



Sambodh IAS (Beta)

UPSC CSE Mains 2026

General Studies Paper III

Model answer booklet · 20 questions

 Economy

 Science & Tech

 Environment



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Q01

10 marks · 150 words

Explain

What do you mean by Digital Rupee? In this context, explain the working and progress of India's Central Bank Digital Currency (CBDC).

Introduction. Digital Rupee (₹) is RBI-issued sovereign currency in digital form: legal tender and an RBI liability, equivalent to cash but unlike private crypto-assets. The Finance Act, 2022 amended the RBI Act, 1934 to enable its issue.

Working architecture

- RBI issues ₹ to selected banks, which distribute it to users. Retail CBDC is token-based, held in wallets, and transferred peer-to-peer or to merchants through QR codes.
- Wholesale CBDC is account-based and settles interbank and government-security transactions. Banks provide customer interface, while RBI controls issuance.

Progress in India

- RBI began the wholesale pilot in November 2022 and retail pilot in December 2022, expanding participating banks, wallets and use cases.
- Programmable ₹ can limit spending to a stated purpose. PMGKAY food-subsidy DBT will be piloted in Chandigarh and Dadra & Nagar Haveli from 14 August 2026.

Conclusion. Thus, ₹ can enable targeted and traceable transfers, provided privacy, interoperability and user adoption are secured.

Q02

10 marks · 150 words

Examine

Examine the view that financial inclusion is an integral part of social and economic inclusion in a country like India. Also throw light on the usefulness of the R.B.I.'s Financial Inclusion Index.

Introduction. Financial inclusion is affordable access to savings, credit, insurance, pensions and payments. In India, it converts equality under Articles 14 and 38 into economic agency; social and financial exclusion reinforce each other.

Link with social-economic inclusion

- PMJDY, Aadhaar-DBT and UPI connect women, migrants and remote households to transfers, curb leakages and reduce moneylender dependence.
- SHG-bank linkage, MUDRA, PMJJBY/PMSBY and APY enable livelihoods, risk cover and old-age security.
- Yet accounts alone do not suffice: EPW (2025) reports group disparities, relatively higher in urban India; digital divides and unsuitable credit reproduce exclusion.

Usefulness and limits of RBI FI Index

- RBI's 0–100 composite uses 97 indicators: access (35%), usage (45%) and quality (20%); it has no base year.
- It tracks progress beyond account counts, diagnoses weak dimensions and guides banks and SLBCs.
- But aggregate scores can mask district, gender and caste gaps and safe, adequate use.

Conclusion. FI is therefore necessary, not sufficient, for inclusive citizenship. Granular scores must be paired with literacy, consumer protection and connectivity.

Q03

10 marks · 150 words

Describe

Describe the various Technology Missions initiated in Indian agriculture and examine their role in food security.

Introduction. Technology Missions are focused, time-bound interventions that deliver a technology package—from seed and extension to processing and markets—for a specific agricultural constraint. Starting with the 1986 Technology Mission on Oilseeds (TMO), they sought to widen the Green Revolution's crop base.

Major missions

- TMO, expanded in 1990 into the Technology Mission on Oilseeds, Pulses, Maize and Oil Palm (TMOP), promoted improved varieties, price support and processing.
- Technology Mission on Cotton (2000) targeted productivity, quality and pest management; the Horticulture Mission for North-East and Himalayan States promoted high-value crops.
- National Food Security Mission (2007), National Mission for Sustainable Agriculture and Digital Agriculture Mission address cereals/pulses, climate resilience and precision advisory respectively.

Food-security contribution

- Higher yields and diversification improve availability beyond rice-wheat; pulse and oilseed missions reduce import vulnerability.
- Irrigation, soil-health measures, weather advisories and resilient varieties enhance stability amid droughts and pests.
- Better post-harvest technology, value chains and farmer incomes strengthen economic access to food.
- Yet, uneven extension, smallholder affordability, seed dependence and digital exclusion constrain outcomes; production gains do not automatically ensure nutrition.

Conclusion. Technology Missions have made food security more crop-diverse and technology-led. Their effectiveness requires convergent extension, public R&D and nutrition-sensitive procurement, especially of millets and pulses.

Sources: gktoday.in · vajiramandravi.com · impriindia.com · business-standard.com · livemint.com · pib.gov.in · biometricupdate.com

Q04

10 marks · 150 words

Explain

Explain the factors responsible for inefficiency of agri-produce marketing. How e-commerce helps to reduce inefficiency of agri-produce marketing? Explain.

Introduction. Agricultural marketing covers aggregation, grading, storage, transport and sale from farm-gate to consumer. Despite output growth, fragmented markets and information asymmetry depress farmers' price realisation and raise consumer prices.

Sources of inefficiency

- Small, dispersed holdings create low marketable surplus and weak bargaining power; farmers undertake distress sales after harvest.
- State APMC regimes, restrictive licences and mandi fees create local monopolies and multiple intermediaries; barriers impede inter-State trade.
- Inadequate rural roads, assaying, warehouses, cold chains and processing cause high perishability losses, especially in fruits and vegetables.
- Farmers lack real-time price, demand and quality information; opaque auctions, non-standard grades and delayed payments enable trader arbitrage.

