

112

SCIENCE & TECHNOLOGY AND ENVIRONMENT

Time Allowed: 3 hrs.

Max. Marks: 250

Q.	Marks	Instructions to Candidate
1.	3.0	<ul style="list-style-type: none"> There are 20 questions. All questions are compulsory. The number of marks carried by a question is indicated against it. Answers to questions no. 1 to 10 should be in 150 words, whereas answers to questions no. 11 to 20 should be in 250 words. Keep the word limit indicated in the questions in mind. Answers must be written within the space provided. Any page or portion of the page left blank in the Question-cum-Answer Booklet must be clearly struck off.
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14.	4.5	
15.	4.5	
16.	2	
17.	4	
18.	6.5	
19.	5	
20.	6	

75

Name CHANDRIMA ATTRI

Roll No. _____

Mobile No. _____

Date _____

Signature [Signature]

1. Invigilator Signature [Signature]

2. Invigilator Signature _____

REMARKS

ES SCORE
ES MAINS TEST SERIES 2015*[Handwritten marks]*

Section - A

Q1. "Bay Of Bengal Large Marine Ecosystem Project (BOBLEME) has tried to mitigate trans-boundary issues affecting marine ecosystem effectively." Critically Analyse.

(10 Marks)

Bay of Bengal is a highly dynamic region with unique challenges of own.

Elaborate the BOBLEME initiatives with the bit

Challenges:

- 1) Transboundary trafficking and smuggling of drugs
- 2) Transboundary illegal migration
- 3) Water sharing disputes as Tista and Brahmaputra
- 4) Border management
- 5) Insurgency

Between mentioning about challenges discuss about the project.

30

Bay of Bengal large marine ecosystem project has been launched to mitigate these trans-boundary issues which affect marine life and ecosystem.

- 1) Use of unsustainable fishing techniques such as trawlers and deep sea fishing

Remarks

- (2) Unscientific oil and gas exploration leading to oil spills and toxicity
- (3) Waste water discharge
- (4) Disasters such as cyclones disrupting the lines of islands of bay of Bengal such as Andaman and Nicobar.
- (5) Consumption of aquatic species such as turtles which nest every year at Rushikulya in Odisha.

Thus, this project takes into account all these issues and tries to solve them in a collaborative

approach
 You can also highlight how this project will help grow economically

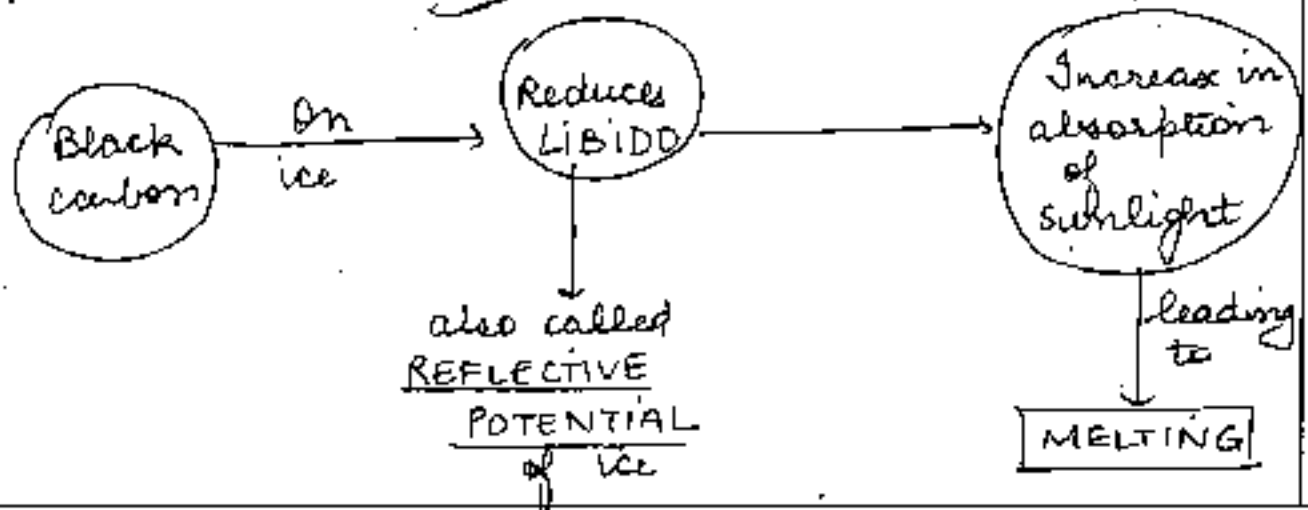
Q2. "Apart from affecting polar ice caps, Black Carbon has significantly contributed in receding Himalayas." Analyse. (10 Marks)

Himalayas or the Trans-Karakoram region is often termed as the "THIRD POLE" of the planet due to presence of huge glaciers like Gangotri, Yamunotri etc.

mainly source of black carbon

Due to air pollution, many elements are released into the air out of which black carbon is one of the most potent green house gas.

Black carbon gets deposited on ice and leads to melting which in turn leads to increase in sea levels. This phenomena happens because



Remarks

Simple
 No
 affected
 getting
 reduced

Thus, ice is no longer able to reflect the sunlight. This is the reason why polar ice caps and also Himalayan glaciers are receding.

