter more. (Cyber effects are instant while **attribution is slow**, inverting the normal decision sequence.)

National security extends **beyond military capability** and needs **scientific institutions and the armed forces** to cooperate; the **Research, Development and Innovation Scheme** was named as an instrument.

Recent conflicts show the value of **cost-effective technologies that complement advanced systems** — the **exchange ratio** argument: a cheap munition against an expensive interceptor is an unsustainable trade.

AI use is growing, but **decision making cannot be outsourced exclusively to it**; a **balanced approach** is needed.

Economic resilience is integral to national security; India absorbed external disruptions **without compromising strategic freedom of action**.

The pattern to notice: this is the **second** senior statement on human authority over AI in a week, after the Chief of the Air Staff on **8 October** — India positioning on **meaningful human control** of lethal autonomous weapons.

Exam hook: **Exam hook:** economic resilience matters to security because a state that can absorb shocks can **decline to be coerced**. Strategic autonomy has a balance-sheet precondition.

• India's First Coalition Command Was a Classroom

Body: **What:** The Indian Navy completed its **maiden command of a Combined Maritime Forces task force**, relinquishing **CTF 154** at **Manama, Bahrain**, on **14 October 2026**. **Cmde Milind M Mokashi** handed over to **Cdr Melissa Desjardins**.

Tenure: assumed command **11 February 2026** from the **Italian Navy**; **eight months**; first Indian Navy contingent to lead a CMF task force.

CMF: a multinational naval **partnership** (not an alliance) headquartered at **Manama, Bahrain**; commanded by **VAdm Curt A Renshaw**. India began its association in **2022** following the India–US 2+2 dialogue; descriptions of its formal status and the coalition's membership count differ between sources.

Task force numbering: **CTF 150** maritime security outside the Gulf; **CTF 151** counter-piracy; **CTF 152** maritime security in the Gulf; **CTF 153** Red Sea; **CTF 154 training**, established **May 2023**.

Why CTF 154 suits India: training commits India to nothing operationally, avoids directing interdiction inside a US-led coalition, and plays to India's large naval training establishments. CTF 154 also lets partners join **ashore courses without providing ships or aircraft**.

Tenure output: **20 Staff Enhancement Training engagements**; two major multinational exercises; the inaugural **Subject Matter Expert Exchange on Piracy and Armed Robbery (SPAR 2026)**; over **7,800 training hours**; personnel from **39 countries**; over **1,100 participant attendances** in SET and SPAR alone.

Operation Compass Rose 26-1: **20–22 April 2026, fully virtual** "in view of the prevailing regional security environment" — **137 participants, 11 observers, 21 facilitators, 25 partner nations, 13 organisations**.

Operation Southern Readiness 26-2: **Southern Naval Command, Kochi, 20–23 July 2026** — the **first major CMF training exercise hosted by India**; **276 personnel** from **27 countries**; about **3,800 training hours**; largest Maritime Domain Enhancement Training engagement by CTF 154 since its establishment.

Three distinct instruments: **independent** national operations (anti-piracy escorts), **bilateral** exercises, and **coalition** appointments — different political costs, used together.

Exam hook: **Exam hook:** commanding a task force is a diplomatic gain; **hosting its largest exercise** is an advertisement for Indian training infrastructure. The two are not the same achievement.

• A Major General in 1976

Body: What: 29 nursing cadets of Batch IX, College of Nursing, Army Hospital (Research & Referral), Delhi Cantonment, commissioned as Lieutenants into the Military Nursing Service on 14 October 2026; parade reviewed by Commandant Lt Gen Avinash Das; four years of training; oath to place "Service Before Self"; MNS commended for 101 years of service.

Dating: "101 years" counts from the 1926 formal establishment as the Indian Military Nursing Service (IMNS) — not from the older roots.

Roots: trained female nurses with British Army units from the Anglo-Zulu War, 1879; Army Nursing Service by 1881; in India, 21 March 1888, Catharine Grace Loch (later first Chief Lady Superintendent) arrived with Miss Oxley and eight other nursing sisters; four circles at Rawalpindi, Meerut, Bangalore, Poona.

