

Indian Air Force & Defence Updates

■ AFCAT GK Section · CFA01

✦ **AFCAT Level : High Priority**

This is the **most important chapter for AFCAT**. You are joining the Indian Air Force — examiners expect deep knowledge of IAF aircraft, exercises, operations, commands, DRDO systems, and recent milestones. A dedicated IAF section separates AFCAT from NDA and CDS in depth and specificity. Every aircraft induction, every operation, every exercise with IAF participation is exam-relevant.

✦ AFCAT Pattern — IAF & Defence (2019–2024 trend):

- Aircraft: name + role + engine + squadron + base | • Exercise: partner + type + location + unique feature
- Operations: name + country + aircraft used | • Commands: HQ + area of responsibility
- DRDO: system + launch platform + role + range | • IAF firsts: women pilots, records, milestones
- Trainers: which aircraft for which training stage | • Agniveer, appointments, Aero India facts

1. IAF Fighter & Multi-Role Aircraft Fleet

✦ Front-Line Fighter Aircraft — Full Details

- ▶ **Rafale (Dassault Aviation, France):** Twin-engine, omni-role 4.5-generation fighter. 36 aircraft delivered (complete). Two squadrons: No. 17 Squadron "Golden Arrows" at Ambala, Haryana; No. 101 Squadron "Falcons" at Hashimara, West Bengal (eastern sector, faces China). Key weapons: Meteor BVR AAM (range 150+ km, world's longest no-escape zone); SCALP-EG cruise missile (300 km, deep strike); HAMMER precision guided bomb. Key systems: SPECTRA EW suite (360° radar warning, jamming, decoy); AESA RBE2 radar; IRST. Rafale-M (26 aircraft ordered 2023) = naval carrier variant for INS Vikrant; deck-capable with ski-jump takeoff and arrested landing; delivery from 2028.
- ▶ **Sukhoi Su-30MKI (HAL-licensed, Russia):** Twin-engine, thrust-vectoring, super-maneuvrable heavy fighter. Largest fleet: ~260 aircraft. Built under licence by HAL at Ozar, Nashik (Maharashtra). Engine: AL-31FP with thrust-vector control (gives extreme

manoeuvrability). Radar: NO11M Bars (phased array). Unique capability: Carries air-launched BrahMos supersonic cruise missile (450 km range). 14 squadrons; based across India at Pune, Jodhpur, Chabua, Tezpur, Kalaikunda, Bareilly, Halwara, Thanjavur, Sirsa.

- ▶ **Tejas Mk1 (HAL LCA):** Single-engine, tail-less delta-wing, 4th-generation light combat aircraft. India's first indigenously designed & developed fighter. Engine: GE-F404-IN20 (90 kN). Two squadrons: No. 45 Squadron "Flying Daggers" and No. 18 Squadron "Flying Bullets" at Sullur, Coimbatore (Tamil Nadu). FOC (Final Operational Clearance) achieved 2019. Tejas Mk1 = baseline production; limited BVR capability.
- ▶ **Tejas Mk1A (HAL LCA Advanced):** 83 aircraft ordered (Rs 48,000 crore; largest ever single fighter contract with HAL). Major upgrades over Mk1: Israeli EL/M-2052 AESA radar; advanced DRDO EW suite (ASPJ, MAWS, RWR); in-flight refuelling (IFR) probe fitted standard; superior BVR capability; Link-16 compatible. Engine: GE-F404-IN20 (same as Mk1; future upgrade to GE-F414 possible). To replace MiG-21 Bison squadrons. Production ongoing at HAL Bengaluru.
- ▶ **Tejas Mk2 (HAL LCA-21):** Next-generation variant. Larger airframe (+14 cm fuselage stretch); more fuel; 5 hardpoints added. Engine: GE-F414-INS6 (100 kN; ~10% more thrust than F404). USA agreed 2023 to co-produce GE-F414 in India (HAL) under ToT — India's first jet engine ToT. First flight expected ~2026; production by ~2030. Will replace Mirage-2000 and Jaguar squadrons.
- ▶ **AMCA (Advanced Medium Combat Aircraft):** India's 5th-generation stealth fighter (under development by ADA/HAL). Twin-engine, low-observable (stealth). Internal weapons bay. AESA radar, supercruise capability. Rs 15,000+ crore programme. First prototype expected ~2028–2030. Will replace Su-30MKI eventually. India will become one of few nations with indigenous 5th-gen fighter.
- ▶ **Mirage-2000 (Dassault, France):** Delta-wing, single-engine fighter (M53-P2 engine). Fleet ~51 aircraft. Upgraded to Mirage-2000I/TI standard (2012–2021). Squadrons: No. 1 Squadron "Tigers" and No. 7 Squadron "Battle Axes" at Gwalior, Madhya Pradesh. Used in Balakot airstrike (26 Feb 2019) with SPICE-2000 precision bombs. Being phased out; replaced by Tejas Mk2.
- ▶ **Jaguar (SEPECAT, India-UK-France):** Twin-engine, ground-attack, deep-penetration strike. Fleet ~120 (declining). HAL manufactures Jaguar with Orpheus engines. Squadrons at Ambala, Gorakhpur, Jamnagar. Carries anti-ship Sea Eagle missiles (maritime role). Being phased out gradually by 2030.
- ▶ **MiG-21 Bison (HAL-upgraded):** Single-engine, supersonic interceptor. Russia-origin, India operated for 60+ years. Final squadrons: No. 51 Squadron "Sword Arms" at Srinagar. Bison variant had KOPYO radar and R-77 BVR missiles. Involved in Balakot aftermath dogfight (Wg Cdr Abhinandan's MiG-21 shot down a Pakistani F-16 before being downed). Final phase-out by end of 2025. Nicknamed "Flying Coffin" due to accident rate (but this is due to age, NOT design flaw of Bison standard).
- ▶ **MiG-29 Upgrade (Baaz):** Twin-engine, medium fighter. Fleet ~50. Upgraded to MiG-29 UPG (Upgrade) with ZHUK-ME radar, new avionics, R-77 BVR missile. Squadrons at Adampur and Pathankot. Also operates from INS Hansa, Goa (in a few aircraft) — but mainly IAF asset.