How e-commerce addresses them

- e-NAM, launched in 2016 and implemented by SFAC, enables electronic bidding across linked mandis, expanding the buyer base and price discovery.
- Digital platforms disseminate prices, permits and payments, reducing search costs, cash leakages and intermediaries.
- Online aggregation by FPOs links farmers directly with processors, retailers and consumers; digital records facilitate traceability and credit.
- Assaying, standardisation, e-warehousing and logistics integration permit sale without physically moving produce immediately.

Conclusion. E-commerce is not a substitute for physical markets: uneven internet access and asymmetric quality testing still constrain arbitrage. Universal assaying, cold chains and FPO digital capacity must accompany e-NAM.

Sources: icrier.org · impriindia.com · link.springer.com · anantamias.com · inclusiveias.com · extension.psu.edu · jedvb.polteksci.ac.id · frontiersin.org · science-gate.com · alkfertilizers.com

Q05

10 marks · 150 words

Explain

Explain by giving two examples, how biotechnology has helped the Indian farmers in processing their perishable crops.

Introduction. Perishable horticultural produce deteriorates through respiration, microbial spoilage and enzymatic browning. Biotechnology converts such produce into stable, higher-value forms or suppresses post-harvest pathogens, thereby enlarging the farmer's marketing window.

Example 1: Mango value addition

- Pectinase and cellulase enzymes, commonly produced by microorganisms such as *Aspergillus niger*, break fruit-cell walls during pulping.
- They raise mango-pulp/juice recovery, reduce viscosity and clarify nectar; surplus mangoes can consequently be processed into pulp, juice and fruit leather rather than sold distressfully.
- ICAR's bio-smart approaches also employ bio-control agents and edible coatings to check post-harvest decay for distant markets.

Example 2: Banana processing

- Enzyme-assisted conversion of ripe banana into puree, beverage and fermented products prevents quick spoilage; unripe fruit can be processed into flour.
- Tissue-culture-derived uniform banana lots facilitate standardised industrial processing. NRCB's 2026 releases, Kaveri Thangam and Kaveri Nadan, have a 15-day shelf life, aiding aggregation and processing.

Conclusion. Thus, biotechnology links farm output with decentralised processing, reducing wastage and improving realisation. FPO-based enzyme/pulping units and cold chains can extend these gains to small growers.

Q06

10 marks · 150 words

Distinguish

Distinguish between a Fast Breeder Reactor (FBR) and a thermal nuclear reactor. In the context of first indigenously developed prototype FBR at Kalpakkam, explain the term 'criticality'. What are its implications for clean energy future of our country?

Introduction. India's 500 MWe Prototype Fast Breeder Reactor (PFBR) at Kalpakkam, developed by BHAVINI, is central to the second stage of Homi Bhabha's three-stage nuclear programme.

FBR vis-à-vis thermal reactor

- Thermal reactors use a moderator (heavy water/light water) to slow neutrons; FBRs sustain fission with high-energy neutrons and need no moderator.
- Thermal reactors chiefly fission U-235; an FBR uses Pu-239 fuel and converts fertile U-238 into more Pu-239, potentially breeding more fissile material than it consumes.
- Thermal reactors generally use water coolant; PFBR uses liquid sodium, enabling high-temperature operation but requiring stringent sodium-handling safety.

Criticality and clean-energy implications

- Criticality means a self-sustaining chain reaction: each fission, on average, produces one subsequent fission (effective multiplication factor, $k=1$). It marks transition from fuel loading/testing to controlled power generation.
- PFBR can multiply India's limited uranium resource, produce plutonium for subsequent breeders, and ultimately support thorium-to-U-233 utilisation.
- It offers firm, low-carbon electricity and can burn long-lived actinides, reducing high-level waste burden.

Conclusion. PFBR criticality is therefore a technological milestone for energy security and decarbonisation. Its gains require rigorous AERB oversight, reliable sodium systems, and safeguarded reprocessing to manage safety, cost and proliferation risks.

Q07

10 marks · 150 words

Discuss

Discuss how the contradiction between 'rapid infrastructure development' and 'disaster-risk reduction' in ecologically-sensitive areas of India can be managed, with suitable examples.

Introduction. Ecologically sensitive Himalaya, coasts and islands marry fragile systems with strategic connectivity needs. Roads, dams and tourism can amplify hazards; the answer is risk-

informed development, not a blanket freeze.

Conflict and evidence

- Hill cutting and muck dumping on Char Dham corridors destabilise slopes; the 2023 Sikkim GLOF showed cascading risk to Teesta-III hydropower.
- CRZ violations, mangrove loss and floodplain construction remove natural buffers; project-wise EIAs miss cumulative impacts.

Reconciling development with safety

- Mandate carrying-capacity, climate-risk and cumulative-impact assessments before clearance, applying the precautionary principle in *Vellore Citizens Welfare Forum*.
- Map no-build zones through hazard zonation; require geological appraisal, slope bioengineering, muck sites and mangrove/wetland buffers.
- Require NDMA/SDMA-vetted designs, early-warning evacuation links, audits and Gram Sabha participation.
- DEA-CDRI's 2026 RCBA finds up to \$12 benefit per \$1 resilience investment; incorporate lifecycle-resilience clauses in DPRs, contracts and finance.

