

General Studies Full Length Test Test - 3 (GS - 3) Test Code - A21053503	Evaluator Code: Date of Assignment: CQ:
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NAME: <input type="text" value="Shivani Kumari"/>	Time allowed: 3 Hours
STUDENT ID.: <input type="text"/>	Email: <input type="text"/>
UPSC ROLL NO.: <input type="text"/>	Submission Date: <input type="text" value="17 Aug 2025"/>
MOBILE NO.: <input type="text"/>	

QUESTION PAPER SPECIFIC INSTRUCTIONS

Please read each of the following instructions carefully before attempting questions:

There are **TWENTY** questions printed in **ENGLISH**. All the questions are compulsory.

The number of marks carried by a question/part is indicated against it. Word limit in questions, wherever specified, should be adhered to. Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.

Q No.	Marks	Q No.	Marks	Q No.	Marks
Q1	/10	Q8	/10	Q15	/15
Q2	/10	Q9	/10	Q16	/15
Q3	/10	Q10	/10	Q17	/15
Q4	/10	Q11	/15	Q18	/15
Q5	/10	Q12	/15	Q19	/15
Q6	/10	Q13	/15	Q20	/15
Q7	/10	Q14	/15	Total	/250

Instructions:-

- Legible Scanning:** Exercise due diligence in scanning your scripts for clear legibility
- Submissions** marred by poor scanning, notably those with illegible sections or blackened pages due to improper scanning, risk being excluded from the evaluation process.
- Non-Adherence Consequences:** Failure to comply with the aforementioned instructions may lead to the disqualification of your submission.

For Student Only

Start Time - <input type="text" value="8:00"/>	End Time - <input type="text" value="11:00"/>
Mode of Examination	Online <input checked="" type="checkbox"/> Offline <input type="checkbox"/>
Receiving date - <input type="text"/>	Dispatch date - <input type="text"/>

Parameters		Good	Average	Needs Improvement
Conceptual Understanding				
Understanding Demand of Question				
Structure	Introduction			
	Body			
	Conclusion			
Presentation-Illustrations, flowcharts, diagrams, etc.				
Language and Handwriting				
No. of Questions Attempted				
Adherence to Word Limit: Yes/No				

Mentor's Feedback

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Evaluator/Reviewer Suggestions

Don't write anything in this part)



Evaluator/Reviewer Suggestions



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(Answer questions in NOT MORE than the word limit specified for each in the parenthesis. Content of the answer is more important than its length.)

1. Explain the concept of the "Missing Middle" in India's industrial ecosystem. How does it affect economic growth and employment generation?

(10 marks, 150 words)

Missing middles are medium enterprises/firms who are polarizing between ~~large~~ very few large industries and very large small industries (qq.1.)

Economic growth impact

- (i) Limited scaling of businesses
 - key → only 10% of small manufacturing firms grow to medium size in 10yr vs 30% in Vietnam
- (ii) low R&D expenditure (0.7% of GDP)
- (iii) weak supply chain linkages (large firms import 40% of intermediate goods due to lack of mid-tier suppliers)
- (iv) Export competitiveness lag (22% export per GDP) v. Vietnam (110%)
- (v) mid sized firms (50-500 employees) are 2-3 times more productive than small firms but are rare in India.

Employment generation impact

- ① 83% of India's workforce is in informal employment (ILO 2023)
- ② Germany mitels and employs ~60% of workforce while India's mid-tier employs <10% due to lack of skilled opportunities
- ③ under developed entrepreneurs
eg → only one in 10 Indian Startups survive beyond 5 yr. v. 1 in 3 in the US (DPIIT)
- ④ slower urbanization of medium firms

Measures taken by India to tap the potential of middle firms.

- ① Credit Guarantee fund trust for MSE → provide collateral-free loans to MSMEs
- ② RAMP to Strengthen MSME Competitiveness
- ③ Technology & digital support MSME innovation scheme (IPR, incubation)
- ④ PLI and interest equalization Scheme, udyam portal.

Thus, while multiple schemes exist, India needs a focused mid-sized enterprise policy to bridge the gap.

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2. Household savings form a crucial pillar of domestic capital formation. In light of their recent decline, elucidate the underlying causes and propose strategies to strengthen savings behavior in India. (10 marks, 150 words)

According to RBI report 2024, household savings fell to a 5 decade low of 18.4% in FY23 down from 22.5% in FY12.

Key causes of decline of in household saving

- ① Rising household debt to GDP ratio to 40% in 2024
 - ② Surge in retail loans → EMIs eat into savings
 - ③ Inflation (food inflation 6.6% 2024) eroding disposable income, squeezing budgets
 - ④ Wage stagnation in rural and informal sectors.
 - ⑤ Decline in Interest rates on deposits by RBI (Dovish stand) to pump domestic consumption
 - ⑥ Rising medical and education expenses
- eg → 48% out of pocket expenditure in health sector (ECo Survey 2024)

- ① Cultural shift towards consumption - pt on → shopping mall culture, buy now pay later schemes boosting spending.

Strategies to strengthen savings behaviour.

- ① Tax incentives for long term savings eg NPS tax benefits
- ② Boost safe and high yield savings options eg: Revision of small saving schemes
- ③ Reduce household debt stress
 - Strict regulations on unsecured loans.
- ④ Strengthening social security net by expanding subsidised education loans & expanding Pradhan Mantri Aashwasan Bharat coverage to low income families
- eg → Japan postal saving schemes
- ⑤ Improve financial literacy.