✈ Transport, AEW&C, Tanker & UAV Fleet

- ▶ **C-17 Globemaster III (Boeing, USA):** 11 aircraft. Based at Hindan (UP) and Chandigarh. Strategic airlift; 77-tonne payload OR 188 paratroopers. Short-field capability: lands on 915 m runway. Used in Op Kaveri (Sudan 2023), Op Ganga (Ukraine 2022), Op Dost (Turkey 2023), COVID vaccine/oxygen cylinder airlifts. Designated Indian AF's primary strategic airlifter.
- ▶ **C-130J Super Hercules:** 12 aircraft. Based at Hindan and Agra. Tactical airlift; ALL-weather, night-capable (NVG + FLIR). Can land on unimproved strips (800 m bare minimum). Special ops role: HALO/HAHO paratroop drops, force insertion. Carries Rolls-Royce AE2100D3 turboprop engines (most fuel-efficient C-130 variant).
- ▶ **C-295 (Airbus Spain / TASL Vadodara):** 56 total ordered. 16 from Airbus Spain (flight-ready, direct delivery). 40 to be built in India by Tata Advanced Systems Limited (TASL) at Vadodara, Gujarat — first military aircraft assembled under ToT in India. Replaces HS-748 Avro (retired 2020s). Carries 71 troops or 9 tonnes cargo. PM Modi laid foundation stone Oct 2022. Deliveries: 2023–2031 phased.
- ▶ **Il-78MKI (Ilyushin, Russia):** 6 aircraft. Aerial refuelling tanker (AAR). Refuels Su-30MKI, Mirage-2000, Rafale (Rafale has retractable probe). Extends IAF's strike radius dramatically. Based at Agra. Without AAR, Rafale range ~3,700 km combat; with AAR = theoretically unlimited. Critical force multiplier for long-range power projection.
- ▶ **Embraer EMB-145 AEW&C:** 3 aircraft. Airborne Early Warning and Control — flying radar platforms. Based at Bhopal. Swedish ERIEYE radar (range 400+ km). Can direct fighter intercepts; replace ground radar in tactical scenarios. IAF also orders additional platforms.
- ▶ **Boeing 737 AEW&C (Phalcon):** Israel's EL/W-2090 Phalcon AESA radar on Boeing 737 platform. 3 aircraft. Most powerful AEW&C in Asia. 360° surveillance; 500 km radar range. Classified as "force multiplier." Based at Bhopal.
- ▶ **MQ-9B Predator (General Atomics, USA):** 31 approved (7 for IAF; 16 for Navy; 8 for Army). HALE (High Altitude Long Endurance) UAV. Altitude 40,000 ft; endurance 40+ hours. Armed ISR (Intelligence, Surveillance, Reconnaissance) platform. Carries Hellfire missiles for precision strike. Rs 35,000 crore deal approved 2023. Deployment: maritime surveillance (IOR) and land ISR.
- ▶ **Heron & Heron TP (IAI, Israel):** MALE UAVs. Heron = ISR; Heron TP = weaponisable. IAF operates Heron Mk2 at forward bases including Ladakh. Endurance 52 hours; ceiling 35,000 ft. Used extensively on LAC post-Galwan for surveillance of Chinese positions.
- ▶ **Tapas BH-201 (DRDO):** India's own MALE UAV under development (DRDO + ADE). Engine: NPO Saturn 36MT. Has faced development delays. Target: replace Heron operationally. Trials ongoing at Aeronautical Test Range (ATR), Chitradurga, Karnataka.

IAF Training Aircraft & Aerobatic Teams

- ▶ **Hindustan Turbo Trainer HTT-40 (HAL):** Stage-I basic trainer. Indigenous. Replaced Pilatus PC-7 Mk.II (which had controversy over procurement). Two-seat; turboprop (Honeywell TPE331-12B). First flight 2016; production order for 70 aircraft placed 2022. Training at Elementary Flying School (EFS), Bidar, Karnataka and Air Force Academy (AFA), Dundigal.
- ▶ **Pilatus PC-7 Mk.II (Switzerland):** 75 aircraft. Current Stage-I trainer for cadet pilots at AFA Dundigal, Hyderabad. Being phased out as HTT-40 induction scales up. Swiss trainer has been controversial (defence offset issues).
- ▶ **Hawk-132 AJT (BAE Systems, UK):** 123 aircraft. Stage-III Advanced Jet Trainer for cadet pilots transitioning to fighter aircraft. HAL produces 50% of components. Powered by Rolls-Royce/Turbomeca Adour turbofan. Equipped with head-up display (HUD), HOTAS (Hands On Throttle And Stick) — same interface as fighter jets. Also used by Surya Kiran Aerobatic Team.
- ▶ **Kiran Mk.II (HAL):** Retired Stage-II jet trainer. Replaced by Hawk-132. Used by Surya Kiran before Hawk transition. Historic significance: Kiran was India's first fully indigenous jet trainer.
- ▶ **Surya Kiran Aerobatic Team (SKAT):** IAF's official display team. 9 aircraft in diamond/arrow formations. Hawk-132 jets. Named after the Sun (Surya). Perform at Aero India, Republic Day, international air shows. Ambassadors for IAF recruitment and national pride. Fly formations as tight as 1.8 m wingtip separation.
- ▶ **Sarang Helicopter Display Team:** IAF's helicopter aerobatics team. HAL Dhruv Advanced Light Helicopter (ALH). 4-helicopter formation. Named after the Sarang bird of Indian mythology. Unique: world's only national helicopter aerobatic display team flying at high altitude. Perform at altitudes up to 14,000 ft (demonstrated over Siachen). 120+ formations. Precision: 2-second timing in aerobatic manoeuvres.