Conclusion. Ecological limits must determine location and design; resilient, locally accountable infrastructure can deliver access without compounding disaster loss.

Sources: cdri.world · downtoearth.org.in · indianexpress.com · thehindubusinessline.com · thehindu.com · jwls.in · link.springer.com · snu.edu.in · iopscience.iop.org · news.mongabay.com

Q08

10 marks · 150 words

Discuss

Discuss the aim and goals of Kunming-Montreal global biodiversity framework. Mention India's commitments and initiatives to achieve the goals and targets of this framework giving suitable examples.

Introduction. The KMGBF, adopted at CBD COP-15 (2022), replaces Aichi Targets and seeks a world living in harmony with nature by 2050. It has four 2050 goals and 23 targets for 2030.

Aims and goals

- Goal A: maintain ecosystem integrity, connectivity and resilience; halt human-induced extinctions and retain genetic diversity.
- Goals B-C require sustainable use and fair benefit-sharing from genetic resources, including digital sequence information.
- Goal D seeks finance, technology and capacity. Key targets: conserve 30% land, inland waters and seas; restore 30% degraded ecosystems; curb invasive species and harmful subsidies.

India's alignment

- India's updated NBSAP (2024) has 23 national targets, including 30-by-30, restoration, sustainable consumption and biodiversity-inclusive planning.

- Protected Areas, Eco-Sensitive Zones and MISHTI operationalise conservation-restoration; Project Tiger illustrates species recovery.
- Biological Diversity Act, 2002, BMCs and PBRs enable community stewardship and ABS; LiFE promotes sustainable lifestyles.

Conclusion. Delivery needs financed State plans and measurable indicators. It must ensure community benefit-sharing.

Sources: cbd.int · dcceew.gov.au · en.wikipedia.org · unesco.org · pnas.org · biofin.org · civildaily.com · tandfonline.com · pmc.ncbi.nlm.nih.gov

Q09

10 marks · 150 words

Explain

Explain how fake news and disinformation pose threat to Internal Security and Public Order in Indian context? In this regard, discuss salient features of amendments in respect of Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules 2021.

Introduction. Fake news is demonstrably false content; disinformation is its deliberate creation and dissemination to deceive. Algorithmic amplification, deepfakes and encrypted forwarding can convert online falsehood into an Article 19(2)-permissible public-order and security concern.

Threat to internal security and public order

- Rumours on religion, migration or child-lifting can trigger communal violence, lynching and panic; false narratives during protests deepen polarisation and erode trust in police, elections and courts.
- Hostile actors use bot networks and manipulated videos for radicalisation, recruitment, espionage and anti-State mobilisation; deepfakes can impersonate leaders and compromise operational credibility.

IT Rules, 2021 and amendments

- Rule 3 mandates due diligence: grievance officer, 24-hour acknowledgement/15-day disposal, removal of specified unlawful content within 36 hours, and preservation of records for 180 days.
- Significant social-media intermediaries must appoint a Chief Compliance Officer, nodal contact person and resident grievance officer; they must enable identification of the “first originator” under Rule 4, subject to judicial safeguards.
- The 2022 amendment created Grievance Appellate Committees; the 2023 amendment required reasonable efforts against prohibited content. The proposed PIB fact-check obligation for government-business content was struck down by the Bombay High Court (2024).

Conclusion. A rights-respecting response needs rapid fact-checking, media literacy and transparent, judicially reviewable takedowns—not executive censorship.

Sources: idsa.in · ianslive.in · news18.com · indianexpress.com · dfrac.org · pib.gov.in · livemint.com · thehindubusinessline.com · economictimes.indiatimes.com · chambers.com

Q10

10 marks · 150 words

Discuss

Ladakh is strategically located between China and Pakistan. As a measure to win hearts and minds of locals, discuss the Border Area Development Programmes (BADP) by the Central Government and civic actions by the Army. Also discuss demand of promulgation of provision of the Sixth Schedule of constitution for Ladakh.

Introduction. Ladakh's frontier villages face remoteness, thin livelihoods and proximity to the LAC/LoC. Development therefore complements military deterrence by making residents stakeholders in territorial security.

BADP and civic outreach

- BADP, now substantially converged with the MHA's Vibrant Villages Programme-I, funds all-weather connectivity, drinking water, solar power, health facilities, livelihoods and digital access in notified border blocks.
- VVP-I covers Ladakh among 19 northern-border districts; 2,662 works worth ₹1,161.81 crore have been sanctioned nationally, including through convergence.
- Under Operation Sadbhavana, the Army conducts medical and veterinary camps, school support, youth tours, skill training and emergency assistance. These improve intelligence, local recruitment and civil-military trust.
- Yet project execution is constrained by altitude, short working seasons and excessive centralisation; works must follow LAHDC village priorities.

Sixth Schedule demand

- Ladakh's largely tribal population seeks constitutional autonomy after UT status without a legislature. Sixth Schedule Autonomous District Councils could protect land, culture, customary institutions and regulate development.
- However, Article 244 currently limits the Schedule to Assam, Meghalaya, Tripura and Mizoram; extension needs constitutional amendment. Stronger elected LAHDCs, safeguards under Article 371-type provisions and consultation can meet concerns.

Conclusion. Border development must be locally owned, ecologically sensitive and accountable; security cannot substitute democratic representation.

