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1. भारत में उच्च राजकोषीय घाटे में योगदान देने वाले कारकों पर प्रकाश डालते हुए, ऐसे घाटे के संभावित परिणामों पर चर्चा कीजिए तथा राजकोषीय समेकन (Fiscal consolidation) सुनिश्चित करने के उपाय सुझाइए। (10 अंक, 150 शब्द)
Highlighting the factors contributing to high fiscal deficit in India, discuss the potential consequences of such deficit and suggest measures to ensure fiscal consolidation.
(10 marks, 150 words)

Ans. Fiscal deficit refers to the difference in income and expenditure of a country/state including the borrowings.

FRBM act, 2005 limits fiscal deficit to 3% of GDP. However, Indian economy has reeled under high fiscal deficit. Budget 24-25 set the target of 4.5% fiscal deficit for this year.

Factors contributing to high fiscal deficit:

① Revenue side

i) low tax to GDP ratio

↳ tax: GDP is 11%, lowest among BRICS countries

↳ hardly 2.3% of voters are tax payers.

ii) Lack of other sources of revenue

↳ postal department

↳ outdated due to technology

② Expenditure side

i) welfare nature of state

↳ large number of subsidies

eg 2024-25 → 2 Lakh crore - food
subsidy, 1.64 Lakh crore - fertilizer
subsidy

ii) huge revenue expenditure

↳ state is a model employer

↳ large no. of employees,
better salaries

Consequences of such deficit

- ① large portion going in repayment of debt eg 34.1% in FY 23-24
- ② Fall in sovereign credit rating
- ③ Decreased capital expenditure
- ④ Retarded economic growth

Measures to ensure fiscal consolidation

① Rationalisation of tax slabs

↳ ↑ in tax : GDP

② Rational reduction in subsidies

eg # Giveit up campaign

③ Diversify sources of income of state.

India has to show fiscal prudence to
become \$5 trillion economy by 2028.

2. 2047 तक भारत के विकसित राष्ट्र बनने की आकांक्षा महत्वपूर्ण पूँजीगत निवेश पर निर्भर है। इसके आलोक में, इस लक्ष्य को प्राप्त करने में पूँजीगत निवेश की संभावनाओं पर चर्चा कीजिए। इस संदर्भ में भारत के समक्ष क्या चुनौतियाँ हैं?

(10 अंक, 150 शब्द)

India's aspiration to be a developed nation by 2047 hinges on significant capital investment. In light of this, discuss the potential of capital investment in achieving this vision. What are the challenges India faces in this regard? (10 marks, 150 words)

Ans.

Capital investment is aimed at creating tangible/intangible assets that generate income for the investor.
eg- investment to build a textile factory.

Potential of capital investment → achieving developed India by 2047 :-

- ① Generate economic growth → increased per capital income (PCI)

present PCI → \$2800
for developed nation → > \$30,000

- ② Generate employment opportunities

eg Acc. to NASSCOM, India's startup ecosystems will generate 10 million jobs by 2030.

- ③ capital investment will improve living standards of citizens.

Challenges faced by India in this regard

- ① ES-24 argued lack of participation by private sector.
- ② Lack of skill in youth.
eg ~51% of graduates → not employable
- ③ Regulatory control
eg Ease of doing business report, India ranked 63
- ④ Lack of women's participation
eg PLFS, female LFPR = 37%
- ⑤ Imbalanced regional development
eg 90% of investment in Gujarat, Maharashtra, Karnataka
- ⑥ Lack of expenditure on R&D
eg India spends only 0.8% of GDP on R&D

Therefore, to address above challenges, Indian government initiated start up India, Skill India mission etc.

These measures will help us in achieving vision of Developed India 2047.

3. "नगरीकरण में वृद्धि के साथ, पेरी-अर्बन/परिनगरीय कृषि (Peri-urban agriculture) ताजा कृषि उपज की आवश्यकताओं के लिए एक महत्वपूर्ण योगदानकर्ता के रूप में उभरी है"। इस संदर्भ में, सतत रूप से पेरी-अर्बन कृषि को बढ़ावा देने से सम्बंधित अवसरों और चुनौतियों पर चर्चा कीजिए। (10 अंक, 150 शब्द)

"With growing urbanization, peri-urban agriculture is emerging as a significant contributor to fresh farm produce needs". In this context, discuss the opportunities and challenges associated with promoting peri-urban agriculture in a sustainable manner.

(10 marks, 150 words)

Ans - According to a report, at present, about one third of population lives in urban areas and contribute to more than 2/3rd of GDP. By 2050, urban population is expected to cross 55%.

Peri-urban agriculture: significant contributor to fresh farm produce needs

- ① London → known as truck farming, it supplies fruits, vegetables and other fresh farm products to urban dwellers.
- ② India → tech cities such as Bengaluru, Pune, Chennai → peri urban agriculture is evident.

Opportunities associated with promoting peri-urban agriculture

- ① Land availability → lesser in urban centres available in peri-urban areas.

- ① Employment → rather than flocking to cities, local youth can engage in this.
- ② Enhanced income → using organic method products could be sold at premium.
- ④ Soil fertility → avoiding cereal monocropping boosts soil fertility.

challenges associated with sustainable peri-urban agriculture

- ① Lack of technology → in the absence of modern technology such as hydroponics, microirrigation etc., yield has not improved.
- ② Existing middle man → thus reducing profitability of farmers.
- ③ Quick commerce → has reduced foot fall in vegetable markets

Rapid urbanisation has presented the opportunity of peri urban agriculture, which has potential to increase farmer's income and economic growth of the region.