25

Himalayas being surrounded by polluting cities of Delhi, Kanpur, Varanasi and some Chinese cities have huge inflow of black carbon particles which emerges from SOOT, CHARCOAL and SMOKE.

Consequences
 affecting
 Himalayan
 water

The consequences are as follows:-

- (1) Sustainability of rivers such as Ganga in jeopardy.
- (2) Downstream flood as meltwater increases the water flow.
- (3) Avalanches due to loosening of snow.
- (4) Climate changes.

Thus, there is a need to address this problem urgently.

Remarks

Q3. India has banned bottom trawling in few areas while Sri Lanka has banned it completely. Critically analyse the impact of bottom trawling and deep sea mining on aquatic ecosystem. (10 Marks)

Government's thrust on "BLUE REVOLUTION" and " pisciculture" has put immense pressure on water resources and aquatic life.

Due to poor infrastructure, low level of technology and inadequate funds Indian fisherfolk employ primitive ways of fishing which includes the use of bottom trawling.

On the other hand, deep sea mining is also ^{being} promoted to meet the energy and resource needs of growing economy. Recently, the ministry of Earth sciences has launched deep sea mission.

The effects of above activities on aquatic ecosystem are →

- ① Interference in species's spawning cycles and migration
- ② Impaired echolocation and season of many species due to noise of machines.

Remarks

Instead of this direct start explaining the problem of trawling

2.5

③ Water pollution leading to mass deaths

④ Eutrophication due to pollution which could lead to algal blooms or a deadly red tide of gulf of Mexico.

⑤ Garbage pile up due to human activities

⑥ Crabs and crustaceans caught up in nets of trawlers

⑦ Reducing aquatic diversity and ecosystem also impacting coral reefs

Also can have a ban on trawling
 India should take a leaf out of Sri Lanka's policy of placing an outright ban on trawlers. The establishment of "FIDE" (fisheries infrastructure and development fund) in last year's budget is in the right direction as it could lead to better adoption of environmentally sustainable practices.

Q4. "Anthropogenic activities have been constantly threatening biodiversity of India's hotspots". Analyze the impact of human interference on flora and fauna of these biodiversity rich regions. Suggest some of the conservation strategy with existing framework citing Gadgil and Kasturirangan reports on Western Ghats. (10 Marks)

India has many 'biodiversity hotspots' such as western ghats, himalayan and north eastern rainforests. These regions are of immense significance for the life of our people especially tribes and for our economy as well as climate.

It is unfortunate that today anthropogenic activities are impacting on such regions —

- (i) Deforestation due to logging, plantation and agriculture.
- (ii) Construction of dams such as Idubi in western ghats which was also responsible for Kerala floods.
- (iii) Stone quarrying and mining leading to landslides / floods.
- (iv) Introduction of exotic species such as eucalyptus which has destroyed many native plants.

Apant from these
 try to include
 the cases in
 human damage
 ecological
 hotspots
 forest
 degradation

Remarks

- (v) Fragmentation of wildlife corridors due to highways and rail lines.
- (vi) Illegal encroachments and constructions.

CONSERVATION STRATEGY →

Here you
to miss
to the
Demarcation
of
ESZ
of
guidelines
in
many
ways

We need to implement stricter penalties for violators and encroachers. Also, government needs to consider Madhav Gadgil recommendation of ~~making~~ ^{declaring} 64% of western ghats as ecologically sensitive as compared to 37% enunciated by Kasturirangan committee.

hence, political will is the need of hour to implement various laws, regulations and guidelines without complacency.

Q5 National policy on Biofuels primarily tries to address supply-side issues that has discouraged the production of biofuels within the country. In this regard, highlight the salient features of the policy and also mention the benefits of the policy.

(10 Marks)

National policy on Biofuels encourages production of biofuels given the enormous social and economic costs of pursuing fossil-fuel based development.

Biofuels, in the policy, are categorised into 3 types — 1st generation is the one where we use food crops such as maize, molasses.

with
nutrients
non-polluting

— 2nd generation where food crops such as jatropha, palm oil are used.

— 3rd generation is where waste is used, in the form of feedstock.

2

— 4th generation is where cellular forms are employed such as algae, fungi etc.

Remarks

you must
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 benefits

Thus, the policy basically eases supply issues of availability and affordability and also aims to increase income of the farmers.

But to make it truly sustainable, we need to complement it with demand-side reforms which include accessibility by poor, pricing, efficiency, safety etc.

of Biofuels are the need of today's fast paced, energy-intensive economy to balance the negative fallout of development.

Remarks

Q6. What do you understand by 5G technology? What are the advantages/applications and challenges to adapt to 5G in India? (10 Marks)

5G technology is the next generation after 4G in internet and broadband connectivity in mobile networks.

Advantages over 4G -

- 1) High speed
- 2) Low latency i.e. time spent is less
- 3) High data density
- 4) Can be employed in emerging technologies of Internet of things (IoT) etc.