Sources: ladakh.gov.in · schemesinindia.in · pib.gov.in · thehindu.com · infra.economictimes.indiatimes.com · indianexpress.com · indianexpress.com · theprint.in · timesofindia.indiatimes.com · frontline.thehindu.com

Q11

15 marks · 250 words

Explain

Explain the key challenges for India's energy security. What measures do you suggest for ensuring energy security along with economic growth and sustainability?

Introduction. Energy security is the uninterrupted availability of energy at affordable prices, with diversification, resilience and environmental acceptability. For India, it must sustain high growth while meeting its NDC and net-zero-by-2070 pathway.

Structural and geopolitical challenges

- India imports about 85% of crude oil and nearly half of natural gas; demand growth therefore enlarges the current-account and inflation shock from price spikes.
- The 2026 Gulf conflict and vulnerability of the Strait of Hormuz expose concentrated sea-lanes: roughly half of crude imports and over 60% of LNG/LPG transit this route.
- Domestic oil and gas output has stagnated; difficult geology, delayed clearances and pricing uncertainty constrain E&P despite HELP and the Open Acreage Licensing Policy.
- Strategic Petroleum Reserves at Visakhapatnam, Mangaluru and Padur are limited relative to a prolonged disruption.

Transition-related constraints

- Coal supplies about three-fourths of electricity. Coal logistics bottlenecks, ageing thermal plants and import dependence for coking coal threaten reliable power.
- Variable solar and wind require storage, flexible generation and transmission; DISCOM losses and weak distribution networks impede investment.
- India depends heavily on imported solar modules, cells, critical minerals and battery supply chains. Land acquisition and ecological concerns complicate renewable expansion.

Measures for secure, sustainable growth

- Diversify long-term oil/LNG contracts across West Asia, Russia, Africa and the Americas; strengthen the Indian Navy/coast guard protection of sea-lanes and expand SPR through public-private leasing.
- Raise domestic output through stable fiscal terms under HELP, faster single-window approvals and enhanced oil recovery; rationalise gas pipelines and city-gas expansion.
- Build a 500-GW non-fossil system through Green Energy Corridors, pumped storage, battery storage and market-based ancillary services; reform DISCOMs under RDSS.
- Reduce import intensity via PM-KUSUM, rooftop solar, National Green Hydrogen Mission, electric mobility, ethanol blending and domestic manufacturing under PLI; secure critical minerals through KABIL and recycling.
- Use energy-efficiency standards, PAT scheme and time-of-day tariffs to flatten peak demand.

Conclusion. Energy security cannot mean mere fuel self-sufficiency. A diversified import basket, strategic buffers, efficient demand and a reliable domestic clean-energy ecosystem will insulate growth from external shocks while lowering emissions.

How are startups in India promoting entrepreneurship, innovation and employment? Discuss the global and domestic challenges in their working and suggest suitable measures to overcome these challenges.

Introduction. Startup India (2016) supports DPIIT-recognised innovation-led, scalable enterprises. India has risen from a few hundred startups in 2014 to 2.3 lakh, generating about 25 lakh jobs and ranking third globally (2026).

Entrepreneurship, innovation and employment

- Fund of Funds, incubators and digital public infrastructure (Aadhaar-UPI) reduce entry costs, enabling fintech, agritech, health-tech and climate-tech solutions.
- Startups create direct skilled jobs and indirect work in logistics/design; tier-II/III, women-led and social enterprises extend self-employment and local problem-solving.

Global and domestic constraints

- Globally, high interest rates and risk-averse capital depress valuations/follow-on funding; geopolitical shocks expose dependence on chips, cloud and foreign markets.
- Platform giants, divergent data rules and costly international patent enforcement impede scale and exports.
- Domestically, seed-to-Series-B patient capital and exits are limited; multi-layer compliance, delayed public procurement, weak university technology transfer and skill gaps impede scaling.

Suitable measures

- SIDBI should deepen the Fund of Funds and Credit Guarantee Scheme, crowd in pension/insurance capital, and enable faster exits under the Insolvency and Bankruptcy Code, 2016.
- A National Entrepreneurship Mission should converge Startup India, MSME, skilling, research and credit schemes through district incubators, with outcome targets for women and SC/ST founders.
- ANRF-backed technology-transfer offices, regulatory sandboxes, IP fast-tracks, and innovation procurement on GeM with time-bound payments would convert research into markets.

Conclusion. India needs not merely more registered firms but durable innovation-based firms. Funding depth, research commercialisation and predictable regulation can turn the demographic dividend into globally competitive employment.

How Indian agriculture has been transformed from food scarcity to food surplus level? Explain the various government policies implemented for diversification of Indian agriculture.

Introduction. India moved from PL-480-dependent food deficits in the 1960s to a cereal-surplus economy through a state-supported productivity revolution. Central-pool stocks on 27 January 2026 were 59.25 million tonnes of rice and wheat, far above the 21.41-million-tonne January buffer norm; yet this success remains cereal-centric.