Thus, Strengthening saving culture will boost economic resilience and growth.

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3. Despite its potential, the corporate bond market in India remains underdeveloped. Examine the structural and regulatory challenges impeding its growth.

(10 marks, 150 words)

Despite being critical source of long term financing, India's corporate bond market remains shallow. (Just 16% of GDP v. USA 75%.)

Structural and regulatory challenges impeding its growth

- ① Limited investor base - more preference to government bonds (AAA Safety)
 - ② Retail participation is low due to complexity and lack of awareness
 - ③ Low trading volume and most bonds held to maturity → no secondary activity.
 - ④ High issuance costs and complexity - eg. credit rating fees, listing costs and stamp duties.
 - ⑤ Regulatory fragmentation (SEBI, RBI, IRDAI, PFRDA) create compliance hurdles
 - ⑥ Lack of a robust credit ecosystem
- Key → Inadequate bank supply

recovery under IBC (~25%)

Measures to strengthen the corporate bond market

① Expand investor base like retail-friendly bonds, introduce tax-free retail bonds

② Create a market making framework like RBI's PD system for G-secs

③ Reduce issuance costs like stamp duty. Σ , streamline listing norms
eg Single window clearance

④ Set up a unified bond market authority (SEBI + RBI)

⑤ Develop new bond products
Green bonds, municipal bonds, covered bonds etc.

⑥ Fast-track bond default under IBC (dedicated NCLT benches)

Thus, adopting these measures in corporate bond will help to strengthen security market in India.

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4. In light of recent Budget 2025 allocations and the push for green infrastructure, analyze how Viability Gap Funding can be leveraged to promote renewable energy projects. (10 marks, 150 words)

The union budget 2025 has allocated ₹30Kcr for green energy transition with a strong emphasis on solar, green H₂, and battery storage.

VGF can be leveraged to promote renewable energy projects

- ① Solar and wind: Reducing tariff subsidies → VGF can cover 20-30% of project cost.
- ② Bridging the production cost of green hydrogen \$4-5/kg vs \$2/kg by 2030.
- ③ DISCOM reforms (overburdened) using VGF for payment security.
- ④ 30% of solar projects delayed due to land and transmission issues. VGF can bridge the funding issue.
- ⑤ Battery storage - VGF for 4hr storage project and green energy

Corridors.

Challenges pertaining to VGF

- (i) Fiscal burden (PPP model where 70% government investment, 30% VGF)
- (ii) Implementation delays - fast track VGF clearance via renewable energy ministry
- (iii) Misallocation risks under VGF

Recommendations

- (i) Adopt hybrid (for holiday) Model
- (ii) Link VGF to state level reforms
eg DISCOM health, land acquisition
- (iii) Introduce VGF bonds to attract institutional investors
- (iv) Expand VGF corpus to 50% of from 30% for RE + storage.
Thus, if utilized properly VGF can bridge funding gaps, cut RE costs and accelerate India's green energy transition

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5. Why is self-sufficiency in pulse production crucial for India? Discuss the policy and technological interventions needed to achieve Aatma Nirbharata in pulses. (10 marks, 150 words)

India is largest producer and importer of pulse in the global pulse market (with 15% - 20% of demand met from import)

Self-sufficiency in pulse production is crucial for India

- i) Food security (Pulse provide 10-15% of dietary protein)
- ii) Reducing food inflation (6.6% 2023) also prices often spike due to import reliance
- iii) Supply chain vulnerability
eg Yellow peas imports of India - 45% come from Canada, Russia and Ukraine
- iv) Farmer's income (doubling target) Ashok Daluwal panel.

Challenges in pulse production

- i) Climate vulnerability with 60% of pulse area is rainfed.
- ii) 15% - 20% Post harvest losses

(Don't write anything in this part)

- due to poor storage (NABARD)
- (ii) low productivity
India's average yield 800kg/ha v. Canada 1500kg/ha.
 - (iv) High current account deficit
due to high pulse import
eg ~~USA~~ India is world's largest pulse consumer country.

Policy intervention & Technological Support

- (1) MSP and procurement reforms by increasing MSP rate by government for pulses
- (2) subsidize seeds and micro-irrigation (eg drip / sprinkler adoption)
- (3) Import restriction quota and buffer stocks.
- (4) High yielding and climate resilient varieties eg GMP pulses
- (5) Precision farming & IOT
eg e-pulse app.
- (6) Crop diversification

Thus, India must boost domestic pulse production with comprehensive policy execution.

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6. Examine how space-based solutions are addressing developmental challenges in rural India. What steps can further enhance their outreach and effectiveness?

(10 marks, 150 words)

India's space technology (ISRO, NavIC and PPP model) is addressing critical rural challenges.

These are as follows

① Agriculture and food security

eg → satellite-based crop monitoring, soil health mapping (Kisan Drone)

② Health and telemedicine via

GSAT sats connection of rural clinics to urban hospitals

eg e-Sanjeevani

③ Education and digital inclusion

eg EDUSAT → virtual classroom in rural areas

④ Disaster management

eg Himachal & GILSAT → MISAR satellite

⑤ Financial inclusion - Aadhar.

