

NEXT IAS

NEXT IAS (Head Office) : 27-B, Pusa Road, Metro Pillar no. 118, Near Karol Bagh Metro, New Delhi-110060

Bhopal Centre: Plot No. 46, ZONE-2, M.P. Nagar, Bhopal-462011

Ph: 8081300200, 8827664612 | **E-mail:** mts@nextias.com | **Web:** www.nextias.com

ADVANCED INTEGRATED MENTORSHIP

ENVIRONMENT ASSESSMENT TEST-12

(To be filled by candidate)

Test Code : TC313

Name of Candidate : RITIKA CHITLANGIA

NEXT IAS Roll No. : AIM24GCRA075 **Date of Examination :** 13/9/23

Exam Centre : Old Rajinder Nagar ☐

Bhopal ☐

Online ☒

GENERAL INSTRUCTIONS

This Question-cum Answer (QCA) Booklet contains 32 pages. Immediately on receipt of the booklet, please check that this QCA booklet does not have any misprint or torn or missing pages or items, etc. If so, get it replaced by a fresh QCA booklet.

Candidates must read the instructions on this page and the following pages carefully before attempting the paper.

Candidates should attempt the questions strictly in accordance with the instructions specified in the question paper and in the space prescribed under each question in the booklet. Any answer written outside the space allotted may not be given credit.

Question paper will be provided separately and can be taken by the candidates after conclusion of the exam.

SUBJECT/PAPER
GENERAL STUDIES

Invigilator's Sign. :

[To be filled by the STUDENT]

Student's Queries for the Evaluator (if any write them below)

[To be filled by the EXAMINER]

Evaluator's response

*(For filling by Examiners only)***Evaluator Code :**

Q.No	Pg No.	Maximum Marks	Marks	Total
1	1			
2	3			
3	5			
4	7			
5	9			
6	11			
7	14			
8	17			
9	20			
10	23			
Grand Total				

Signature

MACRO COMMENTS

IMPORTANT INSTRUCTIONS

CANDIDATES SHOULD READ THE UNDERMENTIONED INSTRUCTIONS CAREFULLY. VIOLATION OF ANY OF THE INSTRUCTIONS MAY LEAD TO PENALTY.

DONT'S

1. Do not write your name or registration no. anywhere inside this Question-cum-Answer Booklet.
2. Do not write anything other than the actual answers to the questions anywhere inside your QCA Booklet.
3. Do not tear off any leaves from your QCA Booklet, if you find any page missing do not fail to notify the supervisor/invigilator.
4. Do not leave behind your QCA Booklet on your table unattended, it should be handed over to the invigilator after conclusion of the exam.

DO'S

1. Read the Instructions on the cover page and strictly follow them.
2. Write your registration number and other particulars, in the space provided on the cover of QCA Booklet.
3. Write legibly and neatly. Do not write in bad/illegible handwritings.
4. For rough notes or calculation, the last two blank pages of this booklet should be used. The rough notes should be crossed through afterwards.
5. If you wish to cancel any work, draw your pen through it or write "Cancelled" across it, otherwise it may be evaluated.
6. Handover your QCA Booklet personally to the invigilator before leaving the examination hall.

1. Define the concept of the carrying capacity of an ecosystem as relevant to an environment. Explain how understanding this concept is vital while planning for the sustainable development of a region.
(Answer in 150 words) 10 words

The Ecosystem provides various services and function, which has the ability to sustain resource use and development.

The limit upto which any ecosystem can sustain a population is called its carrying capacity.

carrying capacity of an Ecosystem

1) The rate of resource use, extraction and consumption should be less than rate of regeneration.

2) The development — economic and human — should be within the permits of nature.

3) Ensures the continued availability, accessibility and affordability of resources for future generations.

4) Helps to estimate the levels of safe and sustainable development.