2. IAF Commands — Detailed

All 7 IAF Commands with Strategic Role

- ▶ **Western Air Command (WAC):** HQ: Subroto Park, New Delhi. Covers: Punjab, Haryana, J&K, Himachal Pradesh, Rajasthan (northern portion). Primary threat: Pakistan's PAF. Key bases: Ambala (Rafale HQ, No.17 Sqn), Pathankot, Adampur, Awantipur, Srinagar, Leh (Kushok Bakula Rimpochee Airport — world's highest airfield at 3,256 m). Responsible for air defence of New Delhi.

- ▶ **Central Air Command (CAC):** HQ: Bamrauli, Prayagraj (Allahabad). Covers: UP, MP, Bihar, Jharkhand. Strategic airlift hub. Key bases: Gorakhpur, Gwalior (Mirage-2000; No.1 and No.7 Sqs), Agra (transport & tanker; C-17, Il-78), Hindan (C-17 and Su-30MKI; also India's VVIP airport for some official flights).
- ▶ **Eastern Air Command (EAC):** HQ: Shillong, Meghalaya. Covers: ALL seven states of Northeast India + entire China LAC border. Most geographically challenged command. Key bases: Tezpur, Chabua (Assam; Su-30MKI), Jorhat, Bagdogra (West Bengal), Hashimara (West Bengal; No.101 Sqn Rafale "Falcons" — positioned facing Doklam/China). Post-Galwan 2020: significantly strengthened; additional aircraft deployed; Mig-29 UPG at Adampur + Su-30MKI rapid-deployment capability.
- ▶ **Southern Air Command (SAC):** HQ: Thiruvananthapuram, Kerala. Covers: Peninsular India (AP, Telangana, TN, Kerala, Karnataka), Lakshadweep, Andaman & Nicobar Islands. Key bases: Sullur, Coimbatore (Tamil Nadu; Tejas Mk1 Sqs; HAL near for support), Tambaram (Chennai), Yelahanka (Bengaluru; Aero India venue), Begumpet (Hyderabad), Car Nicobar (Andaman — strategic for Bay of Bengal). Largest command by geography (includes A&N islands which are 1,200 km from mainland).
- ▶ **South-Western Air Command (SWAC):** HQ: Gandhinagar, Gujarat. Covers: Rajasthan (desert border with Pakistan), Gujarat. Key bases: Jodhpur (Apache attack helicopters for Army; IAF desert training), Nal, Uttarlai, Bhuj, Jaisalmer, Jamnagar (Jaguar maritime; anti-ship role), Bhisiana. Desert warfare expertise; longest border sector with Pakistan.
- ▶ **Maintenance Command (MC):** HQ: Nagpur, Maharashtra. Largest command by manpower and area. Manages all base repair depots (BRDs) across India. Major BRDs: No.1 BRD Kanpur (Avro, Jaguar MRO), No.3 BRD Chandigarh (helicopters), No.5 BRD Sullur (Tejas spares). Overhauls fighters, engines, airborne weapons, electronics. Longest tenures for technical officers.
- ▶ **Training Command (TC):** HQ: Bengaluru, Karnataka. Manages ALL flying training academies and technical training institutions. Flying training: EFS Bidar, Air Force Academy (AFA) Dundigal, Flying Training Establishments (FTEs). Technical training: ASTE (Aircraft & Systems Testing Establishment, Bengaluru — test pilots and flight test engineers), Institute of Armament Technology (IAT), ATC at Jalahalli. AFA Dundigal is where AFCAT officers receive initial training after commission.

3. Air Exercises — Exhaustive List

All IAF Air Exercises with Key Details

- ▶ **GARUDA (India – France):** Bilateral air exercise. IAF Rafale + French Air & Space Force Rafale. Held alternately in India and France. Focus: air combat manoeuvring, strike missions,

BVR combat, air-to-air refuelling interoperability. Significant since both sides now fly same Rafale aircraft – rare inter-service Rafale-vs-Rafale training against friendly adversaries.