4. दालों और वनस्पति तेलों में आत्मनिर्भरता प्राप्त करने के लिए भारत के कृषि क्षेत्र के समक्ष कौन सी प्रमुख चुनौतियाँ हैं? इन चुनौतियों के समाधान भी सुझाइए। (10 अंक, 150 शब्द)

What are the major challenges faced by India's agriculture sector to achieve self-sufficiency in pulses and vegetable oils? Suggest measures to address these challenges.

(10 marks, 150 words)

Ans

India remains largest producer of pulses and largest importer of pulses and vegetable oils.

Major challenges : to achieve self-sufficiency in pulses and vegetable oils

① Cereal monocropping

- ↳ unintended consequences of policies
- ↳ high profitability in rice, wheat

② Cobweb phenomena

- ↳ due to information asymmetry, demand and supply mismatch.

③ Government policies

- ↳ reduced custom duty on import of pulses and vegetable oils
- ↳ farmer demotivated to grow pulses

④ Climate change

- ↳ increasing pest attacks
- ↳ pulses being protein rich → more vulnerable.

- ⑤ Lack of awareness
↳ that it can enhance soil productivity, generate better returns.

Measures to address these challenges

- ① MSP procurement
↳ promote pulses procurement.
- ② Incentivise crop diversification
eg Haryana govt. providing
₹ 17500/hacre for this
- ③ Import policies
↳ tweak them, to benefit Indian farmers.
- ④ Infrastructure creation
↳ for proper storage and minimize post harvest loss.
- ⑤ Insurance of crop
↳ to compensate farmer in case of losses.
- ⑥ Generate awareness among farmer

Ashak Dalwai committee highlighted cultivation of pulses to double farmer's income and ensure India's self-sufficiency in pulses.

5. भारत को एक सतत हरित अर्थव्यवस्था बनाने में जैव-विनिर्माण (Biomanufacturing) और जैव-फाउंड्री (Bio-foundry) की संभावनाओं का मूल्यांकन कीजिए। (10 अंक, 150 शब्द)
Evaluate the potential of biomanufacturing and bio-foundry in driving India's future towards a sustainable green economy. (10 marks, 150 words)

Ans-

As per Indian commitments under Paris deal, India ~~is~~ aims to become carbon neutral economy by 2070.

Technologies of biomanu-
facturing and bio-foundry aims to promote green economy by minimizing carbon emissions.

Potential of biomanufacturing and bio-foundry in driving sustainable green economy

- ① minimizes the use of fossil fuels, which are one of the largest emitters
- ② Using biological techniques, these processes can be made sustainable
↳ ensure long term benefits
- ③ Biomanufacturing ensures the carbon footprint of a manufacturing process is minimum
↳ with same efficiency & effective

- ④ It can be further extended to other sectors of economy as well.
- ⑤ Use of biofuels further reduces wastage going into landfills and creating green house emissions
eg Methane emission.

However, these processes face certain challenges:

- ① Technology is not yet at mass scale
↳ lacks economy of scale
↳ prices not competitive with conventional manufacturing
- ② Due to Government regulatory burdens
↳ lack of interest by private sector.

To fulfill SDG-7 i.e. access to clean energy and environment, bio-manufacturing and bio-foundry are very helpful.

6. पुनः प्रयोज्य प्रक्षेपण यान (RLV) की कार्यप्रणाली के पीछे क्या सिद्धांत हैं? भारत के अंतरिक्ष वाणिज्य में आर.एल.वी. के उपयोग के महत्व और संभावित लाभों की व्याख्या कीजिए। (10 अंक, 150 शब्द)

What are the principles behind the working of Reusable Launch Vehicle (RLV)? Explain the significance and potential benefits of use of RLVs in India's space commerce.

(10 marks, 150 words)

Ans

Recently successful demonstration of Pushpak -RLV by ISRO as a part of Gaganyaan - project, established milestone in India's space capabilities.

Principle behind the working of Reusable launch vehicle (RLV)

- ① Vertical take off vertical ^{descent} lift (VTVD)

↳ Space X's falcon rockets

↳ engine is fired to generate reverse thrust to avoid crash landing

- ② Vertical take off. Horizontal descent (VTHD)

↳ ISRO's - Pushpak

↳ Uses aerodynamic principle

just like airplane wings, it generates reverse lift

↳ Guides while descending.

Significance and potential benefits of RLV in space commerce

- ① Having capability of manned missions
 - ↳ useful in spacetourism
- ② Reduces cost of space launches
 - ↳ some hardware can be used again
- ③ Increased frequencies of launches
 - ↳ Since cycle time is reduced.
 - ↳ only 20% new parts are required
- ④ Technological capability
 - ↳ material science benefits by observations and experiments on RLV.
- ⑤ Boosts space economy.

Therefore, success of India in RLV will prove to be a catalyst in country's economic growth and scientific excellence.