From scarcity to surplus

- Land reforms, Community Development Programme and institutional credit created the initial production base, though tenancy reforms were uneven.
- The Green Revolution combined HYV wheat and rice seeds developed through ICAR, assured irrigation, fertiliser subsidy, pesticides and extension. It first transformed Punjab, Haryana and western Uttar Pradesh.
- The Food Corporation of India (1965), MSP based on CACP recommendations, public procurement and the PDS assured farmers a buyer and consumers affordable grain.
- Expansion of canals, tubewells and later PMKSY irrigation, NABARD-led rural credit, Kisan Credit Cards and mechanisation raised cropping intensity and yields.
- NFSA, 2013 converted production gains into food security, while NFSM expanded the productivity drive to rice, wheat, pulses and coarse cereals.

Policies for diversification

- National Mission for Sustainable Agriculture promotes integrated farming, soil-health management and climate-resilient agriculture; Soil Health Card Scheme enables nutrient-based, rather than urea-intensive, cultivation.
- Mission for Integrated Development of Horticulture supports nurseries, micro-irrigation, post-harvest infrastructure and horticulture clusters for fruits, vegetables, spices and flowers.
- National Food Security Mission-Pulses and the National Mission on Edible Oils–Oil Palm seek to reduce pulse and edible-oil import dependence through seed, area expansion and price support.
- PMKSY's "Per Drop More Crop", PMFBY and RKVY de-risk farmers shifting to high-value, water-efficient crops.
- e-NAM, 10,000 FPO scheme, Agriculture Infrastructure Fund and Operation Greens improve aggregation, storage, processing and market access for perishables; MSP for millets and the International Year of Millets, 2023 support nutri-cereals.

Correcting the policy bias

- Open-ended rice-wheat procurement and fertiliser-power subsidies still induce groundwater depletion, especially in Punjab and Haryana. Diversification requires region-specific price assurance and procurement for pulses, oilseeds and millets, not merely demonstrations.

Conclusion. India must retain strategic cereal buffers under NFSA while redirecting incentives towards pulses, oilseeds, horticulture and livestock. Decentralised procurement, water budgeting

and value-chain investment can make surplus production nutritionally and ecologically sustainable.

Sources: business-standard.com · timesofindia.indiatimes.com · icrier.org · policycircle.org · economictimes.indiatimes.com · livemint.com · thehindubusinessline.com · thehindu.com · business-standard.com · imprindia.com

Q14

15 marks · 250 words

Discuss

Discuss the different types of subsidies and supports provided by the Government of India to agricultural sector. Examine the related issues pertaining to Agreement on Agriculture of World Trade Organisation (WTO).

Introduction. Agricultural subsidies are fiscal transfers or price interventions that reduce farmers' costs, stabilise income and secure food supplies. In India, they protect smallholders but are constrained by the WTO Agreement on Agriculture (AoA).

Forms of support

- **Input subsidies:** subsidised urea and other fertilisers, irrigation water, electricity, seeds and concessional institutional credit; interest subvention lowers crop-loan cost.
- **Direct income and risk support:** PM-KISAN cash transfers, PM Fasal Bima Yojana premium support, disaster assistance and credit guarantees.
- **Price and market support:** MSP announcements, FCI procurement for the Public Distribution System, market-intervention operations and price-deficiency payments in some States.
- **General services/capital support:** agricultural research, extension, soil testing, irrigation, storage, e-NAM and PM-KUSUM solar pumps.

AoA framework and India's position

- Annex 2 "Green Box" permits minimally trade-distorting support—research, extension, environmental programmes, public stockholding for food security and decoupled income support—without limits.
- "Amber Box" support, measured through Aggregate Measurement of Support (AMS), includes product-specific MSP support and non-product-specific input subsidies. Article 6.4 permits developing countries only a 10% de-minimis ceiling of value of production.
- Article 6.2 exempts developing-country investment and input subsidies generally available to low-income or resource-poor farmers. Blue Box covers production-limiting payments; export subsidies face disciplines after the Nairobi Ministerial Decision.

Contentious issues

- India's MSP procurement may breach AMS because WTO calculates support against the obsolete 1986-88 external reference price, not present inflation-adjusted costs.
- The Bali Ministerial "peace clause" gives an interim shield to public-stockholding programmes, subject to transparency, but is not a permanent solution.
- Rich-country green-box payments and historically high farm support distort world prices, while Indian fertiliser, power and water subsidies encourage urea overuse, groundwater depletion and

fiscal stress.

Conclusion. India should secure a permanent food-stockholding solution and a revised reference-price methodology at the WTO. Domestically, it should shift blanket input support towards PM-KISAN-type targeted transfers, micro-irrigation, crop insurance and climate-resilient public investment.

Sources: insightsonindia.com · vajiramandravi.com · simplifiedupsc.in · iasgyan.in · smartkrishi.in · iaspoint.com · journal.sijss.com · economictimes.indiatimes.com · livemint.com · thehindubusinessline.com

Q15

15 marks · 250 words

Mention

Mention salient features of 'Mission Drishti'. Discuss the imaging techniques used in the satellite launched on 3rd May 2026. Why it is being considered world's first satellite of its kind?

Introduction. Mission Drishti is GalaxEye Space Solutions' Earth-observation mission; its first satellite was launched on 3 May 2026. It begins a multi-satellite Drishti constellation based on integrated OptoSAR observations.