- ▶ **VEER GUARDIAN (India – Japan):** *First-ever bilateral India-Japan air exercise (2023 debut, Hyakuri Air Base, Japan).* IAF Su-30MKI + JASDF F-2 and F-15J. Focus: beyond visual range combat, air sovereignty, interoperability. Landmark: Japan's Air Self-Defence Force (JASDF) and IAF have historically had minimal interaction; this signifies deepening Japan-India security ties.
- ▶ **DESERT KNIGHT (India – France – UAE):** Trilateral air exercise (started as bilateral India-France, UAE added). Desert terrain; IAF Rafale + French Rafale + UAE F-16 Block 60 (Desert Falcon) and Mirage-2000-9. Focus: long-range strike coordination, desert operations, combined air operations. Held in UAE/Oman airspace region.
- ▶ **COPE INDIA (India – USA):** IAF vs USAF. Focus: large-force air combat manoeuvring (LFACM). Su-30MKI vs USAF F-15C/D Eagles. Historically significant: 2004 edition saw IAF Su-30 pilots score 90% mission success against USAF F-15 – shocked USA; led USA to upgrade F-15s with AIM-120C-7 AMRAAMs. Now uses Rafale and F-22/F-35 assets from US side.
- ▶ **RED FLAG (USA-led, multilateral, Nellis AFB Nevada):** World's premier large-force air combat exercise. IAF participates with Su-30MKI (since 2008) and recently Rafale. Simulates Day 1 through Day 10 of a major air war. IAF Su-30MKI performed exceptionally in 2008 Red Flag. Participation gives pilots experience of operating in dense, multi-threat environments with allied air forces.
- ▶ **EASTERN BRIDGE (India – Oman):** Bilateral air exercise at Al Masirah Island, Oman and Tezpur, India alternately. IAF Mirage-2000 and Jaguar + Oman Air Force F-16 and Hawk. Focus: desert operations, maritime patrol over Arabian Sea, air superiority. India-Oman defence ties are robust (Oman allows Indian naval access to Duqm port).
- ▶ **TIGER TRIUMPH (India – USA, Tri-service):** India's first tri-service HADR exercise. IAF provides airlift (C-17, C-130J), airdrop capability, CASEVAC. USAF provides similar. Focus: interoperability in disaster scenarios – coordination between air, land, sea components of both nations.
- ▶ **AIR WARRIOR (India – USA, specific IAF-USAF):** Fighter pilot exchange. IAF pilots fly USAF simulators; USAF pilots interact with IAF. Builds tactical level interoperability. Distinct from Cope India (Cope India = actual airborne exercise; Air Warrior = tactical exchange).
- ▶ **SIAM BHARAT (India – Thailand):** Bilateral air exercise. IAF + Royal Thai Air Force. Focus: interdiction, COIN, air superiority. Reflects India's "Act East" policy in ASEAN.
- ▶ **SHAKTI (India – France, Land but IAF component):** Primarily Army exercise but IAF provides close air support, helicopter assault, strategic air transport in combined arms scenarios. Rafale (IAF) + French ground forces integration.

4. IAF Operations – Complete History

Humanitarian & Combat Operations

- ▶ **Operation Kaveri (Apr–May 2023):** Sudan civil war evacuation. 3,862 Indians evacuated. Aircraft: C-130J (primary; operated from Jeddah, KSA; flew into Wadi Seidna airbase Khartoum during ceasefire windows). Complexity: IAF flew under active fire risk, ceasefire windows of 2–4 hours. Multiple sorties. One of IAF's most challenging peacetime evacuations. Indian Navy INS Sumedha also evacuated people via Port Sudan.

- ▶ **Operation Dost (Feb 2023):** Turkey–Syria earthquake aid (7.8 magnitude, Kahramanmaraş, Feb 6, 2023). Aircraft: C-130J and C-17 Globemaster. Carried: NDRF rescue teams, medical personnel, tents, food, medicines. Multiple sorties. India amongst first nations to respond. Part of India's "Neighbourhood Plus" and global humanitarian positioning.

- ▶ **Operation Ganga (Feb–Mar 2022):** Ukraine war evacuation. 22,500+ Indians brought home. Aircraft: C-17 Globemaster operated from Bucharest (Romania), Budapest (Hungary), Rzeszów (Poland) as airspace over Ukraine was closed. 90+ IAF sorties. India ran simultaneous air and road evacuation (overland to Poland/Hungary/Romania then IAF flights). Largest IAF peacetime evacuation at the time.

- ▶ **Operation Rahat (Apr 2015):** Yemen civil war evacuation. 5,600 Indians + 960 foreign nationals from 48 countries. IAF C-17 operated from Djibouti (Africa). Flew over active conflict zone to Sana'a and Aden airports. Indian Navy INS Sumitra and INS Mumbai also participated. IAF's highest complexity pre-Kaveri evacuation.

- ▶ **Operation Maitri (Apr 2015):** Nepal earthquake relief (7.9 magnitude). IAF IL-76, An-32, Mi-17V5, Chinook, ALH deployed. Operated from Kathmandu and Pokhari airfields. Rescued 5,188 people; transported 2,211 tonnes of relief material. IAF's largest HADR operation in the subcontinent.

- ▶ **Balakot Airstrike (26 Feb 2019):** IAF Mirage-2000 jets (12 aircraft) struck Jaish-e-Mohammed training facility at Balakot, Khyber Pakhtunkhwa, Pakistan. SPICE-2000 precision-guided bombs used (Israeli-origin; GPS + image guidance; no guidance pod needed). IAF overflew LoC at night in radio silence. First strike inside Pakistani territory since 1971 war. Next day: Pakistan Air Force retaliated; dogfight occurred; Wg Cdr Abhinandan Varthaman's MiG-21 Bison shot down an F-16 (confirmed by AMRAAM casing recovery) before being downed by BVR missile. Abhinandan captured, returned via Wagah in 48 hours (diplomatic pressure). Decorated with Vir Chakra.

- ▶ **Operation Meghdoot (1984–ongoing):** IAF's sustained operation to maintain India's position on Siachen Glacier (world's highest battlefield). Advanced Light Helicopter (ALH) Dhruv and Mi-17V5 supply troops at altitudes up to 6,400 m. Cheetah helicopter (now being replaced by ALH) has been IAF's workhorse for Siachen decades. Unique challenge: engines lose 25% power at Siachen altitudes; blades ice up. IAF conducts 1,000+ sorties annually to supply 3,000+ troops.

- ▶ **COVID-19 Response (2020–2021):** IAF mobilised C-17 and C-130J for importing oxygen concentrators, Remdesivir, vaccines from multiple nations (USA, UK, UAE, Singapore). Over

6,000 tonnes of medical equipment airlifted. MI-17 helicopters dropped relief in flood-affected areas. Agniveer-era transition planning also affected by COVID delays.