7. कार्बन क्रेडिट ट्रेडिंग स्कीम (CCTS) 2023 की प्रमुख विशेषताओं का परिक्षण कीजिए। भारत में हरित गृह गैस (Greenhouse gas) उत्सर्जन को कम करने की इसकी संभावनाओं का विश्लेषण कीजिए। (10 अंक, 150 शब्द)
Examine the key features of the Carbon Credit Trading Scheme (CCTS) 2023. Analyze its potential for mitigating greenhouse gas emissions in India. (10 marks, 150 words)

Ans

Carbon Credit trading
scheme (CCTS, 2023) aimed to incentivise
adoption of green technology following
the 'polluter pays principle'

Key features of CCTS, 2023

- ① Reduction in carbon emission, as per
given targets, will earn credits.
- ② These credits will be tradeable
↳ one having extra credits, can
sell to one having lesser credits.
- ③ The trade will be done on exchanges
notified.
- ④ Organisation having shortfall in credits
will be penalised.
- ⑤ Startups and MSEs will be provided
certain relaxations -

Potential in mitigating greenhouse gas emissions in India

① Targets Industries

↳ one of the largest GHG emitters

② Incentivises adoption of green technology

↳ leading to reduced emissions

③ In fear of penalty, polluting industries either have to upgrade or shell money to purchase credits

↳ operant conditioning

↳ leading to following climate norms

④ Trade on exchange → reduces govt. involvement → better efficiency

CCTS 2023, when combined with green credit initiative has the potential to exponentially reduce emissions.

As declared by India in Panchamrit, CCTS will help us to achieve carbon neutrality.

8. पिछले दशक में हीट वेव की बढ़ती गहनता, आवृत्ति और अवधि के मद्देनजर, क्या "हीट वेव" को अब आपदा प्रबंधन अधिनियम, 2005 के तहत एक अधिसूचित आपदा के रूप में शामिल किया जाना चाहिए? (10 अंक, 150 शब्द)
In light of the increased intensity, frequency and duration of heat waves in the last decade, do you think the time has come to include "heat waves" as a notified disaster under the Disaster Management Act, 2005? (10 marks, 150 words)

Ans-

Heatwaves refer to abnormally high temperature conditions that may be fatal for human beings.

Increasing intensity, frequency and duration of heatwaves: Reasons

- ① Concretisation of cities
↳ leading to trapping heat and increasing temperature.
- ② Deforestation
↳ absence of trees, deteriorates condition.
- ③ Climate change
↳ increased El-Nino events
↳ reduced precipitation, extended dry spell.
- ④ Use of Air-conditioners
↳ further increasing atmospheric temperatures.

Yes, time has come to include 'heat waves' as a notified disaster under disaster management act, 2005

① As it would lead to reduction in fatal cases, because of better care, responsive administration

② It would lead to efforts for prevention of heat waves

Such as - afforestation,
ban on outdoor working in peak sun hours,
cold water facilities for people etc

③ It would lead to better awareness among people.

However, merely notifying under act will not solve the purpose, further we have to

① adopt mission LIFE to reduce impacts of climate change

② Take precautions in summers etc.

To fulfill SDG-3 i.e. health to all, India should properly handle disaster of heatwaves.

9. भारतीय सशस्त्र बलों द्वारा हाल ही में तैयार किए गए 'साइबर-अंतरिक्ष अभियान (Cyberspace operations) के लिए संयुक्त सिद्धांत' से पारंपरिक ऑपरेशनों के साथ-साथ ग्रे जोन युद्ध दोनों के लिए साइबर-सुरक्षा स्थिति मजबूत होगी। परीक्षण कीजिए। (10 अंक, 150 शब्द)

Recently formulated 'joint doctrine for cyberspace operations' by Indian armed forces will lead to strengthening of the cyber-security posture for both conventional operations as well as gray zone warfare. Examine. (10 marks, 150 words)

Ans National Security advisor
(NSA) highlighted cyber-warfare as the
5th dimension and space-warfare as the 4th
dimension of modern times.

Joint doctrine of cyberspace operations:
strengthening of cybersecurity for conventional warfare

- ① It will enhance border security by
monitoring cyberspace.
↳ counter-infiltration operations
- ② Stops terror funding
↳ using crypto currencies through
offshore accounts
- ③ Break organised crime-terror nexus
↳ by cracking on their cyber accounts
↳ operation pigeon by kerala police

doctrine: helpful in gray zone warfare

Grayzone warfare refers to enemy's activities that are less than full scale war but have potential to disturbing peace.

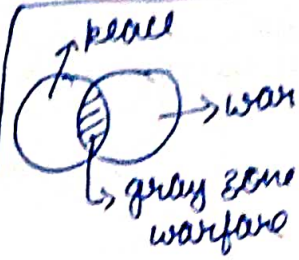


fig - gray zone warfare

- ① Stops radicalisation of youth
↳ monitoring social media space
- ② Prevents leakage of any sensitive info.
↳ tightens cyber-security
- ③ establishes standard operating procedures
↳ in case of any tensed situations
- ④ Training to officers → to counter such efforts

way ahead

- ① Use of cutting age tech such as AI to further strengthen our cyber-security
- ② Global collaboration & adopt their best practices.

Surrounded with adversaries in region, cyber security will help India achieve peace and prosperity in long terms.

10. पाकिस्तान और बांग्लादेश से सटे राज्यों में सीमा सुरक्षा बल (BSF) के प्रादेशिक क्षेत्राधिकार के विस्तार की आवश्यकता एवं संभावित मुद्दों पर चर्चा कीजिए। (10 अंक, 150 शब्द)

Discuss the necessity and potential issues surrounding the extension of the Border Security Force's (BSF) territorial jurisdiction in states adjacent to Pakistan and Bangladesh.

(10 marks, 150 words)

Ans

Recently Government of India, extended jurisdiction of BSF, upto 50 km from border, in states like punjab, Himachal, uttarakhand and west Bengal.

This change was opposed by states governments of punjab and west bengal.