Relevance of carrying capacity in sustainable Development

- 1) Population Management and control - carrying capacity helps to estimate sustainable levels of population that can harness resources without depleting reserves.
- 2) Natural Resource use - Forest, ocean, products etc. can be used for economic development, but its rate of usage should not exceed rate of regeneration.
Eg: use of fossil fuels is unsustainable
⇒ Need to shift towards renewables.
- 3) Infrastructure Planning & development
Eg: in hilly states, Environment Impact Assessment is required before construction of roads, railways, bridges ⇒ assessment of carrying capacity.
- 4) Provision of basic amenities to settled societies ⇒ carrying capacity will lead to planned urbanisation, safer settlements and better quality of life.

Hence, carrying capacity is integral to planning sustainable development of any region.

2. Critically evaluate the role of ocean thermal energy in improving the overall energy security in India. Why has India failed to capture the potential of ocean thermal energy?

(Answer in 150 words) 10 words

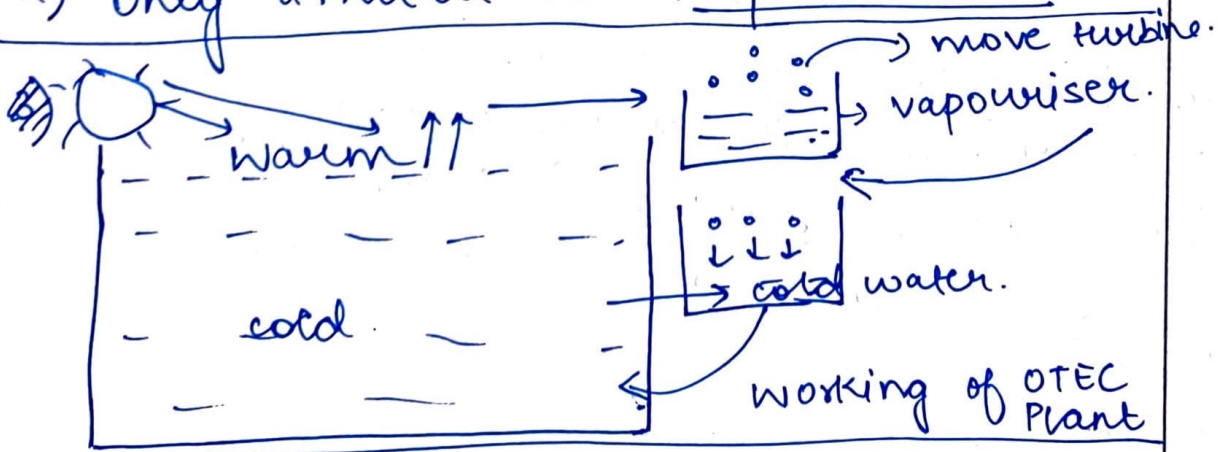
Ocean Thermal Energy refers to utilisation of temperature differences of tropical oceans to generate power.

Advantages of Ocean Thermal Energy

- 1) Pollution-free, renewable source of energy.
- 2) Provides a better alternative to solar and wind power due to combating of intermittency issue.
- 3) Unhindered supply of electricity, all year round.

Disadvantages

- 1) Expensive to install OTEC plants.
- 2) Only limited to tropical areas.



Reasons for India's Failure

→ As per MNRE, there is a potential of 40,000 MW to generate from ocean energy.

① Lack of political will to diversify energy sources $\Rightarrow$ over-reliance on coal, petroleum & natural gas.

② Even in renewable energy, nearly 70% is dominated by solar and wind.

③ Lack of funding & fiscal incentives.

④ Rambunctious involvement of private sector to generate ocean thermal energy.

⑤ Limited research and development for suitable sites, economic viability and long-term impacts on surroundings and marine ecosystem.

Recently, desalination plant in Lakshwadeep has harnessed OTEC, paving way for development of new, clean and renewable sources of energy.