Salient features

- GalaxEye's first satellite, developed by the IIT-Madras-alumni-founded Indian start-up, was launched aboard SpaceX's Falcon 9.
- It carries co-located optical multispectral and Synthetic Aperture Radar (SAR) sensors—collectively termed OptoSAR.
- The mission seeks consistently usable land and ocean imagery, including during cloud cover and at night, for disaster assessment, agriculture, infrastructure and maritime monitoring.

Imaging techniques

- Optical multispectral imaging is passive: it records reflected solar radiation in visible and other spectral bands. It produces intuitive, high-clarity images, aiding identification of vegetation, water bodies and built-up features.
- Its limitation is dependence on daylight and obstruction by clouds, haze or smoke.
- SAR is an active microwave technique: the satellite transmits radar pulses and measures returned backscatter. Motion of the platform synthesises a long antenna aperture, enabling fine spatial imaging.
- Microwave signals operate day and night and largely penetrate clouds; radar backscatter can reveal surface roughness, moisture, inundation and structural change.
- Fusing the optical scene's interpretability with SAR's all-weather reliability reduces gaps and improves confidence in EO analytics.

Why world's first

- Optical and radar data have earlier been obtained from separate satellites or missions. Drishti is the first satellite to integrate both SAR and multispectral optical sensors in one spacecraft as an OptoSAR system.

- Thus, it can generate complementary, co-located observations without waiting for a separate optical or radar overpass.

Conclusion. Mission Drishti demonstrates a private Indian EO capability that addresses the optical-imaging blind spot of clouds and darkness. Its constellation-scale success will depend on reliable sensor fusion and timely delivery of actionable imagery.

Sources: indianexpress.com · business-standard.com · eoportal.org · livemint.com · cnbctv18.com · science.nasa.gov · science.nasa.gov · science.nasa.gov · eoportal.org · nature.com

Q16

15 marks · 250 words

Explain

What is agentic Artificial Intelligence (AI)? Explain its working. Describe its applications with suitable examples. Discuss the advantages, risks and challenges associated with agentic AI systems.

Introduction. Agentic AI is a semi- or fully-autonomous AI system that pursues a goal by perceiving context, reasoning, using digital/physical tools and acting on its environment. Unlike a chatbot that mainly generates a response, it can execute multi-step workflows with minimal supervision.

Working and core features

- A user supplies a high-level goal, e.g., “resolve this customer’s insurance claim”.
- An LLM-based planner decomposes it into tasks, retrieves relevant data and selects tools/APIs.
- The agent executes actions—searching records, filling forms, sending messages or operating software—and maintains memory of intermediate results.
- Feedback from the environment enables it to verify outcomes, revise its plan and escalate exceptional cases to humans.

Applications and advantages

- In healthcare, an agent can collate medical records, flag drug interactions and schedule follow-ups, while the clinician retains final authority.
- In agriculture, it can combine weather forecasts, soil-sensor data and market prices to advise irrigation or crop-sale timing.
- In public administration, a supervised agent can triage citizen grievances, check document completeness and route cases to the competent office.
- It delivers speed, 24×7 service, personalisation and automation of repetitive cross-software tasks; multi-agent systems can coordinate logistics or cyber-security response.

Risks and challenges

- Hallucinated reasoning or biased training data may lead to wrongful denial of welfare, credit or insurance.
- Tool access converts an erroneous output into real harm: an agent may make unauthorised payments, delete data or trigger unsafe physical actions.

- Continuous access to personal data raises privacy concerns under the Digital Personal Data Protection Act, 2023 and implicates Article 21.
- Prompt injection, data poisoning and malicious tool calls expand the cyber-attack surface.
- Diffused responsibility among developer, deployer and user complicates liability, audit and redress; opaque LLM reasoning impedes explanation.

Conclusion. Agentic AI should therefore be deployed as bounded autonomy: least-privilege tool access, human approval for high-impact actions, audit logs, red-teaming and independent testing. NIST's emphasis on evaluation, standards and risk management offers a useful governance direction.

Sources: en.wikipedia.org · nist.gov · computing.mit.edu · mitsloan.mit.edu · techtarget.com · cltc.berkeley.edu · media.defense.gov · link.springer.com · mckinsey.com · microsoft.com

Q17

15 marks · 250 words

Discuss

What are the challenges to solid waste management in India? Discuss the governmental policy framework on solid waste management. Discuss the success/failure cases of Delhi and Indore cities highlighting the salient feature of their solid waste management initiatives.

Introduction. India's municipal solid waste (MSW) is a constitutional urban-service responsibility under Article 243W and the Twelfth Schedule. Rapid consumption, however, has outpaced municipal capacity, converting a public-health service into a landfill, pollution and climate challenge.

Challenges in the waste chain

- Low household segregation means wet waste, plastics, sanitary waste and e-waste are mixed; even segregated waste is often remixed in single-compartment transport.
- ULBs face inadequate land, trained staff, material-recovery facilities and assured markets for compost/refuse-derived fuel; open dumping contaminates leachate and emits methane.
- Fragmented mandates among ULBs, SPCBs and development authorities, weak user-charge recovery, and exclusion of waste-pickers impede implementation.
- Construction-and-demolition waste, single-use plastics and legacy dumps such as Ghazipur add distinct streams requiring separate treatment.