Necessity for extension of BSF's jurisdiction

- ① Increase in illegal cross border activities

eg in 2023, more than 500 drones were sighted on pak border, out of which 119 were shot down by BSF.

- ② Gray zone warfare tactics

↳ hence need for collecting better ground ~~int~~ intelligence

- ③ Ineffectiveness of state police in such matters

↳ BSF needs to take matter in its hand.

Potential issues : extension of BSP's jurisdiction

① Federal conflict

↳ Since state police → under state control
BSP → under central control

② Increased conflicts in civilian areas

↳ people believe that it will be similar to N-E states

③ Human rights issues

↳ experts argue that, lack of state govt's control may lead to this

④ Affected development of region

↳ due to armed forces' control economic development of these regions will be affected.

way ahead

① Bring scheme similar to vibrant villages program → to ensure development of these areas.

② Ensure that human rights violation are not allowed.

Therefore, increased security at border regions will lead to development in the country.

11. भारत की आर्थिक विकास की कहानी प्रायः बेरोजगारी की निरंतर चुनौतियों से प्रभावित होती है। संरचनात्मक बेरोजगारी की अवधारणा का विश्लेषण कीजिए और भारत की वर्तमान आर्थिक स्थिति के संदर्भ में इसकी प्रासंगिकता पर चर्चा कीजिए साथ ही समावेशी रोजगार को बढ़ावा देने के लिए नीतिगत उपाय सुझाइए। (15 अंक, 250 शब्द)

India's economic growth story is often overshadowed by the persistent challenges of unemployment. Analyze the concept of structural unemployment and discuss its relevance in the context of India's current economic situation. Suggest policy measures to promote inclusive job growth. (15 marks, 250 words)

Ans

IMF declared India a 'bright spot', one of the fastest growing economies of the world. In 2023-24, real GDP growth rate was 8.2%.

However, along with the economic growth, India has huge force of unemployed youth, primarily due to structural unemployment.

Structural unemployment :-

It is a type of unemployment among youth, primarily arising out of mismatch of skills demanded by industries and possessed by applicant.

It's causes are

- i) lack of skills
- ii) outdated curriculum at educational institutes
- iii) no upskilling, reskilling

Relevance of structural unemployment in India's current economic situation

- ① To enhance India's economic growth further → we need to focus on emerging sector such as AI, automation, robotics
↳ skilled youth needed.
- ② To solve the issue of 'missing middle' i.e. manufacturing sector growth
- ③ To take advantage of China + 1
↳ developed countries looking for alternative of china for shifting their business.
- ④ To reap demographic dividend
↳ skill training is required, otherwise we will have demographic bomb at our hands.
- ⑤ To sustain the present economic growth in long run
↳ skilled youth is required

Policy measures to promote inclusive job growth:

- ① Imparting vocational training to college students
↳ part of NEP-2020
- ② Internship in established industries -
↳ announced in budget 24
- ③ Upskilling and re-skilling of employees
↳ to increase productivity
- ④ Training to women
↳ eg Drone didi scheme
- ⑤ Artisans' skills should be recognised and further enhanced
↳ eg Vishwakarma scheme
- ⑥ Cooperate with foreign countries to impart training and create jobs
↳ eg EFTA with EU deal, 2024

Therefore by ensuring inclusive job growth, India can achieve its vision of \$5 trillion economy by 2028.

12. भारत में क्षेत्रीय विकास को बढ़ावा देने में सूक्ष्म, लघु और मध्यम उद्यमों (MSMEs) की भूमिका पर चर्चा कीजिए। औद्योगिक विविधीकरण और उन्नत प्रौद्योगिकी प्राप्त करने में डैडमे किस प्रकार योगदान दे सकते हैं?

(15 अंक, 250 शब्द)

Discuss the role of Micro, Small, and Medium Enterprises (MSMEs) in fostering regional growth in India. How can MSMEs contribute to achieving industrial diversification and technological advancement?

(15 marks, 250 words)

Ans

MSMEs are classified on the basis of investment made and revenue generated.

	↓	↓	↓	↓
Investment	< 1 cr	< 5 cr	< 10 cr	
Revenue	< 5 cr	< 25 cr	< 50 cr	
type	micro	small	medium	

Role of MSMEs in fostering regional growth:

- ① These are based on local labour, raw material etc.

eg → Kanpur - leather units

- ② Provide employment to youth, women and artisans in region
↳ reduced migration

- ③ Development of infrastructure
such as - Rail, road etc.
↳ increased connectivity

- ④ Leads to better facilities for health, education etc. in the region.

MSMEs contributing in industrial diversification

- ① owing to small size, flexible in its operations
↳ can cater to demand

- ② MSMEs facilitate the flow of capital in unconventional industries
such as - pickle industry

- ③ Industrial diversification is achieved promoting regional products.

MSMEs contributing in technical advancement

- ① MSMEs are short of funds
hence they innovate

↳ increased efficiency

- ② Involvement of educated youth in MSMEs

↳ focus on tech upgradation

↳ enhances profitability

Steps by government to support MSMEs

- ① Ease of compliance
 such as - single window clearance
 in environmental certification
 ↳ self-certification for EPFO, ESIC norms
- ② Funds of fund for MSMEs
 ↳ to provide loans and other financial assistance
- ③ Udhyam portal
 ↳ for MSME registrations
- ④ Tax holiday
 ↳ for certain period
 ↳ increases profitability

However
more needs
to be done

- technology upgradation
- export orientedness
- ease of exit

We should take inspiration from German Mittelstand companies, similar to Indian MSMEs. They contribute 60% to GDP and 80% to export.