3. What are the challenges that rising plastic waste poses to the terrestrial and aquatic ecosystems? Suggest measures to effectively combat the rising menace of plastic pollution globally.
(Answer in 150 words) 10 words

As per OECD, globally 100 billion tonnes of plastic is produced annually, and it is expected to triple by 2060. This creates plastic waste a big global challenge.

Threats to ecosystems

(A) Terrestrial Ecosystems

- 1) Threat to small animals due to penetration of micro-plastics in blood stream.
- 2) consumption of plastic waste in search for food $\Rightarrow$ death of animals, delayed reproduction etc.
- 3) Habitat loss due to dumping of plastic waste in remote areas.

(B) Aquatic Ecosystem

- 1) choking of marine animals due to entanglement in plastic waste.

- 2) Bioaccumulation and Biomagnification
⇒ concentration of plastic waste over time and in higher strata of trophic cycle.
- 3) Difficulty in communication, alteration in migratory routes etc. due to accumulation of plastic waste on ocean floor.

Measures

- 1) strict implementation of Plastic Waste Management Rules, 2016 - to reduce the plastic waste burden of India.
- 2) International collaborations to effectively ban and manage the plastic waste.
- 3) collaboration between developed and developing countries to bridge funding, infrastructure & technological gap, to actively convert plastic waste to wealth.
Eg: Pelletisation
- 4) standardisation of safe and non-plastic marine fishing equipment.

hence, plastic waste is a global issue and demand common, collaborative and cross-sectoral partnerships.

4. Invasive alien species are a threat to the ecological sustainability of native species which adversely impacts the biodiversity in India. In this regard, critically evaluate the recent amendments in the Wildlife Protection Act to regulate invasive alien species in India. Provide other measures that can be undertaken to contain the spread of invasive alien species.

(Answer in 150 words) 10 words

Invasive Alien species refers to plant or animals that are introduced in a new surrounding and propel exceptionally, outcompeting the native species.

Wildlife Protection Act, 1972

Recent Amendments

- Previously 6 schedules ⇒ now reduced to 4 schedules.
- For invasive alien species ⇒ strict control over introduction of foreign exotic species.

Advantages

- 1) Effectively outlines the trade regulations in movement of exotic species.
- 2) Provisions for assessment of IAS ⇒ to draft management policy.

Limitations

1) The WPA (Amendment) 2020 ^{needs} → defines IAS on geographical basis rather than sovereignty basis.

Eg: Any species from Madhya Pradesh, if introduced in A&N islands, may become invasive.

2) measures to deal with Invasive Alien species.

1) strict Environment Impact Assessment before introducing any species for agriculture. Eg: Eucalyptus → Ecological terrorist.

2) strict implementation of Ballast water convention.

3) Harnessing the resource potential of IAS. Eg: Jal Kumbhi (water hyacinth) can be used for making compost.

4) Relocation of native species to new habitats.

Hence, Invasive Alien species is one of the major threats to any ecosystem and careful checks are needed to restrict their growth.

5. The menace of air pollution remains one of the major environmental concerns of North India. What factors can be responsible for the degrading air quality in North India? Suggest some measures to efficiently tackle this problem. (Answer in 150 words) 10 words

Air pollution refers to addition of particulate matter, toxic gases, soot, dust etc., which has negative consequences on human health and the natural ecosystem.

Factors responsible for air pollution

- ① Agricultural emissions - North India is one of most intensively cultivated areas $\Rightarrow$ emissions of methane etc., burning of agri-waste $\Rightarrow$ release of PM into air.
- ② Increasing urbanisation and industrialisation $\Rightarrow$ release of NO_x , SO_2 , CH_4 , CO , CO_2 from industries & vehicular emissions.
- ③ Indoor pollution $\Rightarrow$ due to cooking, gardening etc.
- ④ Geographical conditions of North India $\Rightarrow$ Temperature inversion observed in winters $\Rightarrow$ formation of pollution dome $\Rightarrow$ urban smog.

Measures

- ① strict implementation of pollution norms $\Rightarrow$ especially for industries and vehicles.