5. DRDO Aerospace & Air Defence Systems

● DRDO Systems — IAF Relevant

- ▶ **RUDRAM-1 (Anti-Radiation Missile):** India's first indigenous ARM. DRDO/DRDO BDL. Passive radar seeker: homes onto enemy radar emissions. When enemy activates air defence radar, RUDRAM locks onto the emission source and destroys it. Role: SEAD (Suppression of Enemy Air Defences) and DEAD (Destruction of Enemy Air Defences). Launched from Su-30MKI. Range: 100–250 km (depending on launch altitude). RUDRAM-2 (range 300+ km) under development. Export potential: UAE, SE Asia nations.
- ▶ **Astra Mk1 (BVR AAM — Air-to-Air):** DRDO. Range: 70–80 km (BVR); active radar seeker terminal homing. Launched from Su-30MKI and Tejas Mk1A. Integrated from 2020. Astra Mk2 (active radar + IIR dual seeker; range 150+ km; comparable to Meteor) under testing. Astra Mk3 (beyond-BVR; 300+ km) conceptual. India currently also uses R-77 (Russian), Derby (Israeli), Python-5 (Israeli), Meteor (French with Rafale). Astra Mk1 makes IAF partially self-reliant in AAMs.
- ▶ **SPICE-2000 (Israel):** Precision guidance kit converting Mk-83 (1,000 lb) free-fall bombs into GPS + Electro-Optic image-guided munitions. 60 km standoff range. Used in Balakot strike. No external pod needed; guidance kit attaches to bomb tail. India procured additional stocks post-Balakot. IAF Mirage-2000 and also compatible with Jaguar and Tejas.
- ▶ **BrahMos Air-Launched (ALBM):** Supersonic cruise missile (Mach 2.8). Air-launched from Su-30MKI (purpose-modified hardpoint). Range 450 km (air-launched from high altitude — extra range vs ship/land launch). Can strike both land and sea targets. Two variants: land-attack (INS-GPS guided) and anti-ship (active radar seeker). Su-30MKI + BrahMos = force multiplier for Indian Ocean strike capability. BrahMos-NG (Next Gen; lighter, same range) for Tejas and other smaller platforms under development.
- ▶ **HSTDV (Hypersonic Technology Demonstrator Vehicle):** Scramjet-powered hypersonic vehicle. DRDO tested Sep 2020 at Balasore (Odisha) from a missile carrier. Achieved Mach 6 for 21 seconds at 32 km altitude. Will lead to: hypersonic cruise missiles (6,000+ km/h), hypersonic glide vehicles. India in elite club with USA, Russia, China in scramjet-powered hypersonic tech. Practical weapon in 5–10 years.
- ▶ **Akash Missile System:** Surface-to-Air Missile for air defence of IAF bases and military assets. Akash Mk1S (active seeker, improved): Range 40 km. Akash-NG (Next Generation): Range 80 km, active AESA seeker, better manoeuvring for defeating BVR missiles. Protects IAF airbases from enemy aircraft and cruise missile attacks. Exported to Mauritius, Philippines interested, Armenia purchasing.

- ▶ **Air Defence Layering (IAF + Army):** India's air defence architecture: S-400 (Russia) = Very Long Range (400 km; strategic air defence of major cities/military installations); Akash-NG = Medium Range (80 km; mobile field air defence); QRSAM (Quick Reaction SAM) = Short Range (25 km; army field units); VSHORADS = Very Short Range (man-portable, 6 km; last-ditch MANPADS against low-fliers, drones).
- ▶ **DARE (Directorate of Airborne Systems – DRDO):** Develops electronic warfare systems for IAF. Programmes: TEMPEST (EW jammer pod for Jaguar), Tarang Mk.III (Radar Warning Receiver for Su-30MKI), ELTA EW suites collaboration. DARE products protect IAF aircraft by detecting, jamming, deceiving enemy radar and missiles.

6. IAF Milestones, Records & Appointments

IAF Firsts, Records & Current Leadership

- ▶ **IAF Founded: 8 October 1932** as Royal Indian Air Force. Became IAF (dropped "Royal") on 26 January 1950 (Republic Day). **Air Force Day: 8 October every year.** IAF completed 90 years in 2022; 91 years in 2023. World's 4th largest air force by aircraft numbers.
- ▶ **Chief of Air Staff (CAS):** Air Chief Marshal A.P. Singh. Appointed **September 2024.** Succeeded Air Chief Marshal V.R. Chaudhari. Fighter pilot background; Su-30MKI and Mirage-2000 experienced. 5,000+ flying hours. Advocates strongly for Tejas Mk1A induction. His priority: bridging the squadron strength gap (currently ~32 squadrons vs sanctioned 42 squadrons).
- ▶ **Women in IAF:** 2016: First three women fighter pilots commissioned — Flt Lt Avani Chaturvedi, Flt Lt Bhawana Kanth, Flt Lt Mohana Singh. Feb 2018: Flt Lt Avani Chaturvedi became *first Indian woman to fly solo in a fighter jet* (MiG-21 Bison, Jamnagar). 2022: IAF opened all branches (including Ground Duty Technical, Ground Duty Non-Technical, Meteorology) to women through AFCAT. Permanent Commission for all AFCAT women officers (not just SSC). 2023: First woman officer to command an IAF fighter base being planned. IAF is considered India's most progressive service on gender integration.
- ▶ **Agniveer Vayu (IAF Agniveer):** Agnipath scheme (Jun 2022). 4-year service; age 17.5–21 (23 for some batches). 25% permanently retained as Airmen. Seva Nidhi on exit: Rs 11.71 lakh (tax-free). Agniveer Vayu = IAF's airmen-level Agniveer. AFCAT officers (you, the aspirant) are SEPARATE from Agniveer — AFCAT is for commissioned officers only (not affected by Agnipath).
- ▶ **Squadron Strength:** IAF currently has ~32 operational fighter squadrons vs sanctioned strength of 42 squadrons (gap of 10 squadrons). Target to reach 42 by 2030s with Tejas Mk1A, Mk2, Rafale, and AMCA inductions.
- ▶ **Aero India 2023:** 14th edition. Yelahanka AFS, Bengaluru. 98 countries, 809 exhibitors, 131 MoUs. Theme: "The Runway to a Billion Opportunities." Showcased Tejas Mk1A prototype,

Prachand LCH, Rudram-1, Akash-NG. HAL signed deals with several nations for helicopter supply.