13. "MSP का एकमात्र उद्देश्य किसानों को आकस्मिक मूल्य परिवर्तन के आघात से बचाना है"। क्या आपको लगता है कि MSP को वैधानिक बनाने से किसानों को आकस्मिक आघातों से बचाया जा सकेगा? MSP आधारित खरीद को प्रभावी बनाने के लिए अन्य कौन से उपाय किए जा सकते हैं? (15 अंक, 250 शब्द)
- "The sole point of MSP is to protect farmers from sudden price shock". Do you think legalization of MSP can insure farmers from sudden price shocks? What are the other measures which can be taken to make MSP-led procurement effective? (15 marks, 250 words)

Ans

Farmers are protesting at Delhi-Haryana Sanghu border to legalise the MSP.

Purpose of MSP: to protect farmers from sudden price shocks

① Prior to MSP regime, price was decided by middle men at APMC mandi.

↳ due to manipulation, farmers realised little profits.

② Post MSP, minimum selling price is already fixed.

↳ middle men has little control

③ Government discloses MSP before sowing → farmer can take an informed decision.

④ Farmer's income is secured and augmented.

However, there are certain issues with current MSP regime

- ① Though in principle for 22 crops, in reality rice and wheat are given priority.
- ② Procurement said to be open-ended
↳ depends on discretion of FCI
- ③ Farmers from remote areas
↳ have to arrange for transport to bring grains to procurement centre.
↳ dissuades them
↳ subjected to middlemen

Therefore, the above challenges, present the case for legalisation of MSP:

- ① It would assure farmer of procurement
- ② apart from wheat & rice, also will be procured
- ③ saves farmers from distress.

However, this will reduce burden on Government. Already FCI has more than 3-4

times of the buffer stock in its godowns.

other measures to make MSP-led procurement effective.

① Strengthening of e-NAM

↳ match buyers and farmers all across the country.

↳ reduced burden on ~~FCI~~ FCI.

② Use of technology such as data analytics

↳ FCI can accordingly manage warehouses and plan procurement

③ Allow sale of produce outside APMC

↳ base price already set by MSP

↳ better price discovery by farmer

④ PM-AASHA

↳ farmer sell at APMC, at market

price
↳ govt. pay the gap

Therefore, above methods will not only enhance the farmer's income but also reduce the subsidy burden of Govt. In long run, it will help us comply with WTO's norms.

14. भारत में खाद्य सुरक्षा सुनिश्चित करने के लिए सार्वजनिक वितरण प्रणाली (PDS) में भारतीय खाद्य निगम (FCI) की भूमिका पर चर्चा कीजिए। भारतीय खाद्य निगम की दक्षता और प्रभावशीलता को बढ़ाने के लिए इसकी कार्यप्रणाली में आवश्यक सुधारों को सुझाए। (15 अंक, 250 शब्द)
Discuss the role of the Food Corporation of India (FCI) in the Public Distribution System (PDS) to ensure food security in India. Suggest necessary reforms in the functioning of FCI to enhance its efficiency and effectiveness. (15 marks, 250 words)

Ans Indian government, under National food security act 2013 (NFSA), provides food grain to poor citizens at a heavily discounted price. The mechanism for food grain distribution under NFSA, is known as Public distribution system (PDS).

Role of FCI in PDS to ensure food security in India:

FCI is a government enterprise, tasked with procurement; transportation, storage and distribution of food grains.

① FCI identifies vendors, to be designated as fair price shops. (FPS)

② FCI distributes food grains to these FPS and they have to distribute it to beneficiaries.

- ③ FCI establishes mechanisms such as e-Pos (point of sale) devices to ensure, leakages are minimums.

However, this process has certain loopholes as following:

- ① Storage is not proper
 - ↳ foodgrain gets spoiled
 - ↳ not edible
 - ↳ (still distributed)
- ② Distribution schedule on FPS is not enough publicized.
 - ↳ poor have to come again and again
- ③ Blackmarketing and leakages
 - ↳ due to collusion of officials and vendors
- ④ Delay in filing audit reports of POS
 - ↳ lack of transparency

Necessary reforms in the functioning of FCI to enhance its efficiency and effectiveness:-

- ① Involvement of independent auditor
↳ increased transparency
- ② Fast decision making by roping in industry experts in management of FCI
- ③ Compulsory biometric authentication at all PDS.
- ④ Geotagging of warehouses
- ⑤ Use of RFID and GPS for real time tracking of transport vehicles.
- ⑥ Public-private-partnership for infrastructure development.
- ⑦ Providing more autonomy (financial & administrative) to FCI
- ⑧ Social audit of PDS just like MGNREGA

To fulfill SDG-2 i.e. zero hunger

India must strengthen its PDS mechanisms
Increased nutrition will help us reap our demographic dividend in long terms.

15. भारत में कृषि उत्पादकता और खाद्य सुरक्षा बढ़ाने में नैनो प्रौद्योगिकी की भूमिका पर चर्चा कीजिए। नैनो-उर्वरकों और नैनो-कीटनाशकों के उपयोग के हाल के विकास/प्रगति और संभावित लाभों एवं जोखिमों पर प्रकाश डालिए।

(15 अंक, 250 शब्द)

Discuss the role of nanotechnology on enhancing agricultural productivity and food security in India. Highlight recent developments and potential benefits and risks of use of nano-fertilizers and nano-pesticides.

(15 marks, 250 words)

Ans Recently IPFEO with Indira Gandhi agricultural research centre developed nano-urea, which is much cheaper and effective compared to conventional urea.