Policy framework

- The Environment (Protection) Act, 1986 and Solid Waste Management Rules, 2016 mandate source segregation, door-to-door collection, processing, scientific landfilling only of rejects, and duties for bulk generators; the SWM Rules, 2026 strengthen implementation responsibility of States and ULBs.
- Swachh Bharat Mission–Urban 2.0 targets Garbage-Free Cities and remediation of legacy dumpsites; Fifteenth Finance Commission tied grants incentivise sanitation outcomes.

- Plastic Waste Management Rules, 2016 employ extended producer responsibility; CPCB/SPCBs monitor compliance, while Article 243W locates delivery with municipalities.

Delhi and Indore: contrasting practice

- Delhi illustrates failure of the chain: Ghazipur, Bhalswa and Okhla dumps receive mixed waste; limited segregation, remixed collection and dependence on waste-to-energy plants leave large legacy mountains and recurrent fires/pollution. Land scarcity and multi-agency governance aggravate the problem.
- Indore's sustained success rests on universal door-to-door collection, household-level multi-stream segregation, GPS-monitored vehicles, user charges and citizen enforcement. Its material-recovery, composting and bio-CNG facilities reduce landfill dependence; integration of waste workers and daily feedback make segregation verifiable.
- Yet Indore's model requires continuous processing capacity and market offtake; cleanliness rankings alone cannot substitute waste audits.

Conclusion. Delhi must enforce segregated transport and landfill biomining, while other ULBs should adapt—not mechanically copy—Indore's accountable, decentralised chain. Fiscal support should be tied to verified segregation, recovery and safe disposal, not merely collection.

Sources: link.springer.com · [thehindu.com](https://www.thehindu.com) · [indianexpress.com](https://www.indianexpress.com) · downtoearth.org.in · [newindianexpress.com](https://www.newindianexpress.com) · [thehindu.com](https://www.thehindu.com) · [indianexpress.com](https://www.indianexpress.com) · [cnbctv18.com](https://www.cnbctv18.com) · [theprint.in](https://www.theprint.in) · [hindustantimes.com](https://www.hindustantimes.com)

Q18

15 marks · 250 words

Analyse

“Community participation is the cornerstone of effective disaster management”. Analyse this statement with suitable examples from India. Also discuss the challenges to community participation and measures to strengthen it.

Introduction. Community participation denotes the organised involvement of residents, Panchayats, SHGs and volunteers in risk assessment, preparedness, response and recovery. In India's diverse hazard settings, communities are the first responders, possessing local knowledge of terrain, vulnerable households and evacuation routes.

Why it is a cornerstone

- It converts warnings into action: locally trusted volunteers can disseminate alerts, evacuate persons with disabilities and operate shelters before external forces arrive.
- Community mapping identifies micro-risks—unsafe slopes, elderly residents, boat routes and water sources—often missed by district-level plans; thus prevention reduces response costs.
- Odisha's cyclone preparedness, through village task forces, shelters and evacuation, demonstrates how local ownership can limit mortality despite severe storms.
- Kerala's citizen rain- and river-monitoring initiatives fill gaps in official data and enable timely flood action. Chengalayi Panchayat's 2026 'Sajjam' volunteer force similarly draws lessons from the 2018–19 floods and Wayanad landslides.

- Participation makes recovery equitable: SHGs and Gram Sabhas can verify beneficiaries, restore livelihoods and monitor reconstruction, strengthening trust in the State.

Constraints and their effects

- Token consultation, weak technical capacity and unfunded Panchayats prevent community inputs from entering District Disaster Management Plans.
- Caste, gender, disability, migrant status and unequal landownership can exclude those most exposed from meetings, shelters and compensation.
- Warning fatigue, misinformation, low risk perception and digital/language divides weaken last-mile compliance.
- Volunteerism may be episodic; unsafe spontaneous rescue and absence of insurance or equipment can create secondary casualties.

Strengthening participatory resilience

- Under Section 41, Disaster Management Act, 2005, institutionalise Gram Sabha-approved village disaster plans, linked to DDMA plans and Panchayat budgets.
- Scale NDMA's Aapda Mitra model: train, equip, insure and periodically drill inclusive local teams with Fire Services, SDRF and ASHA workers.
- Use local-language, multi-channel alerts; integrate validated community rain/river observations into IMD and State early-warning systems.
- Mandate representation of women, SC/ST groups, persons with disabilities and migrants in shelter and relief committees; conduct social audits.

Conclusion. Community agency cannot substitute professional response, but it makes warning, rescue and recovery locally legitimate and timely. A funded partnership between PRIs, communities and disaster agencies is therefore the basis of resilient disaster governance.

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Q19

15 marks · 250 words

Discuss

Separatist movements have been one of the major factors contributing to militancy and instability in Jammu & Kashmir (J & K). Bring out actions taken by the Government to bring J & K into national mainstream. Discuss pre and post abrogation status of Articles 370 and 35A. Also bring out positive impacts of abrogation of both articles in mainstreaming the state.

Introduction. J&K's separatism drew upon Pakistan-sponsored terrorism, alienation and the exceptional constitutional arrangement after accession. Mainstreaming therefore requires security, representative politics, equal citizenship and development—not merely legal integration.

Governmental response to militancy and alienation

- Security: AFSPA, 1990, UAPA, counter-infiltration grid and Operation Sarp Vinash targeted terrorism; rehabilitation/surrender policies and the 2023 J&K Reservation Act addressed victims

and displaced communities.