- enabled payment rely on satellite-linked authentication

⑥ Land reforms 2.0 → unfinished to

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finished agenda

eg DILRMP, SVAMITVA scheme.

Steps to enhance outreach and effectiveness

- ① Expand satellite internet (LEO Constellations) with PPP model
eg Digital village with wifi via satellite
- ② AI + Satellite data for precision farming eg Kisan AI for crop disease alerts
- ③ Strengthen last-mile delivery through village resource centre
- ④ Affordable drone and IOT solutions
- ⑤ Policy and PPP boost
eg NAVIC, eNAM, ISRO+AgriTech startups.

Thus, space tech is already revolve - Horizing rural India, but scaling up via LEO internet, AI analytics and PPP can maximize impact.

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7. Delineate the linkages between urbanization patterns and rising PM 2.5 levels in Tier-II and Tier-III cities of India. What are the various mitigation measures and the government's initiatives to mitigate air pollution in India?

(10 marks, 150 words)

The World Air Quality Index rank Delhi and Begusarai (Bihar city) among the top air polluting cities (2024)

Linkages between urbanization and rising PM_{2.5} in tier 2-3 cities

- ① unplanned urban expansion - construction boom contributes 15% of PM_{2.5} (CPCB)
- ② loss of green cover reduces natural air filtration.
- ③ vehicular surge - 2 time rise in private vehicle in last decade in cities like Jaipur, Indore
- ④ Industrial and small-scale emissions (unregulated small factories emit ~20% of PM_{2.5})
- ⑤ Biomass burning common in cities like Varanasi, Patna
- ⑥ Agricultural residue burning in peri-urban areas (eg. Haryana) worsens winter smog.

- Temperature inversion in winter amplify PM_{2.5} buildup.

Mitigation measures:

(1) Government initiative

- a) NCAP → Reduce PM_{2.5} by 2030. by 2026 (revised)
 - b) e-mobility push - e-Drive, FAME EV charging, BS norms-VII
 - c) Clean industries - zero liquid discharge norms for textile/cluster industries
 - d) waste management (waste to energy model) under Satish Bharat Mission 2.0
 - e) Green urban planning - Amrit Dharohar, Doodhdhara Scheme, etc
- ### (2) Technological and Behavioral Solution

- a) Smog towers (China model)
- b) AI based air quality forecasting (SAFAR app expansion)
- c) Community awareness (Har Ghar Hara Campaign)

Thus, mitigation strategies requires better collaboration to address the concern of PM_{2.5/10} in small cities

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8. Explain the structural and operational limitations of the Disaster Management Act, 2005. How far does the 2025 Amendment address these deficiencies through a shift towards anticipatory and technology-driven disaster governance?

(10 marks, 150 words)

Recently DMA 2005 was amended in the parliament to address the increasing climate based disaster in India.

Structural and operational limitations of the DMA 2005:

- ① Reactive, not proactive governance
- Focuses on post-disaster relief rather than prevention and preparedness
- ② Centralized decision making (NDMA), and weak local capacity.
eg) DMAs lack funds & autonomy
- ③ outdated risk assessment (Static vulnerability maps (2002), no mandate for climate resilient infrastructure
- ④ Siloed approach
Poor coordination between NDRI, state agencies and communities
eg. Cyclone Biparjoy saw delayed evacuation due to bureaucratic delays.

⑥ Poor tech integration -

Limited use of AI, drones, IoT for early warnings

eg 2023 Himachal floods showed gaps in real-time landslide sensors

2025 Amendment: shift to Anti-cipatory and tech-driven governance

① Mandatory anti-cipatory planning (State must allocate 5% of DM budgets for pre-disaster mitigation)

② Empowered DDMA's can now access direct funding and hire tech experts (IL Disaster Mitigation)

③ Advanced tech integration

IoT sensors, drones (piloted in Assam floods 2024), AI powered EMS

④ Inter-agency synergy

NDMA + IMD + ISRO

⑤ Focus on climate adaptation

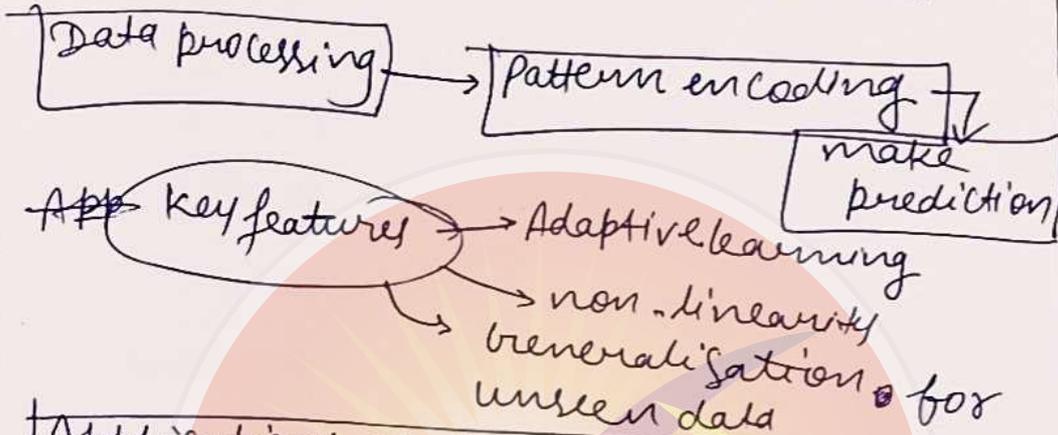
ISRO - urban flood Atlas, UDMA

Thus, 2025 Amendment is a major leap toward proactive governance, but success hinges on local execution & funds.