Role of nanotechnology on enhancing agri productivity and food security:

① In fertilizers

eg Nanourea

↳ reduced cost
↳ increased yield

↳ using fertigation (irrigation + liquid nano urea)

↳ increased effectiveness

↳ better yield

② As Pesticides

↳ nanotechnology → enhances effective surface area

↳ its use → increased productivity

- ③ Enhanced productivity will result in food security.

Recent developments in nanotechnology:-

- ↳ liquid nano urea
- ↳ by IFFCO
- ↳ nano pesticides by ICAR

Potential benefits of nano-fertilizers and nano-pesticides

- ① Increased effectiveness

- ↳ due to nano size of particles
- ↳ enhanced surface area of application.

- ② Reduced cost

- ↳ same productivity can be achieved by much lesser amount of nano-urea

eg 200 ml of liquid urea is equivalent to 25 kg of conventional urea

- ③ Environmental benefits

- ↳ excess application of conventional urea
- ↳ led to eutrophication of lakes

- ↳ soil salinity
- ↳ water pollutions etc.

Potential risks of nano-fertilizers and nano-pesticides

① Harmful to farmers

- ↳ nano dimension
- ↳ easier to penetrate lungs
- ↳ danger of lung diseases

② Harmful to environment

- ↳ causes air pollution
- ↳ bioaccumulation in food chain

Way ahead

In wake of above potential risk

① use of drones for pesticide spray

- ↳ reduced risk for humans

② conduct extensive research

- ↳ to study effect on environment

③ Adopt organic farming

Therefore by taking above precautions, we can make farming, remunerative for farmers and enhance their earnings.

16. 2023 का भौतिकी का नोबेल पुरस्कार क्वांटम डॉट्स के संश्लेषण की खोज के लिए एकिमोव, रुस और बावेंडी को संयुक्त रूप से दिया गया। इस संदर्भ में क्वांटम डॉट्स के अनुप्रयोगों पर चर्चा कीजिए। (15 अंक, 250 शब्द)
The Nobel Prize in Physics of 2023 was jointly awarded to Ekimov, Brus and Bawendi for the discovery of synthesis of quantum dots. In this context, discuss the applications of quantum dots. (15 marks, 250 words)

Ans:

Quantum dots, are semiconductor material of nanometer dimensions which exhibit ~~color~~ size dependent opto-electrical properties.

Principle of working: Quantum dots

- ① Macrosize particles, remain same (opto-electric characteristics) even after they are broken.

eg this paper, when torn in two piece, will still remain white.

- ② On the other hand, Quantum dots exhibit different colour, on being different size, due to

i) discrete energy levels

↳ depending on energy gap, color is emitted (shown in fig.)

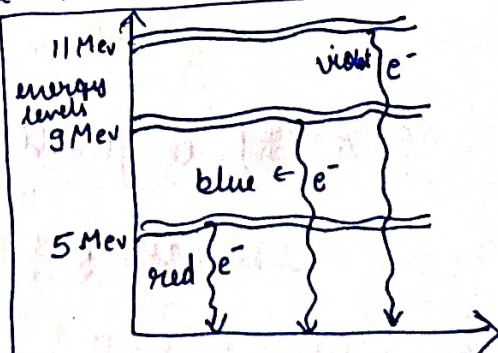


fig - energy levels/size

Physics Nobel prize 2023 → Synthesizing the quantum dots

- ① Ekimov, Brus and Bawendi worked on production of these quantum dots and observing their properties.
- ② Nanodimensions of these materials made the process more challenging.
- ③ They observed both color properties and electric properties as being a function of quantum dot size.

Application of Quantum-dots

① Q-LEDS

↳ by controlling colors in the individual pixel, by controlling current supplied to each pixel.

↳ provides better contrast and lesser latency in picture.

However, it is costly as compared to available LEDs and OLED in market.

② Medical application

↳ as biosensors

↳ to detect tumors

↳ as light will be reflected only in affected cells.

③ In research experiments

↳ owing to its unique properties.

④ In IT industry

↳ in quantum computing

↳ q-gates are made up of quantum dots.

⑤ Environment conservation

↳ to gather information about climate change, effectiveness of human efforts etc.

Therefore, by utilizing the potential held by quantum dots, humanity can take leap in development and ensure better living standards to all.

17. भारत में जैव विविधता संरक्षण में आरक्षित क्षेत्रों (Protected areas) की भूमिका का मूल्यांकन कीजिए। भारत की जैव विविधता को संरक्षित करने में राष्ट्रीय उद्यान, वन्यजीव अभयारण्य और बायोस्फीयर रिजर्व (जैवमंडल निचय) कितने प्रभावी रहे हैं? (15 अंक, 250 शब्द)

Evaluate the role of protected areas in biodiversity conservation in India. How effective have national parks, wildlife sanctuaries, and biosphere reserves been in preserving India's biodiversity? (15 marks, 250 words)

Ans

India has designated more than 16% of its geographical area as protected area, either as national parks, wildlife sanctuaries or biosphere reserves.

Role of protected areas in biodiversity conservation

- ① Reduces human intervention in animal's roaming area

↳ less man-animal conflict

- ② strict laws against poaching

↳ animal population increases

↳ Tiger population reached new high > 3600 in 2024 census.

- ③ Peaceful areas → enhanced animal reproduction

↳ increase in numbers

- ④ For flora → multiplies in absence of exploitation.