4
Include massive device connectivity

Its applications are wide-ranging and it can be used for -

- 1) Faster communication in relief and rescue operations -
- 2) Military communication
- 3) e-governance
- 4) Artificial intelligence
- 5) Faster relay of information

Need to mention atleast 3 Advantages together to get more marks

NITI aayog has created a 5G test bed for researchers to test the feasibility. Still there are some

Remarks

Challenges ---

- (1) Inadequate spectrum policy - High price of spectrum in India makes it unviable.
- (2) Lack of expertise - More skilled professionals are needed.
- (3) Social divide - Will lead to greater digital divide between urban and rural areas.
- (4) Inadequate infrastructure - India still lacks optical fibre networks.

Good Cont.
 Hence, India needs to step up its innovation game to utilise this technology. Ericsson has become the first company to start 5G test bed in IIT Delhi. We need more such initiatives by Indian companies and government.

Remarks

Q7. It is expected that there will be more than 24 billion IoT devices on Earth by 2020. What do you understand by 'Internet of Things' (IoT)? Who are the major stakeholders in it? How will it benefit different industries? Examine. (10 Marks)

"Internet of Things" means integration of various physical systems via internet. It can be understood as a process where machines communicate with each other. Thus, it leads to social, physical and economic integration of things via internet.

Major stakeholders in IoT -

- (1) Citizens using services
 - (2) Government - provider of services
 - (3) Intermediaries - network providers and internet experts / software experts
- About 1000 these
 Regulatory bodies
 + govt
 + private
 application
 also involved.

"Internet of things" will make systems smart as machine learning will make them utilise information to come to accurate predictions.

35

Its applications include -

- (1) Transport - smart traffic management

Remarks

(2) Industrial manufacturing

(3) Social service delivery

(4) Smart provision of services such as electricity (smart grids), water and gas.

Smart cities is an important pillar of government's "smart systems" helping in case of living. In such a scenario, machines will be connected through internet and will give accurate and optimum results.

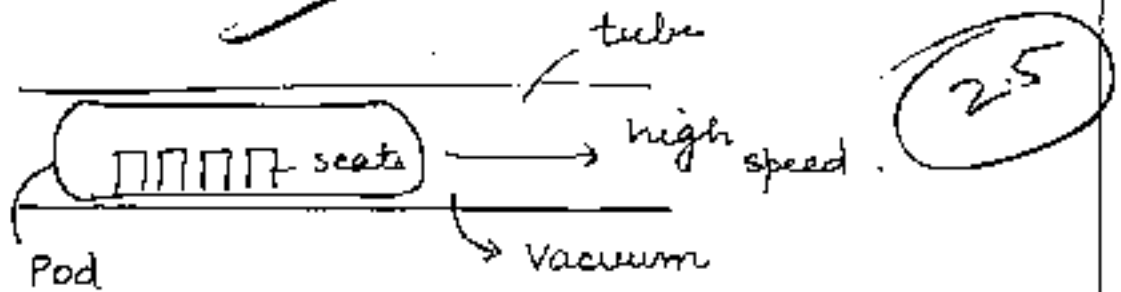
Remarks

Q8. US-based Hyper-loop Transportation Technologies (HTT) is in talks with five Indian states to build a high-speed travel network. Highlight the technology behind hyperloop and discuss its significance for India. (10 Marks)

Hyperloop is a transportation technology based on high-speed, comfort and resistance free movement.

Tesla's owner Elon Musk is also planning or developing hyperloop under the earth for decongesting traffic lanes and easing mobility in urban areas.

A hyperloop consists of a tube and a pod where the pod moves in the tube in zero resistance environment reaching high speeds.



The pod is accelerated at high speeds giving a thrust using MAGNETIC FIELDS. This technology is at a nascent

Remarks

stage as there are issues of COSTS,
VIABILITY and operations in all
types of environments especially
tropical, humid environment of

India

India can gain a lot by this
 technology as we have already
saturated our road and rail
capacities. Even airways and metros
 are going through congestion and
 lack of comfortable travel.

In this scenario, it is imperative
 that government explores hyperloop
 and carry out further research in
 its suitability to Indian conditions.

Remarks

Q9. Owing to growing dependence on space resources, it is important for India to protect its critical space assets and infrastructure from possible threats. In this context, examine the need for a Space Security Policy in India. (10 Marks)

Space domain is increasingly becoming a valuable area in terms of assets, infrastructure and security of a country. There is a looming threat of 'space warfare' as countries such as China are planning to build space stations (Tiangong-1) and space missiles.

Even India tested its anti-satellite weapon in Mission SHAKTI in March 2019. Hence, there is a need for space security policy to safeguard our interests in the domain of space.

- ① Satellite communications are used for broadcasting information. Any disruption can lead to delay in transfer of critical information.
- ② Military communication can be jammed by interfering with satellites.
- ③ Our transport navigation like ships and aircrafts can be interfered with.

Remarks

Thus, any threat to our space assets can disrupt our day-to-day lives in terms of electricity, power, transport, information etc.

you have to highlight why India needs space policy such as to combat space along with a motive of developing a legal framework

Hence, government needs to come with a NON-OFFENSIVE space policy to promote world international agreements such as outer space treaty, 1967

act as a template for

Q10. Graphene was touted as "the next big thing". Many believe it could spell the end for silicon and change the future of computers and other devices forever. In this context, list out its potential applications. Discuss the challenges that are arising in the commercial use of Graphene. (10 Marks)

Graphene is an allotrope of carbon and has a single-layered structure where each carbon is bonded to 4 other carbon atoms. Its properties include high rate of conduction of electricity and heat and it is also one of the strongest materials present on Earth. 3.5

Due to its zero resistance to electricity, it is touted as a replacement for silicon which is a semiconductor. In India's context, this could be particularly beneficial as India imports silicon from outside which adds to its import burden.