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9. What do you understand about Artificial Neural Networks? List out its applications across various fields. (10 marks, 150 words)

An artificial neural network is a computational model inspired by the human's brain neural structure



Applications of ANNs across fields

- ① Healthcare - Disease diagnosis - detecting tumours in MRI scans
 drug delivery : predicting molecular interaction eg α -fold protein.
 - Tailor made personalized medicine

- ② Finance → fraud detection - identifying ~~unusual~~ & unusual transaction eg Mastercard's AI fraud alert
 - Algorithmic trading - predicting stock trends

- ③ Automotive & transportation

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eg. self-driving cars

Traffic prediction → Optimizing routes

④ Retail & e-commerce - predict consumer behavior, inventory management

Amazon customers - who bought this

⑤ Agriculture - using Satb + weather data: predict crop yield & pest dection

⑥ Climate science - weather forecasting, disaster prediction eg forest fire risk mapping

Challenges

→ Data hunger: require massive labeled datasets

Ethical Concern → Black box problem: hard to interpret decision.

→ computational cost needs GPUs/TPUs for training

Thus, addressing these challenges are imperative to ~~reach~~ optimize full potential of ANNs

10. "Internal security challenges in India are increasingly shaped by external and transnational dynamics." Examine the statement with relevant examples.

(10 marks, 150 words)

India's internal security challenges are influenced by external state & non-state actors, cross-border terrorism, cyberwarfare & organized crime.

Cross-border Terrorism and proxy warfare.

- ① Pakistan based groups (LeT, JeM) orchestrate attacks - Pahalgam, 26/11 etc
- ② Radicalization in J&K and mainland India (OSLT)
- ③ Cyberwarfare and digital threats (increased 500% as per Samarth research)
eg China - cyberattack on Kotham - Kulam NPP, AIIMS (Delhi)
- ④ Narcotics and Arms smuggling (golden crescent and triangle)
- ⑤ Illegal migration & demographic Warfare (especially in NER)
eg Rohingya influx, CAA-NRC protests, China's sleeper cells in Assam/NE

6) Khalistani extremism & foreign funding.

eg SF J in Canada/UK fund

Farm protests (2020)

7) LWE (Naxalism) -

external provocation & Arms supply (Red Corridor)

Government Counter measures



i) SAMADHAN, operation Sindoor

ii) SCORATS, UNTOC, FATF, interplay for international collaboration

iii) CERT-in, I+L, Cyber Swachhata Kendra to tackle cyber threats

iv) Strengthening border management (K. Madhukar Gupta Shekhar Committee)

v) Multi-agency centre for real-time intel sharing.

vi) Smart border fencing and development in border areas.

Thus, these multi-pronged strategy (tech-backed policing, global cooperation) is critical.

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11. While tariff rationalization aims to enhance economic efficiency, it may also pose challenges to certain sectors. Critically assess the potential trade-offs involved in the Union Budget 2025-26's approach to tariff reforms.

(15 marks, 250 words)

Union budget 2025-26 proposes tariff rationalization to boost economic efficiency by simplifying customs duties, reducing import barriers and promoting competitiveness.

Potential trade offs involved in union budget 2025-26's approach to tariff reforms

Aspects	Pros	Cons
① Economic efficiency v. Domestic industry protection	① Lower input costs eg steel, electronics ② Export competitiveness (pharmaceuticals, textile) ③ Consumer benefits - fits eg EVs	① Threat to MSMEs (missing middle) → Chinese goods dumping ② Job losses sectors like textiles, agriculture, toy industry
② PLI linked Tariff v. market distortion	① Tariff hikes on finished goods protect PLI sectors.	① Inconsistent protectionism

	<p>(i) Duty exemption for R & D import eg semi-con tools</p>	<p>(ii) Rent Seeking</p>
<p>Revenue loss v. growth stimulus</p>	<p>(i) Lower tariff, lower customs revenue.</p> <p>(ii) Higher economic activity may compensate via GST, corporate taxes</p>	<p>(i) Short-term revenue gap</p> <p>(ii) SOPs for key sectors (semi-con, defense) could strain budget</p>
<p>Social equity v. market-driven reforms</p>	<p>(i) Lower food inflation (Pulses, wheat)</p> <p>(ii) Rural demand boost aids productivity</p>	<p>(i) Duty cuts on pulses may hurt domestic farmers</p> <p>(ii) cheaper Chinese agri-tech impact</p>
<p>Global integration v. strategic autonomy</p>	<p>(i) FTAs with EU, UK → tariff rationalization</p> <p>(ii) China +1 strategy</p>	<p>(i) Import reliance</p> <p>(ii) Food security risk eg oilseed local farmers</p>

Don't write anything in this part)

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(Don't write anything in this part)

Key recommendations to balance trade-offs

- (i) Phase tariff cuts gradually to allow domestic industries to adapt
- (ii) Strengthen anti-dumping measures against predatory imports (China → ASEAN (rule of origin))
- (iii) Link tariff reforms to PLI / Subsidies for affected sectors
eg textile upgradation fund
- (iv) Boost R&D incentives to offset import dependency in critical sectors (eg semiconductors)
- (v) Self-reliance in critical supply chains (REE, critical minerals)
eg Make in India to Make for world.