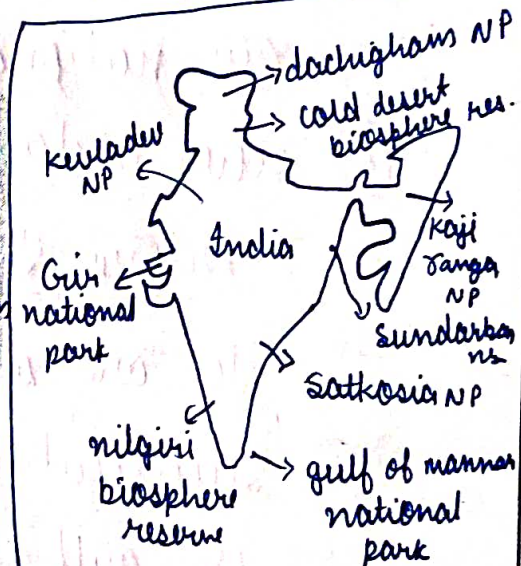


fig: a few of the protected areas in India

Effectiveness of National parks, wildlife sanctuaries, and biosphere reserves in preserving India's biodiversity:

- ① Successful revival of tiger population by project Tiger, 1973
- ② We have been able to prevent extinction of Asiatic lion in our national park.
- ③ Other endangered species such as Nilgiri tahr, Indian pangolin etc. are also preserved in wild.
- ④ Successful revival of mangroves in Gulf of Mannar national park
- ⑤ Bhitarkanika reserve → important for olive ridley sea turtle → protection to its eggs
- ⑥ Sundarbans → protection to mangroves, royal bengal tiger, florican etc.

However, despite our efforts we have several examples of shortcomings such as

① Rajasthan → Great desert national park

↳ Great Indian bustard (critically endangered) dying due to electric lines passing through national park

② Cheeta → extinct in wild

↳ reintroduced by translocating from Namibia

↳ 8/20 dead till now.

③ Due to mining activities, railway

infra, corridors are obstructed

→ leading to death of animals.

measures
needed

→ continuous wildlife corridors,
connecting protected areas

eg MP → Rani durgawati TR

↳ protection to animals at railway
crossing eg Gajraj AI system

Therefore by adopting above measures,
we can ensure that animals and trees i.e.
flora and fauna remain unthreatened.

18. भारत में पार्टिकुलेट मैटर (PM_{2.5} and PM₁₀) और ओजोन प्रदूषण के उच्च स्तर होने के क्या कारण हैं? पार्टिकुलेट मैटर और ओजोन प्रदूषण को कम करने के लिए सरकार द्वारा किए गए विभिन्न प्रयास कितने प्रभावी रहे हैं?

(15 अंक, 250 शब्द)

What the causes of high levels of particulate matter (PM_{2.5} and PM₁₀) and ozone pollution in India. How effective are the various steps taken by the government to mitigate particulate matter and ozone pollution? (15 marks, 250 marks)

Ans

Particulate matter (PM_{2.5} & PM₁₀) are a type of pollutants that are causing severe respiratory issues to people. According to a Lancet survey, on an average 2 million loose their lives due to air pollution, every year.

Causes of high levels of PM_{2.5} & PM₁₀

① Industrial flue gases

↳ combustion of any substance generate these particles.

↳ However if treated/arrested they will not be released in air.

↳ Proper treatment ~~to~~ ESP in thermal power plants

② vehicles

↳ Exhaust of IC engine release PM particles.

② Household sources

↳ use of firewood to cook, releases PM 2.5 and PM 10.

causes of ozone pollution

↳ Ozone (O_3) pollution is a tertiary pollution, causing skin irritation, eyes irritation etc.

① vehicular premissions

↳ especially in winter season

② Industries

Normally, with rain these pollutions would come down or with wind they will scatter but in winters, due to high atmospheric pressure, they remain in its place and concentration increases.

Effectiveness of steps taken by government to mitigate these pollutions:

① vehicles :-

• BS IV and below not allowed for registration

• compulsory PVC certificate (pollution under control)

② Industry

↳ compulsory FGD & ESP in power plants (flue gas desulphurisation + electrostatic precipitator)

↳ environmental clearance from regulatory bodies

③ Artificial rain

↳ to bring down pollution in concentrated regions

↳ NCR region

④ Alternatives to stubble burning

↳ Happy Seeder

⑤ Air purifiers on cross roads

way Despite these measures we have not seen significant reduction in pollution levels.

way ahead → adoption of mission LIFE
→ technology upgradation

By ensuring clean environment, and healthy people, we can leverage our demographic dividend.

19. अंतर्राष्ट्रीय नारकोटिक्स नियंत्रण बोर्ड (INCB) रिपोर्ट 2023 दक्षिण एशिया में मादक पदार्थों की तस्करी के बढ़ते खतरे को प्रदर्शित करती है, जिसका कि भारत एक प्रमुख केंद्र है। भारत के संदर्भ में इस चुनौती के विभिन्न आयामों का विश्लेषण कीजिए। साथ ही, इससे निपटने के लिए बहु-आयामी दृष्टिकोण भी सुझाइए। (15 अंक, 250 शब्द)

The International Narcotics Control Board (INCB) Report 2023 highlights a growing menace of drug trafficking in South Asia, with India being a major hub. Analyze the various dimensions of this challenge with respect to India. Also suggest a multi-pronged approach to address it. (15 marks, 250 words)

Ans According to a report, BSP shot down 119 drones carrying drugs across the border in 2023. In another news, Indian coast guards busted drugs worth more than ₹ 5000 crore in Indian ocean.