As silicon is widely used in computer chips, electronics industry and even solar panel industry, its replacement by graphene can make a major change.

Remarks

Discuss its Applications in point-structure of Answer

our industries profitable and internationally competitive.

Graphene can be employed in many industries such as tool making, electronics, transport, metallurgical industry as well as consumer durables.

To capitalise on these positives, certain challenges need to be overcome. These include easy availability, framing a policy to fill regulatory gap and creating awareness and guidelines on its handling and usage techniques.

Conclusion: Government must address these issues and act proactively so as to not lose this precious opportunity.

Section - B

Q11. Environment Pollution Prevention and Control Authority (EPCA) recently recommended to the Supreme Court that Delhi's buses switch to H-CNG within the next two or three year. In this regard, what do you understand by Bio-CNG and HCNG? What are the advantages of Using H-CNG Vehicles? Also highlight the challenges. (15 Marks)

EPCA (environment pollution, prevention & control authority) is a Supreme court mandated body formed to tackle the growing menace of Air pollution in Delhi.

Delhi government, few years back, shifted to CNG from petrol and diesel in the wake of choked skies. But, the problem is far from being solved. Hence, the new alternative proposed are those of H-CNG and Bio-CNG.

Bio-CNG and HCNG are the modified variants of CNG which are more environment friendly, sustainable and cause less vehicular emission as compared to CNG.

Bio-CNG is that natural gas which is obtained from biomass or any biological material. The feedstock for forming bio-CNG can be kitchen waste, crops (non-edible), and other biodegradable material.

On the other hand, HCNG is hydrogenated

conclude
 conclude
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 on single paragraph

Remarks

CNG. This particular form of CNG reduces the pollution potential of CNG. Addition of hydrogen reduces CO₂ emissions and gives more efficiency.

ADVANTAGES

- ① Less air pollution and CO₂ emissions
- ② Sustainability as they are renewable
- ③ Utilisation of waste - Waste to energy plants can be constructed to cater to this industry
- ④ Will lower vehicular emission load and hence more operational efficiency.

Elaborate these examples

20.8 points

Despite the above advantages, various challenges still remain -

- ① Availability of these fuels in all stations
- ② Pricing issues
- ③ Vehicular modifications might be required such as engine changes to make them compatible to such fuels.
- ④ Regulatory gaps - Some illegal units are manufacturing these alternatives - A hawk eye needs to be kept on such manufacturers.

only minor change required

Remarks

Elaborately explain the advantages and challenges.

To truly benefit from these developments, governments need to frame a holistic policy so that easy and gradual phasing out of current CNG vehicles is done.

It also has to be ensured that the new variants do not make public transport unviable for poor due to increased costs of maintenance. This could increase usage of private vehicles, nullifying any gains made.

write this
in
margin

Hence, a multi pronged solution is needed after carrying out FEASIBILITY STUDIES before adopting such technology.

4.5

Q12. Over-exploitation and loss of habitat is leading to the extinction of various plants, animals and microbial species. How is the India government attempting to tackle the issue? (15 Marks)

Today, India's development strategy is at a crossroads with ecological imperatives demanding more sustainability and prudence. To balance the two, there is a need for proactive actions in the area of CONSERVATION and ENVIRONMENT MANAGEMENT.

This is not directly asked in question. It is a bridge.

The factors that are leading to extinction of various plants, animals and microbial species are -

loss of habitat or fragmentation of wildlife corridors - Due to highway construction, railways and encroachments, animals venture out of habitat and get killed in accidents / man-animal conflict.

loss of diversity - Monoculture plantation and introduction of exotic species have made irreversible damage to natural ecosystems of many flora and fauna.

(3) Disasters such as forest fires - Due to careless conduct of humans in vicinity to forests.

Remarks

(4) Deforestation
 (5) Harmful technology - Humans have resorted to unsustainable scientific practices such as use of trawlers harming aquatic life.
 In the past years, many animals such as cheetah, Himalayan quail etc have become extinct from Indian subcontinent.

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To address these gaps, government came up with wildlife Protection act, 1972 and environment protection act, 1986 which declares certain areas as Ecologically sensitive areas. Apart from above legislations, Indian government has taken following steps

- ① launching of Project Tiger, Project elephant etc. Recently, the tiger estimation survey has shown the population increase and resultant 2900 tigers, which is a positive development.
- ② Collaboration with international organisations and NGOs such as IUCN, TRAFFIC, WWF etc

- (3) Translocation of animals to increase genetic diversity and geographical spread which leads to better chances of survival.
- (4) Upkeep and maintenance of national parks, sanctuaries, sacred groves, bird parks & Forest rights act, 2006 was also enacted to involve local communities and utilise their indigenous knowledge.