Contested dates (quote with care): Indian Army Nursing Service designation 1893 or 1896; Queen Alexandra's Imperial Military Nursing Service 1902 or 1903; commissioned rank from the Indian Military Nursing Service Ordinance, 1943 or from 1947.

Firm milestones: 1926 establishment as IMNS; 1943 Ordinance separating the Indian arm; 12 August 1950 IMNS subsumed into the Military Nursing Service.

Structure: an all-women, all-officer corps of the Indian Army — no JCO or other ranks, because the entry standard is itself a professional nursing qualification. Officers hold a Permanent Commission or a Short Service Commission, with SSC officers able to seek PC subject to selection and vacancy.

Placement: part of the Armed Forces Medical Services under the Directorate General of Armed Forces Medical Services (DGAfMS), alongside the Army Medical Corps and Army Dental Corps.

Landmark: Gertrude Alice Ram, Matron-in-Chief, became the first woman officer in the Indian Army to attain the rank of Major General on 27 August 1976.

Why a uniformed service: the clinical skill is the same as civilian nursing; the context is not — field hospitals, high altitude, hospital ships, disaster relief and aeromedical evacuation require an officer deployable under orders at short notice.

Exam hook: Exam hook: the MNS is India's oldest route for women to commissioned rank, decades before the women's entries of the 1990s.

• Rs 2,563 Crore for a Satellite, and the Company That Will Build It

Body: The contracts: Rs 4,106 crore total on 15 October 2026 — GSAT-7C at Rs 2,563 crore with NewSpace India Limited, Bengaluru, and Varunastra at Rs 1,543 crore with Bharat Dynamics Limited, Hyderabad. Signed in the presence of the DG (Acquisition), Department of Defence.

NSIL: incorporated 6 March 2019, wholly government-owned CPSE under the Department of Space, ISRO's commercial arm, operating on a demand-driven model after the June 2020 space reforms; nodal agency for PSLV production by an industry consortium.

The GSAT-7 line: GSAT-7 (Rukmini), 30 August 2013, Ariane-5 from Kourou, for the Navy; GSAT-7A, December 2018, GSLV-F11, about 2,250 kg in Ku-band, for the Air Force; GSAT-7C now contracted.

AoN to contract: the Defence Acquisition Council cleared GSAT-7C on 23 November 2021 at about Rs 2,236 crore. The signed contract is Rs 2,563 crore, almost five years later. An AoN is a clearance, not a purchase.

Varunastra: designed by NSTL (DRDO), Visakhapatnam, manufactured by BDL, inducted 2016; 533 mm ship-launched heavy weight anti-submarine torpedo; a 2019 BDL contract covered 63 units for about Rs 1,187.82 crore.

Exam hook: Torpedo classes: 324 mm lightweight from ships, helicopters and maritime patrol aircraft; 533 mm heavy weight from surface ships and submarines, with a far larger warhead and longer run.

• A Warship Whose Job Is Testing Other Weapons

Body: The ship: INS Samarthak, first of class Multi-Purpose Vessel, commissioned 16 October 2026; ceremony presided over by Vice-President C.P. Radhakrishnan, with CNS Admiral Krishna Swaminathan present. The name means "The Proponent".

The builder: designed and constructed by Larsen & Toubro at Kattupalli Shipyard near Chennai — the Ministry calls it the first major warship built by an Indian private shipyard. Warship construction has traditionally been with DPSU yards: Mazagon Dock, GRSE, Goa Shipyard, Hindustan Shipyard, Cochin Shipyard.

Timeline: contract March 2022 worth about Rs 887 crore; launched 14 October 2024; delivered 27 August 2026; commissioned 16 October 2026. Second of class INS Utkarsh launched January 2025.

Primary role: a trials and evaluation platform for testing and training with new sensors and weapons developed by Indian industry. Secondary roles: maritime surveillance and reconnaissance, offshore patrolling, HADR.

Indigenous content: over 75%, measured by value, with modular construction and pre-outfitting used to compress build time.