- ▶ **IAF at Siachen:** Highest combat sortie record: Mi-17 V5 helicopter operating at 6,400 m above sea level at Siachen. Cheetah helicopter replaced by ALH Dhruv (HAL). Engine performance in thin air = critical limiting factor. IAF operates Siachen Base Camp at 3,620 m.
- ▶ **Tejas First Carrier Landing:** February 2023 — Tejas NP-2 (Navy prototype) successfully landed on INS Vikrant (indigenous carrier). Historic: first time an Indian fighter landed on an Indian-built aircraft carrier. Opened the path for LCA Navy Mk2 (twin-engine naval variant).

CHIEF OF AIR STAFF (CAS)

Air Chief Marshal A.P. Singh

Appointed Sep 2024. 5,000+ flying hours. Su-30MKI & Mirage-2000 background. Focus: Tejas Mk1A induction, IAF self-reliance, bridging squadron gap.

CHIEF OF DEFENCE STAFF (CDS)

General Anil Chauhan

Appointed Oct 2022; 2nd CDS (1st was Gen Bipin Rawat). Theatre Command restructuring across all 3 services; Air Defence Command and Maritime Theatre Command proposed.

IAF FOUNDED + AIR FORCE DAY

8 October 1932 | 8 October

Became IAF (dropped "Royal") on 26 Jan 1950. 4th largest air force globally. ~1,400 aircraft; ~1.4 lakh personnel. 32 of sanctioned 42 fighter squadrons.

AFA (AIR FORCE ACADEMY)

Dundigal, Hyderabad (Telangana)

Where AFCAT-selected officers receive initial commissioning training. PC-7/HTT-40 basic flying. Hawk AJT advanced. Passing-out parade = Graduation Day. 143 Wing responsible for flying training.



IAF & Defence — AFCAT Actual Pattern Questions (2019–2024) with Full Explanations

Q1. Surya Kiran, the IAF aerobatic display team, currently uses which aircraft? (AFCAT 2/2023)

(a) Tejas Mk1 (b) BAE Hawk-132 (c) Kiran Mk.II (d) Mirage-2000

Answer: (b) BAE Hawk-132

Surya Kiran Aerobatic Team (SKAT) transitioned from HAL Kiran Mk.II to BAE Hawk-132 Advanced Jet Trainer (AJT). Hawk-132 is India's Stage-III trainer for fighter pilots. 9 aircraft in formation; wingtip separation as tight as 1.8 m. Tejas Mk1 is a front-line fighter (not used by aerobatic team). Sarang team (helicopters) uses HAL Dhruv ALH. Kiran was retired from Surya Kiran in 2015 when Hawk transition was complete.

Q2. Operation Kaveri (2023) was an IAF evacuation operation from which country, and which aircraft primarily flew the sorties? (AFCAT 1/2024)

(a) Ukraine; C-17 Globemaster (b) Sudan; C-130J Super Hercules (c) Turkey; Il-76 (d) Afghanistan; C-295

Answer: (b) Sudan; C-130J Super Hercules

Operation Kaveri (April–May 2023): Sudan civil war. C-130J aircraft operated from Jeddah, Saudi Arabia — flew into Wadi Seidna airbase (Khartoum) during brief ceasefire windows. 3,862 Indians evacuated. C-130J (not C-17) because C-130J can operate from shorter, more austere airfields in crisis zones. Operation Ganga (2022) = Ukraine; used C-17. Op Dost (2023) = Turkey earthquake relief; used C-17 and C-130J. C-295 not yet delivered (still in induction phase).

Q3. IAF's Eastern Air Command is headquartered at which city, and what makes it strategically significant? (AFCAT 2/2022)

(a) Guwahati; covers Bangladesh border (b) Shillong; covers entire Northeast India and China LAC border (c) Kolkata; covers West Bengal and Odisha coast (d) Itanagar; covers Arunachal Pradesh only

Answer: (b) Shillong, Meghalaya; covers all 7 Northeast states and the entire China LAC border

Eastern Air Command (EAC) has its HQ at Shillong and is IAF's most geographically challenged command. It covers the LAC (Line of Actual Control) with China which runs from Arunachal Pradesh through Sikkim. Key bases include Tezpur, Chabua (Su-30MKI), Bagdogra, and Hashimara (Rafale No.101 Sqn "Falcons" positioned facing China). Post-Galwan 2020, EAC was significantly reinforced with additional aircraft and infrastructure.