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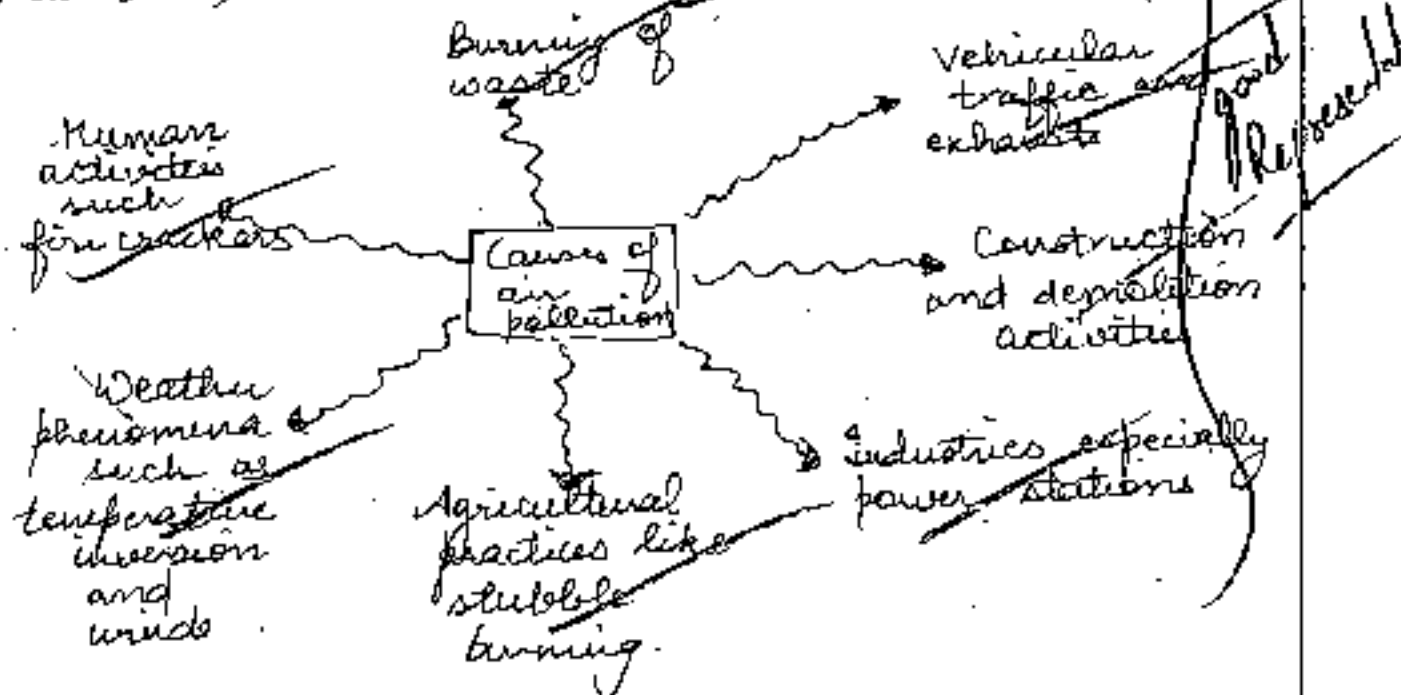
Recently, floods in Assam have deteriorated the ecosystem of Kaziranga National Park with many animals dying or resorting to survival tactics. This represents a genuine foreshadowing.

Our wildlife is our natural heritage with equal rights on natural resources. Hence, government should be more conscious of their welfare and their necessity in providing sustainable development for all.

Remarks

Q13. The main factors contributing to urban air quality deterioration are growing industrialization and increasing vehicular pollution. Discuss the recent policy initiatives taken by the government in mitigating air pollution. (15 Marks)

Air pollution has become a new policy challenge for the government. WHO's report cited that 17 of the 20 most polluted cities in the world are from India. This includes metropolitan cities and developed towns of Delhi, Bengaluru, Mumbai, Varanasi, Raipur etc.



Hence, it is clear that with increasing urbanisation, industrial development and the accompanying population pressure, our cities are becoming "SMOKE HOUSES".

Remarks

This is not required

Question should be your main focus

1
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This has an adverse effect on
 1 Health - respiratory diseases, skin and eye irritation.

2 Social costs - leads to social conflicts

3 Economic costs - loss of efficiency and productivity.

4 Environmental costs - global warming.

5 Tourism - This industry also suffers due to negative image.

To address air pollution, government has taken various steps such as -

1 NAAQS (National ambient air quality standards)

2 NAQI (National air quality index)

3 EPCA (mandated by supreme court)

4 Judiciary allowed only 'green' markers during Delhi

5 Monitoring system which provides real time data.

6 Use of technology such as water sprinklers, happy seeder for farmers so that they avoid stubble burning

Remarks

Lunch of
SAMER APP
Zorouge institute
management of
CSOP Residue

- ① Amendments in Plastic waste (management) rules 2016 amendment which stops blowing waste
- ② Mandatory covering of construction sites by tarpaulin sheets

Add ban on Pet-cats

4.5

Along with this, government needs to start awareness campaigns so that people take this issue seriously. Mandatory wearing of masks, use of air purifiers and avoiding going out during high levels of smoke are some of the steps that need to be encouraged.