Thus, a calibrated approach - balancing protectionism with liberalisation is essential to ensure equitable growth.

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12. A shift from fiscal deficit targeting to debt-to-GDP ratio as the fiscal anchor signals a more holistic approach to fiscal discipline. Do you agree? Give reasons in support of your arguments. (15 marks, 250 words)

The union budget 2025-26 is expected to prioritize debt to GDP ratio over rigid fiscal targets, signaling a shift toward long-term fiscal sustainability.

Debt to GDP is a Superior Anchor

- ① Broad view of fiscal health.
 - a) fiscal deficit focus - measures only annual borrowing (revenue - expenditure gap)
 - b) Debt to GDP - Captures cumulative liabilities relative to economic capacity, reflecting long-term solvency.
- eg → Japan has high FD but manageable debt due to low borrowing costs and domestic holding
- ② Flexibility for growth oriented spending.
 - a) FD targets can force austerity during downturns, harming growth.
 - b) Debt to GDP allows counter cyclical

Spending (eg: Post-Covid stimulus)
if debt remain ~~un~~ sustainable

eg) US debt surged post 2008 but GDP growth stabilized the ratio

③ Accounts for interest rate and growth dynamics: as debt stabilizes even with deficits

④ Aligns with global best practices
EU: 60% debt to GDP Maastricht threshold.

IMF Recommendations - emerging markets keep debt below 50-60% of GDP.

eg) India's debt ~ 84% of GDP (Centre + States), needing gradual consolidation

⑤ Encourages structural reforms -

a) ID targeting often leads to off-budget borrowings

b) Debt to GDP forces real reforms

Tax base expansion (eg GST, property tax reforms)

Potential risks

- (i) Lack of short-term discipline without deficit caps, populis + spending may rise
- (ii) Market perception - High debt ratios could spook investors if growth falters
- (iii) State fiscal irresponsibility if Centre relaxes FD norms (FRBM way forward for India)
- (i) Set a medium-term debt target (eg 60% by 2030 via gradual consolidation)
- (ii) Link borrowing to productivity: prioritize infrastructure over subsidies
- (iii) Strengthen institutional oversight
Eg -> Fiscal Council to monitor debt sustainability.

Thus, Debt to GDP is more fiscal anchoring however transparency & enforcement mechanism are also critical.

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13. India's food processing sector is moving towards greater formalization and efficiency. Critically assess how initiatives like the PLI scheme and Pradhan Mantri Formalisation of Micro Food Enterprises (PM-FME) contribute to this transformation.
(15 marks, 250 words)

India's FPI ranks 6th globally with ~8.9%. CAGR is undergoing structural shift driven by PLI & PMFME.

PLI Schemes: Boosting large-scale formalization

- Objectives :
- ① Incentivize large food processors to expand domestic production.
 - ② Promote branding and marketing of Indian products globally.

Impact on formalization & efficiency

- a) Scaling up of organized sectors
- b) focus on ready to eat, marine and organic products.
- c) Technology and Quality

upgradation

eg mandates ISO Certification

R&D investments

Challenges

- ① 40% FPI are still informal → Poor storage facilities
- ② only ~30% of funds disbursed (2024)
- ③ High investment thresholds exclude small processors (missing middle)

PM FME : Formalizing the unorganized sector

Objectives :

- ① Support 2L micro-enterprises via credit, training & branding
- ② Reduce post-harvest losses (93000cr loss Niti Aayog 2023)