- ② Decentralisation of pollution generating industries from urban areas for cleaner air.
- ③ Using geo-engineering techniques to reduce pollution levels.
Eg: Artificial precipitation to reduce PM levels.
- ④ Institutionalising mass public transport system to reduce dependence on individual diesel/petrol vehicles.
Eg: Delhi Metro.
- ⑤ Fiscal incentives to move towards adoption of e-vehicles $\Rightarrow$ BS VI vehicles
- ⑥ Centralised cooling systems to reduce emissions.
- ⑦ Adoption of LPG and electric stoves, solar generators, smart grids to reduce dependence on polluting fossil fuels.

Therefore, air pollution is a growing menace, claiming thousands of lives, directly or indirectly. Need to move towards EV's, clean energy, energy efficient production etc. to reduce air pollution.

6

The recently concluded water bodies census has brought the issue of depleting water bodies in India to the fore. In this context, elaborate on the ecological and environmental challenges faced by natural and artificial water bodies in India. Also, suggest measures to prevent depletion of the water bodies and improve the status of water bodies in India.

(Answer in 250 words) 15 words

As per the Water Bodies census, more than 98% of the water bodies are under stress, leading to degradation in their quality as well as quantity.

Challenges faced by water bodies

(a) Natural water bodies - includes natural lakes, ponds, reservoirs etc.

① Overextraction of water resources
⇒ disequilibrium in demand and supply.

Eg: Dal lake supplies freshwater to Pune city.

② Waste disposal ⇒ pollution of water bodies due to dumping of waste ⇒ change in acidity and

alkalinity $\Rightarrow$ alterations in marine ecosystem.

Eg: in Tala kaveri, fishes have been found with neurological disorders due to increasing pollution.

③ Invasive alien species - causes competition for resources.

Eg: Lantana camara (Jal kumbhi) $\Rightarrow$ blocks sunlight and BOD.

④ Artificial Bodies $\Rightarrow$ artificial lakes, dams etc.

① Modifications to existing hydrology and drainage $\Rightarrow$ can lead to floods.

Eg: in Hyderabad, construction of artificial lakes altered the slope pattern.

② Introduction of water body may lead to changes in the local climate and biodiversity $\Rightarrow$ threat of invasive species.

③ Excessive sedimentation & siltation may lead to fluctuations in the water levels $\Rightarrow$ disturbances in

developing marine ecosystems.

Measures

- ① Maintenance of minimum ecological flow to regulate BOD and COD levels.
- ② Strict enforcement of waste management rules to avoid dumping of waste into water bodies.
- ③ Restrictions on the drawing capacity of water body, in accordance with its carrying capacity.
- ④ Frequent ecological checks to ensure avoidance of alien species.
- ⑤ Development of water bodies as recreational sites for sustainable eco-tourism.
- ⑥ Environment Impact Assessment before construction of large dams.

Hence, steps like Amrit Sarovar mission, construction of farm ponds etc. can help rejuvenate water bodies.

7. MISHTI (Mangrove Initiative for Shoreline Habitats & Tangible Incomes) Initiative was recently launched in the Union Budget 2023-24 in order to ensure sustainable growth of the mangroves in India. Elaborate on the features of the MISHTI programme while highlighting the importance and threats to mangroves in India.

(Answer in 250 words) 15 words

MISHTI aims to preserve mangrove ecosystems, which are ecotonal habitats, super markets of bio-diversity and coastal buffers.

Features of MISHTI

- ① Aims to rejuvenate degraded mangroves.
- ② Involvement of local communities to restore the mangroves.
- ③ Integration of mangrove protection campaigns with MGNREGA to ensure diversification of incomes to local shoreline communities.
- ④ Financial incentives for mangrove protection.
- ⑤ Checks on coastal mangrove forests encroachment.

Importance of mangroves

① carbon sequestration and storage $\Rightarrow$ mangrove forests are net carbon sinks and sequester nearly 4000 tonnes of CO_2 .