Civil society also needs to wake up and make air pollution a public debate issue

Include some current news so that answer gets more enriched

Q14. The Environment (Protection) Act was enacted in 1986 with the objective of providing for the protection and improvement of the environment. To what extent, the act has been able to live up to its mandate? (15 Marks)

Instead of this Gdp can be highlighted by the govt. The environment (protection) Act, 1986 was a culmination of environment movement which started in 60s and 70s in India, in the form of Chipko movement, Narmada Bachao Andolan etc

Article 32 & 226 of Judiciary passed landmark judgements affirming right to safe environment of citizens under article 21. Judgements such as Godavarman and MC Mehta vs. U.O.I made government sit up and take stock of environmental impacts of policies.

Environment protection Act, (1986) includes following provisions —

- (1) It balances development with rights of future generations —
- (2) It includes guidelines for industries to reduce their effluents and emissions

Remarks

- (3) It also has provisions for afforestation drives and plantation campaigns.
- (4) In 1994, it was amended to include Environment impact assessment which also incorporated social audits of developmental projects.
- (5) It also delineated ecologically sensitive areas (ESAs) where strict regulations were necessary.

How to discuss how bounded legal powers to individual government agencies
 violations etc

Though the act was a landmark legislation, its implementation along the years has remained half-hearted and lackadaisical.

5.5

It is seen that —

- (1) Industries are rarely inspected regularly.
- (2) Corruption and wrong capitalism dilute the implementation of provisions.
- (3) The act's provisions are general and have necessitated guidelines which are clear, coherent and unambiguous. But this has remained an unfinished agenda.

(4) Forest officials and wildlife wardens are not adequately equipped to tackle the challenges.

(5) Even environmental impact assessment studies are not backed by scientific evidence and confusing reports and inputs are submitted to the ministry.

Thus, the government must show political will to come up with strict penalties for violators of environment act, 1986.

At the same time, it must streamline various guidelines under different laws such as air pollution (prevention) act, 1981 and water pollution act, 1974 etc. to make it easier for people and industries to follow them.

Q15. "Nearly 30% perennial springs in the Himalayan region have dried up causing water scarcity in the Himalayan region". Discuss the issue in light of Shimla water Crisis and suggest the need to implement structural and non-structural solutions.

(15 Marks)

Himalayan region is a lifeline of Indian subcontinent with importance in monsoon management, source of rivers, biodiversity as well as shielding us from climatic and security threats from north.

In many regions such as shimla and northern trans-himalayan regions such as ladakh, water crisis has become a perennial problem.

The reasons for this problem are manifold —

- (1) Population pressure on scarce resources due to tourism.
- (2) Poor land use planning with many hotels, service centres and industries are constructed on encroachments and unsustainable terrain.
- (3) Water wastage
- (4) Lack of water management such as

mention what
one the
Significance
of
Himalayan
springs

explain
it

Remarks

water harvesting in tanks, lakes, ponds etc.

- (5) Interference with natural aquifers and hence no recharge of groundwater takes place.

To tackle this problem, various reforms are needed urgently →

→ STRUCTURAL REFORMS -

- (i) There is a need to study the geographical structure of Himalayas using scientific tools such as soil mapping, slope, water level, weather predictions etc. before going for any development.

These are not structural reforms.

(ii) Government of Himalayan states need to formulate a HOLISTIC STRATEGY to manage scarce water resources in region.

(iii) Study the climatology of glaciers which are the source of water in the region and also check the effects of climate change on region's resources.

NON - STRUCTURAL

- (i) Drainage area by adopting natural land use planning and sealing illegal constructions.
- (ii) Adopt indigenous people knowledge in saving and harvesting sector.
- (iii) Create water reservoirs or reclaim dried up aquifers like ponds, sarovars, lakes etc. Explain it as structural reform.
- (iv) Create awareness among local people and tourists on the region's fragile ecosystem.
- (v) Formulate a plan for charging water fee in water scarce areas.

Well Structured Answer

"

You have not explained structural reforms properly

Climate crisis is just a start of the problem. If we do not act now, it will be too late. Already, the world is witnessing extreme events due to climate change. If we do not protect himalayan ecosystem, it will have huge repercussions for our agrarian economy, social life, ecosystem and national prosperity.

Q16. What do you understand by geo-engineering? Examine why North Eastern Monsoon brings less rainfall far below its actual potential and also critically discuss how geo-engineering can solve the problem. (15 Marks)

Geo-engineering is a process through which the geological make-up of any place is altered via scientific methods. It could also mimic various natural phenomena such as reclamation of islands or creation of artificial islands is an example of geo-engineering.