Impact on formalization and efficiency

- ① Credit and Subsidy Access

a) 35.1. Capital subsidy for FPOs/SHGs

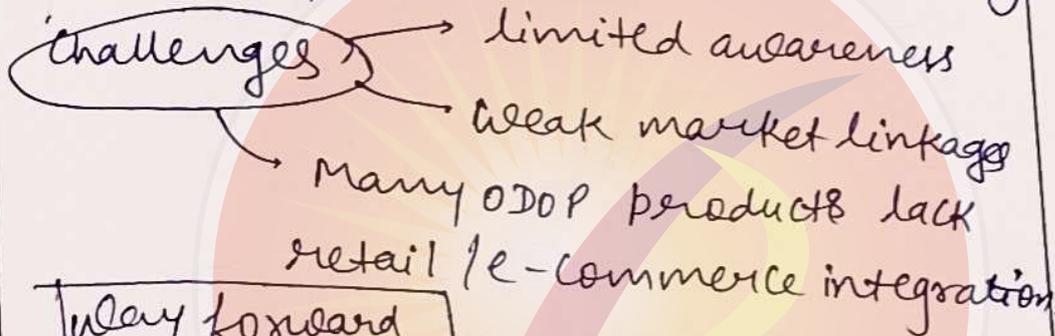
eg) Millet based clusters on Walmart

b) Standardization and branding

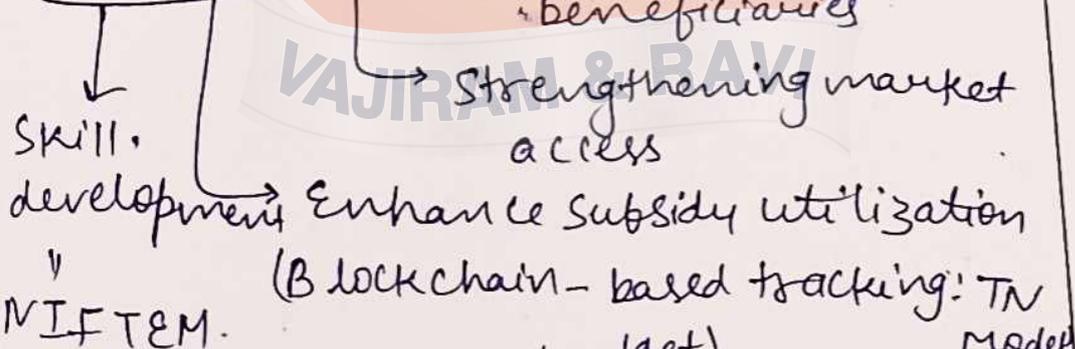
ODOP, Aspiration district

programme eg) Mahua - Jharkhand

c) Reducing wastage - mini processing units



Way forward for greater formalization



(Bihar 2025 union budget)
 Thus, better integration & faster implementation are needed to maximize impact of PLI - FME.

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14. Do you agree that granting a legal guarantee to Minimum Support Price (MSP) may create a fiscally unsustainable and economically inefficient agricultural system? Suggest viable alternatives to ensure fair farmer remuneration without distorting the market. (15 marks, 250 words)

MSP system in India started in 1960s to stabilize agricultural market, ensure food security and protect farmers income from price volatility.

Legalization of MSP may create a fiscally unsustainable and economically inefficient agricultural system.

- (i) Fiscal burden (₹516000 as per Eco. Survey 2024) if MSP extended to all 23 crops
- (ii) Market distortions - over production of MSP crops (rice, wheat leads to water depletion).
- (iii) Lack of FCI stock pile facilities (Post harvest loss 9.3% per annum)
- (iv) Exclusion of small farmers

only 6% farmers benefit
(mostly in green revolution belt) (Shanta Kumar panel)

- ④ Trade barriers - WTO may challenge MSP as "market-distorting (amber box) subsidy like US/EU farm policies"



Viable alternatives to MSP legalisation - on

- ① Direct income support (PM-Kisan model) → all farmers covered, no market interference
- ② Price deficiency payment system.
eg MP → Bharantari Bhugtan Yojana

- Pays farmers only when market price falls below MSP

③ crop diversification incentives -

Subsidies for non-MSP crops (millets, pulses, makhana) to reduce water-intensive wheat/rice.

eg) Andhra's ZBNM

④ Contract farming + market reforms

→ Reduces middlemen exploitation

⑤ Private mandi + e-NAM expansion.

⑥ Adopt EU-style per-acre-income support for ecological farming.

⑦ EU decoupling model (Green box subsidies)

Farmers earn stable income without over producing specific crops.

Thus, while it stabilized farm incomes it's inequitable reach & ecological cost & now demand reforms like direct income support.

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15. Digital Public Infrastructure (DPI) can empower developing countries to lead the global climate action narrative. Discuss with suitable examples.

(15 marks, 250 words)

DPI is a network of interoperable, open-source digital systems - can help developing countries leapfrog traditional barriers and drive inclusive, Scalable climate solutions.

DPI → developing countries to lead the global climate action narrative

(1.) Climate-smart agriculture -

➤ Digital soil health card + satellite-based advisories help farmers adopt precision farming, reducing fertilizer waste.

eg Kenya Digital Farm.

➤ Transparent carbon markets

DPI use - Blockchain-based carbon registries (eg India's Carbon Credit trading scheme) enable real-time tracking of emission

reduction.

③ Renewable energy access
Pay-as-you-go Solar in Nigeria

④ Disaster resilience - NAVIC
(India) predict floods/cyclones

⑤ Circular economy & waste management

eg → Cash for Trash Model - Singapore

DPI gives developing nations a leadership edge

Causes

① Cost-effective - India's SUPI transaction

② Scalable model, can be replicated globally

③ Inclusive - Reaches informal sectors

eg → farmers, waste-pickers who are excluded from traditional climate finance.

Challenges pertaining to it

- (i) Data privacy risks - Need robust data protection laws (eg India's DPDP Act vs IT Act Sec 8(i))
 - (ii) Digital divide - requires last-mile connectivity (5G, rural broadband)
 - (iii) Inter-country collaboration for DPI → supply chain risk.
Way forward
 - (iv) Global DPI alliance - share India's Aadhaar, UP I models with Africa, Latin America
 - (v) COP28 spot light - push DPI as a global public good for climate action
 - (vi) Green DPI funds (WB/IMF)
- Thus, DPI lets developing nations punch above their weight in climate leadership through democratizing data.