Q4. RUDRAM-1 is India's first indigenous anti-radiation missile. Which aircraft launches it and what is its primary role? (AFCAT 1/2024)

(a) Rafale; targets surface ships (b) Su-30MKI; destroys enemy air defence radar systems (SEAD) (c) Tejas Mk1; beyond visual range air combat (d) Mirage-2000; precision ground strikes

Answer: (b) Su-30MKI; Suppression/Destruction of Enemy Air Defences (SEAD/DEAD) by homing onto and destroying enemy radar systems

RUDRAM-1 (DRDO/BDL): passive radar seeker homes onto enemy radar emissions. When the adversary activates their radar to track IAF aircraft, RUDRAM locks onto that emission and destroys the antenna. This "blinds" enemy air defence, opening corridors for IAF strike aircraft. Range: 100–250 km. Launched from Su-30MKI from standoff distance. RUDRAM-2 (300+ km) under development. This is a critical SEAD weapon India previously lacked and relied on Israel for (AGM-78/AGM-88 equivalents).

Q5. Which IAF squadron operates the Rafale in the Eastern Sector facing China, and at which base? (AFCAT 2/2023)

(a) No. 17 Sqn "Golden Arrows" at Ambala (b) No. 101 Sqn "Falcons" at Hashimara (c) No. 45 Sqn "Flying Daggers" at Sulur (d) No. 7 Sqn "Battle Axes" at Gwalior

Answer: (b) No. 101 Squadron "Falcons" at Hashimara, West Bengal

India has two Rafale squadrons: No. 17 Sqn "Golden Arrows" at Ambala (Haryana, Western Sector facing Pakistan) and No. 101 Sqn "Falcons" at Hashimara (West Bengal, Eastern Sector facing China near Doklam/Sikkim). Hashimara was specifically chosen for its proximity to the LAC with China. No. 45 Sqn at Sulur operates Tejas Mk1. No. 7 Sqn at Gwalior operates Mirage-2000.

Q6. Aero India 2023 was the 14th edition. At which IAF station was it held, and what was the stated theme? (AFCAT 1/2024)

(a) Hindan AFS, New Delhi; "India Soars High" (b) Yelahanka AFS, Bengaluru; "The Runway to a Billion Opportunities" (c) Sulur AFS, Coimbatore; "Wings of Atma Nirbhar Bharat" (d) Tambaram AFS, Chennai; "Skies Unlimited"

Answer: (b) Yelahanka Air Force Station, Bengaluru; "The Runway to a Billion Opportunities"

Aero India 2023 (14th edition, February 2023): Yelahanka AFS is the permanent venue for Aero India. It is Asia's largest aerospace and defence exhibition. 2023 edition: 98 countries, 809 exhibitors, 131 MoUs/Lols signed. Featured live fly-bys of Tejas, Prachand LCH, Dornier-228, Rafale. HAL signed agreements for Dhruv supply and tejas upgrades. DefExpo (different event, land & naval) is held at other locations (Gandhinagar 2022, Lucknow 2020).

Q7. The Balakot airstrike (February 2019) used which precision weapon, and which IAF aircraft carried it? (AFCAT 2/2022)

(a) BrahMos cruise missile; Su-30MKI (b) SPICE-2000 precision bombs; Mirage-2000 (c) RUDRAM anti-radiation missile; Su-30MKI (d) Astra BVR missile; Tejas Mk1

Answer: (b) SPICE-2000 precision-guided bombs; Mirage-2000

12 IAF Mirage-2000 jets (No. 1 Sqn "Tigers" and No. 7 Sqn "Battle Axes", both from Gwalior) carried Israeli SPICE-2000 (Smart, Precise Impact, Cost-Effective) precision guidance kits. SPICE converts free-fall Mk-83 (1,000 lb) bombs into 60 km standoff GPS + EO-guided weapons. IAF crossed the LoC at night; conducted the strike in radio silence; returned without any aircraft loss. The following day's aerial engagement: Wg Cdr Abhinandan Varthaman's MiG-21 Bison downed a Pakistani F-16 using R-73 IR missile before Abhinandan was shot down by BVR missile.

Q8. Exercise Veer Guardian (2023) was first ever of its kind for IAF. What made it unique? (AFCAT 1/2024)

(a) First IAF exercise in Africa (b) First-ever bilateral air exercise between IAF and Japan Air Self-Defence Force (JASDF) (c) First IAF exercise using only Rafale jets (d) First IAF

exercise in the Arctic region

Answer: (b) First-ever bilateral air exercise between IAF and Japan Air Self-Defence Force (JASDF)

Veer Guardian 2023 was held at Hyakuri Air Base, Japan. IAF flew Su-30MKI jets to Japan; JASDF flew F-2 and F-15J jets. Focus: BVR combat, air superiority, interoperability. This was a landmark in India-Japan defence ties, reflecting the Comprehensive Global Partnership between the two nations. The exercise name: "Veer" (brave/warrior in Hindi/Sanskrit) + "Guardian" (protector). Japan has historically been a major ODA (Official Development Assistance) provider for India's bullet train project.

TRICKY QUESTIONS

IAF — Multi-Layer AFCAT Analysis

T1. An AFCAT question says: "Sarang flies HAL Dhruv; Surya Kiran flies Hawk-132; both are IAF teams. The Hawk is also used for training." Which statement is incorrect?

All three facts are correct, but the link needs precision:

Sarang: HAL Advanced Light Helicopter (ALH Dhruv) — helicopter aerobatics team.

Correct.

Surya Kiran: BAE Systems Hawk-132 (AJT) — fixed-wing aerobatics. Correct.

Hawk as trainer: Hawk-132 IS used for Stage-III Advanced Jet Training at Flying Training Establishments (Bidar, Hakimpet) before pilots convert to fighter jets. Correct.

AFCAT trap version: If asked "Which IAF trainer aircraft does Surya Kiran use?" — answer is Hawk-132, which is a trainer repurposed for aerobatics. It is NOT a fighter jet. Common confusion: students think aerobatic teams use combat jets (like the Blue Angels use F/A-18). IAF uses a trainer for its team.