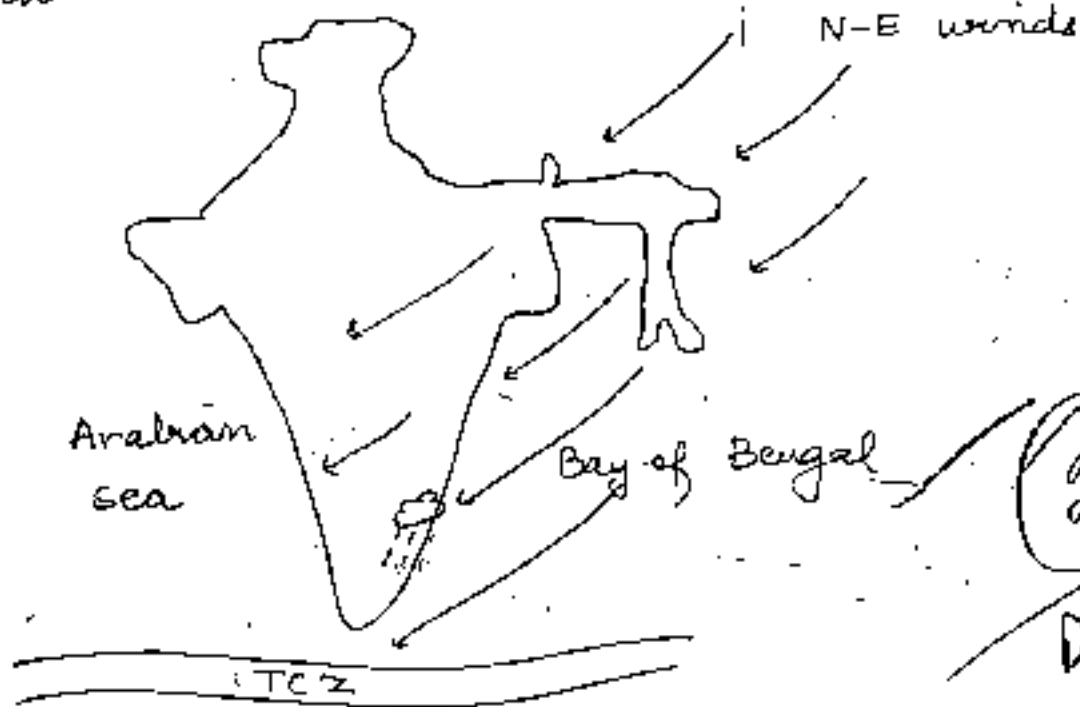
Indian monsoon can be divided into two seasonal branches — SOUTHWEST (June-July) and NORTHEAST (OCT-DEC).

During October - December, the ITCZ (Inter-tropical convergence zone) is back to its original position along equator. As it is a low pressure zone, it attracts winds from both sides.

These winds blow from north-easterly directions and hence these winds are called north east winds and the accompanying rains on Chennai coast is called

Remarks

North east monsoon



These winds when blow over bay of bengal pick up moisture and cause heavy rains on Chennai and Andhra Pradesh (Vishakhapatnam) coast.

On the rest of the country, these winds generally blow as dry winds as there is no source of moisture on mainland.

Thus, they give rain far below their potential as they blow over major part of the country devoid of any moisture.

2
 Deviated from the
 answer of
 the
 Question

Remarks

Geo engineering can be used as a technique to increase the rainfall in other parts as well and reduce the intensity over few parts such as Chennai which often suffer from floods.

Thus, we need geo-engineering tools to provide source of moisture to these winds along their journey so that they benefit the large farming community of India.

- Conceptual clarity is lacking
- You need to explain how Geo-engineering can help to solve the problem
- Discuss the role of aerosols

Q17. Unregulated growth of urban areas without necessary infra-structural services and proper collection, transportation, treatment and disposal of solid wastes has resulted in increased pollution and health hazard from these wastes. Assess Swachh Bharat mission's efficacy on the matter. (15 Marks)

Urban India is a driver of our economic growth. It is estimated that 50% of our population will live in urban areas by 2050. Currently, the percentage is 34%.

To ensure sustainable development and EASE OF LIVING for all as enunciated by Niti Aayog, it is imperative that we go for structural urban reforms across the various sectors.

Some of the reforms that have been adopted are

- (1) Smart cities mission - 100 cities
- (2) AMRUT - 500 cities
- (3) Swachh Bharat Abhiyan (Urban)
- (4) RERA act
- (5) e-governance
- (6) Municipal reforms.

While smart cities mission and AMRUT deal with infrastructure

This is not directly asked to question. Relate it to the content of Question.

creation and provision of basic amenities, Swachh Bharat mission incorporates behavioural change along with focus on cleanliness.

EFFICACY OF SWACHH BHARAT-

Today, cities produce vast quantities of waste including plastic waste, kitchen waste etc. Various problems that have been identified are

- (1) Lack of segregation at source
- (2) Overloaded landfill sites
- (3) Incinerating waste leads to air pollution
- (4) Breeding ground for mosquitoes leading to dengue, malaria
- (5) Health of children affected typhoid etc.

You need to relate these points with efficacy of the mission.

In this regard, Swachh Bharat fulfills following requirements:-

- (1) Toilet construction, use of public toilets
- (2) Cleanliness drives.

explain the content of efficacy

Remarks

③ Solid waste management is the latest addition to Swachh Bharat Mission. It entails proper collection, disposal, and usage in other recycling industries.

However, apart from Swachh Bharat Mission's focus on solid waste management, various other reforms are needed —

- ① Reforming the organisational structure of municipal committees as they overlap in their functions.
- ② Lack of funds, manpower with waste collection agencies.
- ④ Problem of manual scavenging. (4)

Apart from this, a change in the attitude of waste producer is needed so that segregation at source is achieved.