- Democratic inclusion: Panchayati Raj elections (2018), District Development Council elections (2020), delimitation (2022), and the 2024 Assembly election restored electoral participation; Back-to-Village and Aspirational District interventions expanded last-mile governance.
- Developmental integration: PMDP, 2015, new IIT/IIM/AIIMS institutions, rail-road connectivity and investment incentives sought to link youth with national opportunities.

Articles 370 and 35A: pre- and post-2019

- Article 370 granted J&K a separate Constitution, flag and autonomy; Parliament's laws applied mainly with State concurrence. Article 35A, inserted through the Constitution (Application to J&K) Order, 1954, empowered the State to define "permanent residents" and reserve land, jobs and scholarships.
- On 5-6 August 2019, C.O. 272 applied the entire Constitution; Parliament recommended cessation under Article 370(3), followed by C.O. 273. The J&K Reorganisation Act, 2019 divided the State into UTs of J&K (with legislature) and Ladakh. Consequently, 35A ceased and 370 became inoperative. In *In re: Article 370* (2023), the Supreme Court upheld this, while directing early Assembly elections and restoration of statehood.

Mainstreaming gains and cautions

- Equal application of fundamental rights and central welfare laws, domicile-based eligibility, women's equal property rights on marrying non-residents, and SC/ST reservation widened citizenship and social justice.
- Uniform anti-corruption, education and investment frameworks, alongside reduced separatist space, can deepen economic integration.
- Yet prolonged UT status, detentions, communication curbs and continuing militancy can weaken trust; constitutional integration must be matched by accountable elected government and dialogue.

Conclusion. Thus, abrogation removed asymmetric legal barriers, but durable mainstreaming rests on speedy statehood, credible elections, rights-sensitive policing, jobs and reconciliation across Jammu, Kashmir and Ladakh.

Sources: thehindu.com · bbc.com · newindianexpress.com · m.thewire.in · aljazeera.com · thehindu.com · indianexpress.com · economictimes.indiatimes.com · link.springer.com · middleeasteye.net

Q20

15 marks · 250 words

Discuss

Discuss counterfeit currency and money laundering as major sources of terror funding in India. State the actions being taken at International level to check these menaces. Highlight the role of Financial Action Task Force (FATF) and methods of compliance by its member states in preventing terror funding.

Introduction. Counterfeit Indian Currency Notes (FICN) provide terrorists an apparently low-cost, anonymous purchasing medium; money laundering converts proceeds of crime into usable, ostensibly legitimate funds. Together they sustain recruitment, arms, logistics and propaganda.

Terror-funding channels and impact

- FICN is printed/smuggled through transnational networks, exchanged via couriers and retail markets, and used to buy weapons or pay over-ground workers. It also erodes trust in the rupee and finances hostile covert operations. BSF reportedly seized ₹65.25 lakh FICN by June 2026, a sharp rise over 2025.
- The Chennai 2026 counterfeit-network bust, involving alleged Pakistan-Malaysia links, illustrates the convergence of forged currency, cross-border travel and suspected terror networks.
- Laundering layers terror proceeds from extortion, narcotics, hawala, donations and front businesses through placement, layering and integration. Shell companies, trade-based laundering, crypto-assets and misuse of non-profit organisations obscure the beneficial owner.
- India applies the PMLA, 2002 (attachment, confiscation and prosecution of proceeds of crime), UAPA, 1967 sections 17 and 40 (terror funding/support), FIU-IND reporting, NIA investigation, KYC norms and border enforcement.

International architecture and FATF

- UNSC Resolutions 1267, 1373 and 2462 require targeted sanctions, asset-freezing and criminalisation of terror financing; the Egmont Group enables Financial Intelligence Unit information exchange.
- FATF sets 40 Recommendations: risk-based AML/CFT (R.1), customer due diligence and beneficial-ownership transparency (R.10, 24), suspicious-transaction reporting (R.20), regulation of virtual assets (R.15), and targeted financial sanctions (R.6).
- Its mutual evaluations and follow-up reviews expose legal and enforcement gaps; grey/black-listing creates reputational and financial costs, inducing compliance.

Member-state compliance

- Conduct National Risk Assessments; license and supervise banks, money-service businesses and crypto providers; mandate KYC, STRs and record retention.
- Establish autonomous FIUs, share intelligence rapidly, freeze designated persons' assets without delay, prosecute facilitators, and audit high-risk NPOs without disrupting legitimate charity.

Conclusion. India must combine real-time FIU-border intelligence, forensic currency detection and swift UAPA-PMLA prosecutions. FATF compliance is effective only when formal rules produce cross-border asset tracing and convictions.

Sources: [organiser.org](https://www.organiser.org) · [one.news18.com](https://www.one.news18.com) · [ianslive.in](https://www.ianslive.in) · [newkerala.com](https://www.newkerala.com) · [thehindu.com](https://www.thehindu.com) · [fatf-gafi.org](https://www.fatf-gafi.org) · [bloomberg.com](https://www.bloomberg.com) · [finintegrity.org](https://www.finintegrity.org) · [lseg.com](https://www.lseg.com) · [imf.org](https://www.imf.org)