Preparation	
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16. Analyse the reasons behind the increasing vulnerability of the Himalayan region to landslides. What steps can be taken for their management and control?
(15 marks, 250 words)

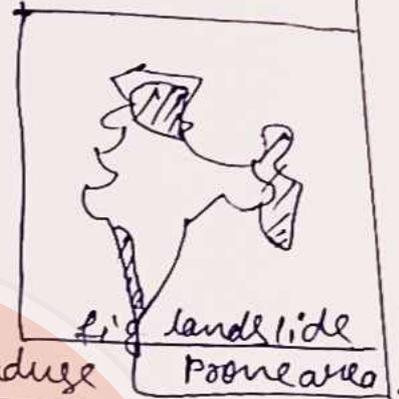
As per UNDP Himalayas account for 30% of global landslide fatalities. & Landslide is the sudden fall of rocks, debris due to pressure under gravity.

Reasons for rising landslide vulnerability

- (i) Geological: tectonically active and steep gradient hills
- (ii) Ecologically fragile, youth mountains - in.
- (iii) Climate change and extreme weather events eg WLOI (Sikkim) - in 2023 (Lhonak lake)
- (iv) Erratic rainfall - Intense cloud bursts (Himachal Pradesh 2023) Saturate slopes, causing debris flows.
- (v) Deforestation and infrastructure project eg unscientific blasting for highways (eg Char Dham project)

Forest loss - 15% decline in Himalayan forests (last 20 yrs FSI) reduces soil binding

(vi) ~~Seismic~~ Seismically active (Zone-V) loose soil eg Nepal 2015



(vii) Poor drainage & land use unregulated mining & waste dumping eg MC Mishra Committee - Joshi Mathe

(viii) unplanned urbanization & tourism (Shimla, Mussoorie)

- Impacts
- loss of life / Migration
 - Economic cost (eg HP lost 300 cr ₹)
 - Tourism erosion only in July 2015
 - Loss of agricultural land
 - water contamination & water borne disease.

Landslide management strategies

(I) Early warning system :

AI based monitoring : install sensors

ISRO land Slide Atlas to predict Slips.

(2) Ecological Restoration (Bradgily & Kasturi Rangan Committee)
eg → plant deep-rooted species like bamboo, Alder to stabilize slopes

(3) Engineering solutions

Controlled blasting; use micro-tunnelling for roads to minimize variations

(4) Policy & Planning -

Carrying capacity studies, shift villages from landslide-prone areas

(5) Community preparedness

eg NDMA - Atal Biju programme

(6) Climate adaptation -

biological mitigation, rainwater diversion to reduce slope saturation.

Thus, urgent action is needed to avoid disasters like 2023 Himachal floods by acknowledging climate & human pressure.

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17. Forest fires are yet another symptom of climate change. Analyze the various causes for wildfire in forests. Give two examples of recent wildfires. Mention the policies and frameworks aimed at tackling wildfire in India. (15 marks, 250 words)

According to FSI, over 36% of India's forest cover is prone to frequent fires. It is an uncontrolled and non-structural combustion occurring in forest area with high frequency.

Various causes for wildfire in forest

- ① Human activities - shifting cultivation, campfire, cigarette disposal etc.
eg) In Tamil Nadu, 99% of fires are human induced.
- ② Deforestation → opening the forest → prone to erratic heat wave.
- ③ Weather & climate - anticyclonic stability in the atmosphere.
- ④ Heat waves, prolonged dry spells and poor winter snow or rainfall.

increase its vulnerability.

eg) J&K \Rightarrow reduced snow (75% less than usual) dried out the forest floor.

5. Dried vegetation : leaf litter and pine needles accumulating over time act as fuel.

Impacts of Forest fires

① - Environmental and ecological ~~loss~~ hinder forest regeneration, soil health, CO_2 emissions increase

②. Smoke carries pollutants like $PM_{2.5}$, CO and carcinogenic compounds aggravating respiratory illness

③. Displacement near human settlements, man-animal conflict.

However it also has some positive impact -:

① Secondary succession ② Soil fertility

③ Kill mosquitoes or other undesirable species etc.

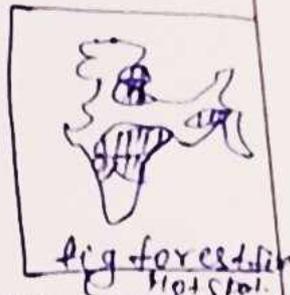
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- Recent examples
- (i) 32k forest fire 2025 Jun
 - (ii) Uttarakashi forest fire 2024
 - (iii) Kerala forest fire 2024

Government measures and policies:



- (i) National action plan on forest fire (2018) → community involvement, technology use, and capacity building
 - (ii) NISAR Sat, early warning system and real time weather forecasting
 - (iii) Community engagement
eg women led Sankist group in odisha raised awareness ~~and~~ related to forest fire
 - (iv) NDMA guidelines, State level coordination for information sharing, fire breaks to prevent spread of forest fire
- Thus, effective forest fire management in India demands pragmatic approach, use of tech & community participation.

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18. One Health approach is key to preventing future pandemics and preserving ecosystems. Analyze how the Biodiversity and Health Global Action Plan adopted at COP 16 aligns with this vision. (15 marks, 250 words)

The one health approach recognizes the interconnectedness of human, animal and environmental health. Crucial for preventing future pandemics.

COP 16 Biodiversity and health global action plan Aligns with one health

- ① Preventing zoonotic spillovers
- a) Habitat protection: Reduces deforestation and land-use changes that force wildlife into human areas.
 - b) Regulating wildlife trade - minimize high risk human animal contact
eg wet markets, illegal trafficking
 - c) Disease surveillance across human, animal and environmental sectors.