→ You need to explain the efficacy of this elaborately

→ Need to Analyse the Question with Good valid points

→ Show the Analysis point of Swachh Bharat Mission

Q18. What is e-waste? A United Nations-affiliated group estimates that e-waste is growing faster than almost any other waste type. Examine how India can effectively manage its e-waste. Also briefly discuss the fresh rules that India recently brought in to govern the handling of electronic waste. (15 Marks)

e-waste is electronic waste that is generated from various electrical appliances / equipments such as batteries, chips, semiconductors, aluminium boards etc.

Subst. your points
 Refer link

With the growth in information technology, e-waste is also growing in volume. Today, government is pushing for electric vehicles, electronics manufacturing, digital India as well as e-governance. Hence, it is necessary that e-waste guidelines are properly implemented to cater to waste generated by these activities.

4/5 Recently, government came up with e-waste guidelines, 2018 which have made following changes -

- ① There is a ban on import of waste except certain industries.

Remarks

② The definition of e-waste has also been changed as now it would include those products as well whose product life is still valid.

③ It promotes e-waste recycling.

④ Segregation of non-harmful waste from that which can result in radiation or other chemical leakages

E-waste to be dealt with holistically needs further reform such as —

① Extension of Producer responsibility (EPR) can be applied to e-waste generators. Currently EPR guidelines are being applied for plastic waste generators.

Good reference made

② Consumer awareness on negative effects of e-waste on health of humans, animals and birds. Some animals feed on such e-waste and become critically ill.

more points can be included

③ Government also needs to check dumping by developed countries like US, China etc which have stricter rules back home

Refer to some of these best practices

Thus, e-waste is a growing challenge.
We need to ensure that our cities
do not become piles of e-garbage
in the times to come.

Hence, government needs to step up
its game by going for timely
implementations.

~~mention the
challenges in this
regard~~

Q19 With the view of Regulating the use of drones in India, Ministry of Civil Aviation recently announced guidelines on drones that will come into effect from 1 December 2018. In this regard, mention the key features of the "Drone Regulation 2018". Also highlight the various non-military applications of drones. (15 Marks)

As Unmanned aircraft vehicles (UAVs) or drones are emerging as efficient ways of doorstep delivery carriers, and for welfare of various communities like farmers.

As various concerns still remain such as privacy, security, surveillance, illegal transactions etc, Directorate general of civil aviation has come up with the drone policy. The provisions are as follows -

- ① They can fly only during daytime, in the visual line of sight and not above 400 feet.
- ② The operator needs a license to import the drone and also a permit to operate it.
- ③ A pilot can operate only one drone at a particular time.

mentioned in the question
 flying license
 permit to operate (drone)
 only one drone
 only one time
 (over 200)

Remarks

④ A radius of 5 km from international airports and 3 km from other airports and military installations is devised as "out of reach."

⑤ All the prohibited areas are out of reach of drone.

⑥ A drone cannot carry any human or animal life / part on it.

⑦ The drones have also been classified according to their weight such as nano, micro, mini, medium, large ranging from less than 250 grams to more than 25 kg.

Many civil society experts and business groups have termed these provisions as restrictive of innovation. Yet, given the nascent stage and security concerns, some of the provisions are well intentioned.

Apart from military purposes, drones have wide ranging application in domains like

- ① Agriculture - Crop monitoring, animal movement.
- ② Doorstep delivery - Amazon is also working on its idea.
- ③ Transport - Uber is also said to be playing with the idea of using drones.
- ④ Monitoring of functions - such as VIP arrangements, events, security surveillance.
- ⑤ Remote sensing - Drones can also be used to take photos and help in urban planning, city modelling etc.

Thus, the emergence of drones has wide implications and it can be a gamechanger in the way we live our lives.

5

notably used in rescue operations as well

Q20. What is Robotics? Highlight its applications in Automobile, Military applications, Health & Medicine, Agriculture, Space Exploration and Banking sector. Also mention the objectives of Robotics society of India. (15 Marks)

Robotics is the use of machinery to do tasks that humans can do. It implies automation with some quality of machine learning and artificial intelligence to mimic human's ability to sense, comprehend and act.

Its applications are wide ranging →

(1) Automobile - It is used in assembling the parts, putting together the design and also production of spare parts.

(2) Military - Robotics can be utilised in training modules, simulation experim-
 ents like missile testing, flight testing etc.

(3) Health - Robotics surgery is fast gaining traction as it minimises human errors and increase precision in complicated and sensitive areas.

Remarks

Give examples to bring clarity e.g. US forces used Robots in Iraq

- (4) Medicine - It can be employed for drug delivery like endoscopy.
- (5) Agriculture - Automatic seeders and harvesters. elaborate
- (6) Space exploration - Robotics have huge potential as human lives cannot be put in risk. This can be seen in recent Chandrayaan-2's Vikram lander and Pragyan rover which employ robotics. (6) good example
- (7) Banking sector - This sector employs robotics in automatic cash calculations, security monitors in vaults etc.

The robotics society of India has its objectives as --

- (1) Promoting development of robotics industries.
 - (2) Ensure ethical standards.
 - (3) Provide technical expertise.
 - (4) Promote research and development in academic institutions.
 - (5) Collaborate with like-minded national
- Analyse these points

and international groups.

Thus, robotics has huge potential in all the domains of our lives and can increase our efficiency and ease of living.

Remarks