T2. Wg Cdr Abhinandan Varthaman downed a Pakistani F-16 with a MiG-21 Bison. Why is MiG-21 Bison downing an F-16 considered surprising, and what weapon did he use?

Why surprising: F-16 (4th generation, AESA-equipped, AMRAAM BVR missiles, fly-by-wire) is vastly superior in technology to MiG-21 Bison (originally 1950s design; Bison upgrade added R-77 BVR and Kopyo radar but it remains a basic airframe). F-16 is 4th gen; MiG-21 Bison is 2nd/3rd gen. The matchup = 1950s jet modified vs 1970s jet (current standard). Most aviation analysts considered a MiG-21 killing an F-16 in BVR combat improbable.

Weapon used: R-73 IR-guided close-combat missile (NOT BVR). Abhinandan manoeuvred into close range and fired R-73, which homed on F-16's engine heat. AMRAAM casing found on Indian side = Pakistan fired AMRAAM; India recovered physical evidence confirming F-16 participation (Pakistan denied this).

Outcome: Abhinandan's MiG was hit by a BVR missile (likely AMRAAM). He ejected into

Pakistani territory. Returned via Wagah border in 48 hours after diplomatic pressure.
Awarded Vir Chakra.

 **T3. What is the difference between Tejas Mk1, Mk1A, and Mk2 in terms of the IAF's fleet plan?**

Tejas Mk1: Initial production; 40 delivered (16 FOC + 16 IOC + 8 trainers LCA-T). Basic radar (EL/M-2032 mechanically-scanned). No IFR probe standard. 2 squadrons at Sullur. No further orders. Being used for operational experience-building with Tejas type.

Tejas Mk1A: 83 aircraft ordered (largest HAL contract). AESA radar (EL/M-2052), IFR probe, advanced EW suite (full DRDO package), Link-16 datalink. Same GE-F404 engine. *This is the primary MiG-21 replacement.* Orders may increase to 97 or 180 aircraft based on IAF projections. First delivery expected 2025; full induction by ~2031.

Tejas Mk2 (LCA-21): New, larger airframe (+14 cm fuselage). GE-F414 engine (USA; ToT agreed 2023). 5 hardpoints more than Mk1A. Higher range, payload, supercruise potential. *This will replace Mirage-2000 and Jaguar squadrons.* Not yet in production; first prototype ~2026; production ~2030.

AFCAT summary: Mk1 = current (limited); Mk1A = 83 ordered, main MiG replacement; Mk2 = future Mirage replacement, GE-F414 engine, ToT from USA.

Rapid Revision – CFA01 IAF & Defence

➔ Fighters (Quick)

- ∴ Rafale: 36; Ambala (No.17) + Hashimara (No.101)
- ∴ Su-30MKI: ~260; backbone; BrahMos ALBM
- ∴ Tejas Mk1A: 83 ordered; AESA radar; replaces MiG-21
- ∴ Tejas Mk2: GE-F414 (ToT USA); replaces Mirage
- ∴ AMCA: 5th gen stealth; under development
- ∴ Mirage-2000: Gwalior; Balakot; phasing out

➔ Exercises (Quick)

- ∴ GARUDA = India-France (Rafale bilateral)
- ∴ VEER GUARDIAN = India-Japan (1st ever; 2023)
- ∴ DESERT KNIGHT = India-France-UAE (trilateral)
- ∴ COPE INDIA = India-USA (Su-30 vs F-15)
- ∴ RED FLAG = USA multilateral (IAF participates)
- ∴ EASTERN BRIDGE = India-Oman (desert/maritime)

Operations (Quick)

DRDO + IAF Facts

- Op Kaveri (2023): Sudan; C-130J; 3,862 evacuated
- Op Dost (2023): Turkey earthquake; C-17
- Op Ganga (2022): Ukraine; C-17; 22,500 evacuated
- Op Rahat (2015): Yemen; C-17; 5,600 evacuated
- Balakot (2019): Mirage-2000; SPICE-2000
- Op Meghdoot (1984-): Siachen; ALH Dhruv

- RUDRAM-1: anti-radiation; Su-30MKI; SEAD role
- BrahMos ALBM: 450 km; Su-30MKI; supersonic
- Astra Mk1: BVR AAM; 70-80 km; DRDO
- Surya Kiran = Hawk-132 | Sarang = HAL Dhruv
- IAF founded: 8 Oct 1932; Air Force Day = 8 Oct
- AFA = Dundigal, Hyderabad (where AFCAT officers train)

⚡ Quick Booster – CFA01

Aircraft Quick-Fire

- Rafale No.17 = Ambala (Pakistan front)
- Rafale No.101 = Hashimara (China front)
- Tejas = HAL; AESA radar on Mk1A
- Surya Kiran = Hawk-132 (NOT Tejas)
- Sarang = HAL Dhruv helicopter
- MiG-21: phased out 2025; 60+ year service

Commands (7 Total)

- Western = Delhi (Pakistan/J&K)
- Eastern = Shillong (China LAC; all NE)
- Southern = Thiruvananthapuram
- South-Western = Gandhinagar (Rajasthan)
- Central = Prayagraj (Agra/Gwalior bases)
- Maintenance = Nagpur | Training = Bengaluru

AFCAT Traps

- Op Kaveri = Sudan (NOT Ukraine)
- Op Ganga = Ukraine (NOT Sudan)
- Veer Guardian = India-Japan (NOT India-USA)
- Balakot = Mirage-2000 + SPICE-2000
- RUDRAM = SEAD; NOT air-to-air
- Tejas Mk1A replaces MiG-21; Mk2 replaces Mirage



AFCAT Mock Tests



AFCAT Quizzes



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