Exam hook: Why it matters: a dedicated trials platform removes the bottleneck of using frontline warships to test new indigenous systems.

• Eight Days Off Plymouth, and Who Ran the Exercise

Body: KONKAN-26: India-UK bilateral maritime exercise, 08–15 October 2026, concluded off Plymouth, UK. The Sea Phase ran 12–15 October.

Participants: INS Trishul, a Talwar-class stealth frigate, and HMS Sutherland, a Duke-class (Type 23) anti-submarine warfare frigate. Conducted by FOST — the Royal Navy's Fleet Operational Standards and Training organisation, which runs operational readiness assessment for British and allied warships.

Serials: advanced seamanship manoeuvres, joint tactical exercises, communication procedures, anti-surface asymmetric warfare, anti-submarine warfare, and weapon firings in a multi-threat environment.

The series: began in 2004, alternates between Indian and British waters, named after the Konkan coast of western India. The 2006 edition involved HMS Illustrious; the 2025 edition brought both countries' Carrier Strike Groups together.

Exam hook: Interoperability means the technical and procedural ability of two navies to operate as one force — compatible communications, common procedures and shared tactical understanding.

Sci/Tech (4)

• Rs 1 Lakh Crore, and the State Chose Not to Pick Winners

Body: What: The Research, Development and Innovation Fund (RDIF) announced its **first cohort of 19 Second Level Fund Managers (SLFMs)** on 12 October 2026.

Approval: the Empowered Group of Secretaries (EGoS) on 8 October 2026 approved 14 Alternative Investment Funds (AIFs) and 5 Focused Research Organisations (FROs), total RDIF commitment Rs 7,131 crore. Five additional technologies were also approved for coverage.

The scheme: Rs 1 lakh crore RDI Scheme, launched by the Prime Minister in November 2025.

Where it sits: an Independent Business Unit within the Anusandhan National Research Foundation (ANRF), under the Department of Science and Technology.

Structure: a fund of funds — the RDIF is the first level; the 19 SLFMs are the second level and invest in Eligible Technology Enterprises (ETEs).

Why that structure: the state is good at setting strategic priorities and poor at picking individual winners; professional managers with capital at risk make company-level calls.

Selection chain: first call January 2026 → objective assessment and Expert Advisory Committee interaction → ANRF Executive Council → EGoS.

AIF vs FRO: an AIF is a SEBI-regulated pooled vehicle taking equity for returns; an FRO is a mission-driven research organisation for a defined problem that academia will not take (incentives reward papers) and industry will not take (payback too distant).

Eligibility floor: TRL 4 and above — laboratory-validated, far earlier than the TRL 7-plus that commercial investors normally require. The fund therefore accepts technology risk, not just scale-up risk.

The test: SLFMs are expected to mobilise private capital equivalent to the RDIF contribution — a 1:1 match turning Rs 7,131 crore into roughly Rs 14,000 crore.

Risks to watch: fund-of-funds fees, and an intermediary's incentive to protect its record, which pulls investment towards safer later-stage deals and away from the TRL 4 floor. Rs 7,131 crore is about 7% of the corpus, and nothing has yet been disbursed to a company.

Exam hook: Exam hook: 'Science 4 Technology' — long-term patient capital aimed at moving India from technology consumer to technology developer.

• The Shirt Must Not Fade, and the River Pays

Body: What: INST Mohali (an autonomous institute of the Department of Science and Technology) developed a machine-learning-assisted, multifunctional filter for dye-contaminated wastewater; published in Advanced Functional Materials; from Dr Aviru Kumar Basu's laboratory.

Construction: green-synthesised zinc oxide (ZnO) nanoparticles immobilised in biodegradable polylactic acid (PLA) nanofibers, with mechanical excitation applied alongside light.

Green synthesis: ZnO made using turmeric extract — curcumin, flavonoids and phenolic compounds acting as reducing and stabilising agents in place of conventional chemicals.

The core distinction: adsorption, sedimentation and flocculation separate pollutants (leaving contaminated sludge); photocatalysis destroys them, ideally mineralising to CO₂, water and simple ions.