② Biodiversity regions $\Rightarrow$ accomodate a wide variety of species in the dense buttress roots of mangroves -
eg: snakes, crabs, fishes, prawns, turtles etc.

In Sunderbans - 95% of Royal Bengal Tigers are found.

③ employment generation for local communities $\Rightarrow$ tourism potential, aquaculture, pisciculture, dyeing etc.

④ Coastal Disaster Mitigation -
act as 'buffers' or 'sponge' $\Rightarrow$ absorbs impact of floods, tsunamis etc.

eg: In 2004 tsunami, 90% of impact of tsunami was absorbed by Pichavaram mangrove forests.

Threats to Mangroves

- ① coastal infrastructure expansion
⇒ erosion of coastal areas & deforestation of mangroves.
- ② Growing tourism leads to threat of waste pollution.
eg: Development of Ganga Vilas cruise on National Waterway II.
- ③ Increasing frequency of tropical cyclones ⇒ storm surges etc.
- ④ Increasing sea level and salinity
⇒ threat of mangrove submergence & death of species.
- ⑤ Overextraction of resources like fishes, crabs etc. ⇒ disturbances in mangrove ecosystem.

therefore, measures like MISHTI, Amrit Sashohar, Magical Mangroves campaign, coastal zone Regulation Rules etc., attempt to conserve these precious ecosystems.

8. Discuss global warming and mention its effects on the global climate. Explain the control measures to bring down the level of greenhouse gases that cause global warming, in the light of the Kyoto Protocol, 1997. (Answer in 250 words) 15 words

Global warming leads to an anomalous rise in average temperature conditions.
As per IPCC, 2°C rise in global average temperature is set to occur by 2100.

Impacts on Global Climate

① Temperature variation $\Rightarrow$ rise in temperature, increased frequency of heatwaves and cold waves.
Eg: 2022-23 $\Rightarrow$ heatwaves in Greece, Italy, Spain

② Erratic patterns of precipitation - influenced by intensification of hydrological cycle, increased frequency of El-Nino southern oscillation, modoki, Indian ocean dipoles etc. $\Rightarrow$ erratic floods & droughts.

Eg: In 2022, Pakistan was under massive floods, while china experienced worst drought of the century.

- ③ Impact on polar areas due to melting of sea ice and glaciers, weakening of polar vortex and arctic amplification
- ④ Impact on oceans - rising sea level, increased salinity and decrease in carbonate ions due to increasing acidity of oceans.

Kyoto Protocol, 1997

- Extension to UN FCCC
- Places obligations on developed countries (Annex I) to cut down GHG emissions by 5%, from 1990 levels.

Measures under Kyoto Protocol

1) Clean Development Mechanism (CDM) ⇒ carbon credits for financing decarbonation projects in developing countries.

2) Joint Implementation - involvement in decarbonation projects in

developed (Annex I) countries.

3) Voluntary obligations on developing countries like India & China $\Rightarrow$ Renewable Energy certifications to fulfil Renewable Purchase obligation; Energy saving certificates to improve energy efficiency etc.

However, the Kyoto Protocol failed to curb emission levels due to non-involvement of USA, India and China (3 top GHG emitters); top down approach and lack of collaboration.

In replacement to Kyoto Protocol, Paris summit introduced sustainable Development Goals to establish voluntary, bottom-up and inclusive approach to reduce GHG emissions by 2030.

9. Clean energy is the order of the day.' Describe briefly India's changing policy towards climate change in various international fora in the context of geopolitics.

(Answer in 250 words) 15 words

At the recently concluded G20 summit, India again took the lead towards climate action, by establishing the goal to triple renewable energy capacity by 2030.

India's changing policy towards Clean Energy

→ India has espoused the concept of 'Vasudhaiva Kutumbakam' i.e. One Earth, one family & one future & to combat the problem of climate change, India has emerged as the 'vishva guru'.