② Cross-Sectoral Collaboration

- a) Joint efforts between government, scientists, ecologists & veterinarians
- b) Align with WHO-FAO-WOAH (OIE) one health partnership.
- c) Encourages national one health policies integrating biodiversity into health strategies.
- ③ Sustainable agriculture and AMR reduction eg soil health & pollinators conservation
- ④ Addresses livestock farming impacts on ecosystems and antibiotic resistance
- ⑤ Indigenous & community involvement - Integrate traditional knowledge for sustainable wildlife management.
- ⑥ Ecosystem restoration, focus on urban biodiversity.

Challenges ahead

- (i) Funding gaps for integrated health - biodiversity programs
- (ii) Policy fragmentation between health & environmental agencies
- (iii) Corporate resistance from industries driving habitat loss (eg. agribusiness logging, green washing, biopiracy) etc.

Key actions for stakeholders needed

- (i) Governments: mainstream one health in national policies
- (ii) UN & WHO - strengthen cross-border coordination.
- (iii) Pharma & Agribusiness - Fund sustainable alternatives
- (iv) Scientists & NGOs - advocate for data-driven policies
- (v) Public - Lifestyle - Pro Environment.

Thus one health vision can succeed if COP16 plan is implemented with stronger governance, funding, innovation and equity

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19. In light of evolving national security threats, how do the New Criminal Laws address modern threats like cybercrime and organized crime? Outline the challenges perceived in its effective implementation.

(15 marks, 250 words)

The three criminal laws BNS, BNSS & BSA aim to modernize India's Criminal justice system to counter evolving national security threats.

Key provisions addressing Modern threats

- (i) Expanded definitions of Cybercrime by including cyber fraud, deep fakes, identity theft, cyber terrorism.
- (ii) Unauthorized sharing of personal data attract strict penalties.
- (iii) BSA validates electronic records, emails, blockchain as admissible evidence.
- (iv) Specialized investigation for digital crime
- (v) Stronger anti-organized measures.
eg. Money laundering, Ponzi Schemes

treated as organized crime

vi) Terrorism funding, cross border Smuggling. face enhanced ~~for~~ punishments

vii) witness protection under BNS and relocation safeguards

viii) National security and tech driven policing

eg mandatory fingerprinting & DNA profiling for serious crimes

ix) Sedition is replaced with deshdroh with wider definition.

Challenges in effective implementation

i) Lack of cyber-literacy, digital forensic, crypto-tracing

ii) Overburdened court may struggle with tech-heavy evidence interpretation

iii) Mass surveillance risk & vague

definition of anti-national activities

- (iv) Interagency silos - CBI, state police and cyber cells often lack real time data sharing
- (v) Corporate compliance burden to report cyber breaches within 72hrs
- (vi) Global cybercrime networks require global cooperation (Interpol etc)

Way forward (i) Capacity building via NIA & NICFS partnership

- (ii) Dedicated cybercrime benches in high court (Gulshan Rai Committee)
- (iii) PPP model - Meta, Google & CERT-In in threat intelligence.
- (iv) Balanced oversight → judicial review of surveillance powers to prevent misuse.

Thus, if 3 criminal laws implemented in letter & spirit, they could significantly curb cyber crime in India.

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20. Discuss how integrated border infrastructure and management practices can balance security imperatives with the socio-economic development of frontier communities. (15 marks, 250 words)

India has ~15000 km border with security threats due to sandwiched between golden crescent and golden triangle.

Smart border infrastructure: Security with connectivity

a) Multi-layered surveillance with minimal disruption.

eg Tech-driven monitoring use of AI-powered drones, thermal sensors

b) Deploy laser walls and motion sensors in sensitive zones while keeping traditional trade routes open.

c) Cross-border trade and mobility

d) Dedicated economic zones - Establish border haats and free trade corridors to boost local commerce.

e) Pre-clearance facilities: Allow fast-tracked immigration checks for residents with biometric IDs.

② Transport and digital connectivity

Road & Rail links: improve last-mile connectivity to land ports (Agartala-Dhaka rail route)

(a) mobile health units - address remoteness with traveling clinics

eg: India's Seema Bhadrani initiative - drive for women BSF medics

(b) Livelihood and skill development - eg: Wagah-Attari retreat ceremony

Challenges in implementation

<u>Challenges</u>	<u>Possible solution</u>
(i) Harsh restrictions (eg AFSPA) alienate locals	Community consultation before fencing projects
(ii) Smuggling & shadow economy	legalize traditional trade via regulated corridors
(iii) Poor roads hinder both security & development	PPP (HAM) projects

(N) Ethnic tensions

eg Manipur.

- Autonomous Councils for self-governance
- e.g.

eg Ladakh Hill Council.

(V) External provocations

eg Chinese incursion

Inter Country Cooperation

eg Operation all out

(Indo-Bhutan)

Way forward

① Adopt a secure & develop model
BSF + ITBP with skill centers

② Flexible regulation - issue multi-entry permits for pastoralist tribal communities

③ Gender responsive policies

Ensure women benefit from trade, health care and policing roles

Thus, integrated approach of border management can transform frontiers from zone of conflict to sustainable development.

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