Biological treatment also destroys but is slow against stable synthetic dyes.

Photocatalysis mechanism: a photon of energy $\geq$ the band gap lifts an electron to the conduction band, leaving a hole; both migrate to the surface and generate reactive oxygen species (hydroxyl radical, superoxide) that break the dye apart.

The central problem: electron-hole recombination within nanoseconds, releasing heat and doing no chemistry — efficiency is a race between recombination and reaction.

The piezoelectric trick: ZnO is piezoelectric; mechanical vibration creates an internal electric field that separates electron and hole before they recombine → more reactive species. Called piezo-photocatalysis; the mechanical energy can come from flowing water.

Other problems solved: catalyst recovery (immobilised = a liftable filter, no separation step); surface contact preserved by a porous fibre mat; the support is biodegradable; reduced dependence on light alone.

Why dyes are hard: colourfastness is the design requirement — the stability that stops a shirt fading also resists sunlight, oxygen and microbial attack in a river. Textile effluent is the main source.

Honest limits: green synthesis uses a variable plant feedstock (batch consistency); and real effluent is hot, saline, surfactant-laden and multi-dye, unlike a single dye in clean water.

Exam hook: Exam hook: the strategy is to take an abundant, cheap material and engineer it to perform above its class, rather than to pursue the most advanced material.

• 32 Slices, and the Part That Is Hard to Build

Body: The agreement: signed 15 October 2026 between the Technology Development Board (Department of Science and Technology) and Panacea Medical Technologies Pvt. Ltd., Malur, Karnataka, for an indigenous 32-slice CT scanner.

How CT works: a rotating X-ray source and digital detector array capture many projections; a computer reconstructs cross-sectional images by algorithm. Tissue contrast comes from differences in X-ray attenuation.

Hounsfield scale: water = 0 HU, air $\approx$ -1000 HU, dense bone around +1000 HU and above.

Slices = detector rows per rotation, not X-ray tubes. More slices means faster coverage, which matters for cardiac and paediatric imaging. 32-slice targets the high-volume general diagnostic market.

Hardest components: the detector array (thousands of matched scintillator-photodiode elements), the slip-ring rotating gantry, and the reconstruction software.

Modality contrast: CT uses ionising X-rays; MRI uses magnetic fields and radiofrequency pulses with no ionising radiation; ultrasound uses high-frequency sound.

Import dependence: about 80–85% for complex, high-value medical devices; imports rose about 41% in 2021-22 to roughly Rs 63,200 crore.

Exam hook: TDB's instrument: financial assistance for commercialisation of indigenous technology — the stage between a proven prototype and a sellable product.

- **A Lignite Mine in Tamil Nadu, and Why It Looks Like Mars**

Body: **The finding:** announced **16 October 2026** — **melanterite** identified at **Neyveli, Tamil Nadu**, and **gypsum** in the **Atacama Desert (Chile)** and the **Tiruchirappalli Badlands**, establishing them as **Martian analogue sites**.

Why analogues: **orbital data alone cannot fully characterise Martian minerals**. Analogue sites are used to interpret mission data, test instruments and train teams.

Gypsum: **calcium sulphate** with water in the structure; forms by **evaporation**; records **past aqueous environments** and can **preserve biosignatures**.

Melanterite: **hydrated iron sulphate**; forms by oxidation of **marcasite** in the **lignite** substratum at Neyveli; marks **transient wet, acidic, oxidising conditions**.

Both are hydrous sulphates — water bound into the crystal structure is the evidence of liquid water.

The instrument: a **laser Raman spectrometer** supported by **DST-FIST** at the **Department of Geology, University of Kerala**, team led by **Dr Sajin Kumar K.S.**

Raman spectroscopy: inelastic scattering of laser light shifts photon frequency by an amount set by molecular vibrations; the **Raman shift** gives each mineral a spectral fingerprint. **Non-destructive**, minimal sample preparation, sensitive to structural water.

Exam hook: **Published in the *Journal of Geophysical Research: Planets*** (two papers).