① International Solar Alliance

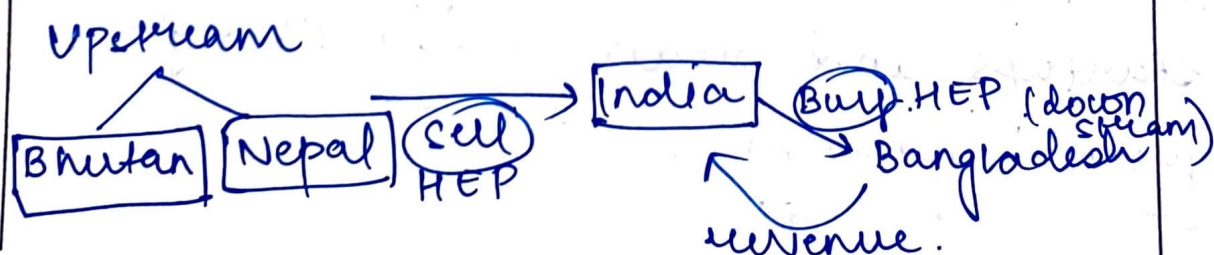
→ in collaboration with France, to tap into solar energy, solar startups and clean energy through green hydrogen.

② Panchamrit Goals at COP 26 (2021)
→ to achieve net-zero by 2070 ⇒
strong resolve towards decarbonisation
and carbon neutrality.

③ Global Biofuels Alliance - with
Global south (G-20) ⇒ inclusion of
voice of developing countries in
climate negotiations & funding.

④ Construction of nuclear power
plants at Ropur, Bangladesh,
in collaboration with Russia ⇒
to generate clean energy and
countering chinese influence.

⑤ Hydropower negotiations with
Nepal & Bhutan on one hand and
Bangladesh on other hand.



⑥ Propagation of life campaign at global stage $\Rightarrow$ growing clout at international level.

Therefore, to achieve the climate ambitions and fulfilment of Paris commitments, Indian diplomacy has taken a leadership role to forge an inclusive, accommodative and reciprocal order.

10. Geoengineering proposes practical solutions to the problem of climate change. What is geoengineering and how can it help in fixing the issues of climate change? Substantiate with examples.
(Answer in 250 words) 15 words

Geoengineering is a modern solution, that encompasses technique to manage albedo of the earth's surface, induce artificial precipitation and methods to capture green house gases.

Role of Geoengineering to combat climate change

(A) Solar Radiation Management

→ cirrus cloud thinning technique to increase reflection capacity of high cirrus clouds ⇒ to increase albedo of earth's surface.

→ Aerosol injections of silver dioxide ⇒ acts as freezing

hygroscopic nuclei $\Rightarrow$ artificial precipitation.

Eg: china has employed this technique in its drought-prone regions.

$\rightarrow$ space Reflectors $\Rightarrow$ to reduce the incoming solar radiation.

$\rightarrow$ Use of Asphalt cement in urban areas
(B) Green House gas Reduction

$\rightarrow$ Afforestation $\Rightarrow$ more the no. of trees, greater the carbon capture and storage.

$\rightarrow$ Ocean Fertilisation - addition of certain elements to increase the carbon capturing capacity of oceans.

$\rightarrow$ carbon capture, utilisation and storage $\Rightarrow$ using aquifers to capture carbon, utilising it in.

various ways like production of biofuels etc and storing it underground.

Limitations of Geoengineering

- 1) Expensive $\Rightarrow$ technological and economic feasibility needs to be explored.
- 2) Unanticipated consequences on local climate, hydrology and ecosystem $\Rightarrow$ use of aerosol injections.
- 3) International collaboration due to giant scale of projects.
- 4) limited research and development.

Therefore, there is a need to evaluate the promising potential of geoengineering, at the same time, focus on rapid decarbonisation and shift towards clean energy.

Space for Rough Work

Candidates must not
write on this margin

Space for Rough Work