Growing menace of drug trafficking in south asia
India being a major hub

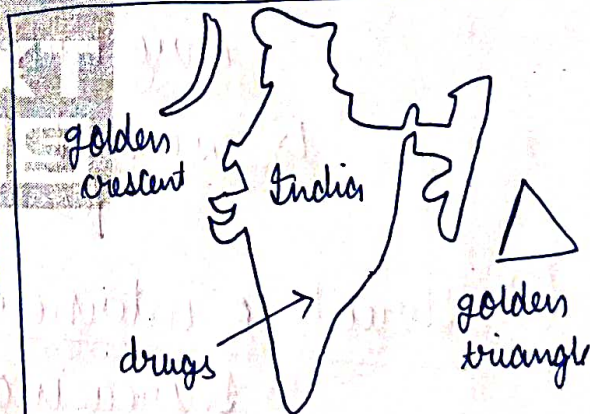


fig - Drug menace in south asia

① Geographical position

↳ sandwiched between golden crescent and golden triangle

② Political crises in neighborhood

- ↳ Afghanistan → taliban promoting opium cultivation
- ↳ Myanmar → Junta rule
 - ↳ economic crisis
- ↳ Sri Lanka → illegal drug trafficking

⑧ Unemployed youth

↳ vulnerable to drug addiction

④ organised crime - terror nexus

↳ funds from drug trafficking
funding terror activities.

Various dimension of this challenge with
respect to India:

① Enhanced border security threats

↳ border crossing required for
drug trafficking

↳ use of technology

↳ Drones

② Threat to internal security

↳ increasing youth population
getting addicted to drug

↳ brainwashing or forcing to
act against state.

③ Threat to economic growth

↳ money flowing into drugs

↳ youth wasting their lives

④ Disturbed social harmony

⑤ support to terrorism & insurgency

Multipronged approach to address this menace

① At National level

- ↳ enhance border security
using tech → AI, drones, IR tech
- ↳ curbing funding of drugs
↳ using vigilance tools

② At societal level

- ↳ family engaging with police to rehabilitate the addict
- ↳ inculcate values in youth

③ Diplomatic efforts

- ↳ to reduce cross border
drug trafficking
- ↳ impose state actors
encouraging it.

To curb the menace of drugs,
above multipronged approach will be helpful.

By ensuring drugs free society, we can
ensure peace and prosperity of humanity -

20. वामपंथी उग्रवाद के प्रति भारत की प्रतिक्रिया (कारवाई) में नक्सलवाद के मूल कारणों को दूर करने के लिए कठोर सुरक्षा उपायों के साथ-साथ सामाजिक-आर्थिक नीतियों और संवाद जैसे नरम दृष्टिकोणों/उपागमों (Soft approaches) को एकीकृत करने की आवश्यकता है। चर्चा कीजिए। (15 अंक, 250 शब्द)

India's response to left wing extremism needs to integrate soft approaches like socio-economic policies and dialogue along with hard security measures to address the root causes of Naxalism. Discuss. (15 marks, 250 words)

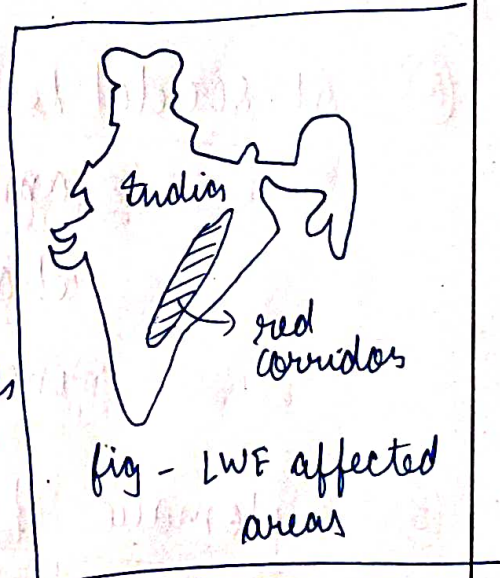
Ans Naxalism is a left wing, extremist ideology, which aims to eradicate the state rule and establish marxist communism.

India's conventional response to Naxalism

① Bullet was answered with bullet.

② Target was complete elimination of extremists

③ Implementing APSPA in certain, highly affected areas.



However, This result took a long time and still we were not able to eradicate Naxalism.

India's changed approach: socio-economic policies and dialogue with hard security measures

- ① The priority was given to socio economic development
such as - schools, hospitals,
industries
- ② Enhanced social capital and economic parameters
↳ generated trust towards govt.
in the hearts of public.
- ③ Dialogue with locals
↳ hearing their grievances
↳ publicising govt's welfare policies
↳ taking feedback of security situation
helped government, as locals felt they
have a say in governance.
- ④ Regular elections in canal-affected areas
↳ from bullet to ballot
↳ representative of locals can
represent their grievances in assembly.
- ⑤ Exposing Naxalite's true face in public
ie their motive is to gain control
of economic and political power.

- ⑥ Along with hard security measures
- ↳ ensuring no innocent life is lost
 - ↳ No naanal extremist is able to escape security forces
 - ↳ ungoverned spaces, a heaven for naanals, are eliminated.

Result of changed approach

- ① Significant reduction in events of violence
- ② increased participation of locals in democratic process.
- ③ Naanals are at the backfoot.
 - ↳ almost eliminated.

'Winning hearts and minds'
strategy of Armed forces and Indian government has ensured peace in LWE affected areas.