

## Welfare (1)

• **CDSCO approves India's first dengue vaccine (Qdenga)**

**Body:** CDSCO / Ministry of Health

**Detail:** Qdenga = live-attenuated tetravalent (all 4 DENV serotypes); dengue spread by the day-biting Aedes aegypti (breeds in clean water); vaccines create active immunity via antibodies

**Exam hook:** Live-attenuated vs killed vs subunit vs mRNA; herd immunity; DCGI heads CDSCO

## Defence (2)

• **INS Malvan commissioned — Mahe-class ASW Shallow Water Craft**

**Body:** Indian Navy

**Detail:** 2nd Mahe-class ASW-SWC, built by Cochin Shipyard, commissioned at Karwar; anti-submarine warfare uses sonar (sound travels far in water) + torpedoes/depth charges

**Exam hook:** Warship order carrier > destroyer > frigate > corvette > craft; INS Vikrant = 1st indigenous carrier; Arihant = nuclear-triad submarine

• **Indian Coast Guard rescues 170 in Gujarat floods**

**Body:** Indian Coast Guard / Ministry of Defence

**Detail:** ICG = India's 4th armed force (est. 1978, under the Ministry of Defence), motto 'Vayam Rakshamah'; roles = EEZ protection, search & rescue, anti-smuggling, coastal security

**Exam hook:** 3-tier coastal grid — Navy (outer), Coast Guard (EEZ), marine police (coast); zones 12/24/200 nm (UNCLOS)

## Environment (2)

• **Urban Heat Island (UHI) effect in Indian cities**

**Body:** Ministry of Housing & Urban Affairs

**Detail:** Cities warmer than rural areas (esp. at night) due to low-albedo concrete/asphalt, lost vegetation and waste heat; mitigate with green cover, cool roofs, water bodies

**Exam hook:** Albedo = reflectivity; evapotranspiration cools; NDMA Heat Action Plans; wet-bulb limits

• **India begins first deepwater appraisal well in the Mahanadi basin**

**Body:** Ministry of Petroleum & Natural Gas

**Detail:** Petroleum forms only in sedimentary rock (buried marine life), in reservoir rock under cap rock; India has ~26 sedimentary basins (Category I-IV); Mumbai High (ONGC 1974) = western offshore; KG & Mahanadi = eastern offshore

**Exam hook:** India imports ~85% of crude; Assam = oldest oil region (Digboi)

## Sci/Tech (7)

• **India's Pumped Storage Projects (the 'water battery')**

**Body:** Ministry of Power / CEA

**Detail:** Pump water to an upper reservoir with surplus power, release it at peak through reversible turbines to generate; energy chain potential->kinetic->mechanical->electrical; ~70-80% round-trip efficiency

**Exam hook:** PE = mgh; large-scale long-duration storage for renewables (500 GW non-fossil by 2030)

• **India assesses its Rare Earth Permanent Magnet demand to 2030**

**Body:** IREL / DMRL / BARC

**Detail:** Rare earths = 17 elements (15 lanthanides + Sc + Y); strongest permanent magnets = neodymium-iron-boron (NdFeB); vital for EV motors, wind turbines, electronics, defence; China dominates ~90% refining, ~95% magnets

**Exam hook:** India's reserves in monazite (beach sands, also thorium); IREL under DAE

• **Borophene demonstrated as a green lubricant additive**

**Body:** Ministry of Science & Technology

**Detail:** Borophene = a 2D sheet of boron (allotrope; cousin of graphene = 2D carbon); added to castor oil it cut friction ~40% (superlubricity); tribology = the science of friction/wear/lubrication

**Exam hook:** Boron = metalloid (element 5); graphene = carbon; 2020 Physics Nobel = graphene

• **Study maps aerosols and their radiative effects on climate**

**Body:** Ministry of Science & Technology

**Detail:** Aerosols = tiny particles suspended in air (dust, sea salt, soot, sulphates); dual effect — reflective ones (sulphates) COOL, dark ones (black carbon) WARM; measured as Aerosol Radiative Forcing

**Exam hook:** Distinct from greenhouse gases (which trap outgoing heat); South Asia = dust + pollution

• **BioE3 Policy progress (high-performance biomanufacturing)**

**Body:** Department of Biotechnology

**Detail:** BioE3 = Biotechnology for Economy, Environment & Employment (Cabinet Aug 2024); biomanufacturing = making products with cells/microbes/enzymes; six thematic sectors

**Exam hook:** Biotech colours — red (medical), green (agriculture), white (industrial), blue (marine); fermentation = oldest biotech

• **New nanofluid electrolyte for rechargeable zinc-air batteries**

**Body:** SASTRA University (Ministry of Science & Technology)

**Detail:** Zinc-air = a metal-air battery; zinc anode + oxygen drawn from air at the cathode + alkaline (KOH) electrolyte; high energy density, cheap/safe zinc; weakness = poor rechargeability (fixed by the new electrolyte)

**Exam hook:** Cell = anode + cathode + electrolyte; chemical -> electrical energy

• **Roundtable on reforming GM and gene-edited (GE) crop rules**

**Body:** ICAR / TAAS

**Detail:** GM/transgenic = a foreign gene inserted (Bt cotton — only approved GM crop); gene editing (CRISPR) edits the plant's own DNA; SDN1/SDN2 (no foreign DNA) exempted from GEAC rules (2022); SDN3 = GM

**Exam hook:** GEAC (apex GM regulator) under MoEF&CC; Bt = Bacillus thuringiensis

## Infra (1)

• **Anahat Singh wins the World Junior Squash Championship**

**Body:** —

**Detail:** First Indian ever to be crowned junior world champion in squash; trained under Saurav Ghosal; squash = four-walled court + hollow rubber ball; world body = WSF (pro tour = PSA)

**Exam hook:** Squash debuts at the LA 2028 Olympics; India's stars — Ghosal, Joshna Chinappa, Dipika Pallikal

## Other (1)

• **Soil health & conservation push (Soil Health Card, natural farming)**

**Body:** Ministry of Agriculture

**Detail:** Major soils — alluvial (most widespread, N. plains), black/regur (volcanic, best for cotton), red (crystalline rock, south), laterite (heavy rain); threats = erosion, salinisation, desertification

**Exam hook:** Soil profile A/B/C horizons; NPK macronutrients; World Soil Day 5 Dec